

MARATHA VIDYA PRASARAK SAMAJ'S KPG ARTS, COMMERCE & SCIENCE COLLEGE, IGATPURI

Take Ghoti, Tal. Igatpuri, Dist. Nashik,
Maharashtra-422403 (MH)

AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY,
PUNE, MAHARASHTRA : ID. NO. PU/NS/ASC/023/1981

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Syllabus



Savitribai Phule Pune University

(Formerly University of Pune)

Faculty of Humanities
Board of Studies in Economics

New Syllabus for Affiliated Colleges of SPPU

FYBA Economics

[Semester I & II]

**Choice Based Credit System Syllabus
NEP 2020**

To be implemented from Academic Year 2024-25

INTRODUCTION:

B.A in (Economics) Program (Pattern 2023/CBCS/NEP2020) will be introduced in the following order:

- a) First Year BA from 2024-2025
 - b) Second Year BA from 2025-2026
 - c) Third Year BA from 2026-2027
 - d) Fourth Year BA from 2027-2028
- ✓ Examination (CIE & SEE) will be held for each semester. Continuous Internal Assessment will have 30% weightage and Semester End Assessment (University Exams) will carry 70% weightage. Internal Assessment tools used for previous Semester should be avoided for the next Semester.
 - ✓ It covers in-depth study of Economics as a major subject at graduation level with focus on the economic theory, different streams in the subject of Economics.

Programme Objectives:

The objectives of a Bachelor of Arts (B.A) programme in Economics offered as per the National Education Policy [2020] to provide complete knowledge of Economics to the students, to develop theoretical base of the subject with the help of classical and advanced theories, to skill them to apply the knowledge in policy making in different sectors at the national and international level.

- 1) To develop a strong foundation of advanced economic theory aligned with the graduation and honours program.
- 2) To help the students to gain the comprehensive understanding of policy making at various government levels such as, local, state, national and international.
- 3) To help the students in understanding the intricacies of policy making process from local to global level.
- 4) To build the foundations of Economics and its inter and multidisciplinary relationship with respect to pure and other social sciences.
- 4) To develop an understanding about the role of the national and international governments/institutions for building consensus about the policies that help in welfare.
- 5) To create awareness among the students about interrelations between economy and society, and develop a critical thinking on socio-economic conditions of various strata of the society.

Programme Specific Outcomes (PSOs):

- PSO - 1. Knowledge of Economic Theories:** Graduates of a B.A. in Economics will possess a strong understanding of economic theories, including microeconomics, macroeconomics and other specialized areas of economics.
- PSO - 2. Analytical Skills:** Graduates will be able to apply economic concepts and theories to analyse real-world economic issues, such as market behaviour, policy implications, and economic trends. They will also be able to critically evaluate economic research and data using statistical and econometric techniques.
- PSO - 3. Research and Writing Skills:** Graduates will have developed advanced research and writing skills, including the ability to conduct independent research, analyse economic data, and communicate their findings effectively through written reports, policy briefs, and other forms of economic writing.
- PSO - 4. Policy Analysis:** Graduates will be able to assess the impact of economic policies on various stakeholders and evaluate their effectiveness in achieving desired outcomes. They will also be able to propose evidence-based policy recommendations to address economic challenges and promote economic growth.
- PSO - 5. Quantitative Skills:** Graduates will develop a strong foundation in quantitative methods, including statistical and econometric techniques, and be able to apply these skills to analyse economic data and conduct empirical research.
- PSO - 6. Communication Skills:** Graduates will be able to communicate complex economic concepts and findings to different audiences, including policymakers, business leaders, and the general public, in a clear and concise manner.
- PSO - 7. Critical Thinking:** Graduates will develop critical thinking skills and be able to analyse economic problems from multiple perspectives, consider trade-offs, and propose innovative solutions based on economic principles and evidence.
- PSO - 8. Professional Ethics:** Graduates will understand and adhere to the professional ethics and standards of the economics, including academic integrity, objectivity, and confidentiality in research and policy analysis.
- PSO - 9. Professional Development:** **MA Economics programs** often include professional development components, such as internships or seminars, to prepare students for careers in economics.

Syllabus Designing Committee

FYBA - Economics, Semester – I & II

Sr. No.	Name of Professor	BoS Member / Member
1	Dr. Sunil P. Ugale	Chairman
2	Dr. Vilas B. Adhav	BoS Member
3	Dr. Amita Yadwadkar	BoS Member
4	Dr. Gorakshanath K. Sanap	BoS Member
5	Dr. Baban M. Sonawane	BoS Member
6	Dr. Nitin D. Ade	BoS Member
7	Dr. Madhav H. Shinde	BoS Member
8	Dr. Parmeshwar S. Gadkar	BoS Member
9	Dr. Somnath V. Patil	BoS Member
10	Dr. Jaywant R. Bhadane	BoS Member
11	Dr. Amol A. Gaikwad	BoS Member
12	Dr. Ramdas K. Gadge	BoS Member
13	Dr. Suresh Maind	BoS Member
14	Mr. Jignesh C. Furiya	BoS Member
15	Dr. Ajit Bhandakkar	BoS Member
16	Dr. Sawant Savita Govind	Member
17	Prof. Sham Laxman Satarle	Member
18	Dr. Palwe Ajaykumar Madhukar	Member
19	Dr. Surekha Appasaheb Gaikwad	Member
20	Dr. S. M. Waghmare	Member
21	Dr. Hanumant Popat Shinde	Member
22	Dr. Vishal Bhausaheb Pawase	Member
23	Dr. Pankaj Tryambak Nikam	Member
24	Prof. K. R. Padvi	Member
25	Prof. R.T. Tuplondhe	Member

Credit Distribution Structure for BA Economics SPPU- as per NEP 2020

With effect from Academic Year 2024-2025

Level/ Difficulty	Semester	Subject DSC-1 (Group A - Languages)	Subject DSC-2 (Group B)	Subject DSC-3 (Group C)	GE / OE	SEC	IKS	AEC	VEC	CC	Total
4.5/100	I	2 (T) + 2 (T/P)	2 (T) + 2 (T/P)	2 (T) + 2 (T/P)	2 (T)	2 (T/P)	2 (T)	2 (T)	2	--	22
[1 st Year]	II	2 (T) + 2 (T/P)	2 (T) + 2 (T/P)	2 (T) + 2 (T/P)	2 (T/P)	2 (T/P)	--	2 (T)	2	2	22

Exit option: Award of UG Certificate in Discipline Specific Course with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor

Continue option: Students will select one subject among (subject I, subject II and subject III) as major and another as minor and third subject will be dropped.

Level/ Difficulty	Semester	Credits Related to Major					Minor / RM	GE / OE	SEC	AEC	VEC	CC	Total
		Major Core	Major Elective	VSC	IKS	FP/OJT / CEP/R P							
Vertical [V]		V-1		V-4	V-5	V-6	V-2	V-3	V-4	V-5	V-5	V-6	
5.0/200 [2 nd Year]	III	[4T+2T/P]	-	[2T/P]	[2T]	[2FP]	[2T+2P]	[2T]	-	[2T]	-	2	22
	IV	[4T+2T/P]	-	[2T/P]	-	[2CEP]	[2T+2T/P]	[2T/P]	2 (T/P)	[2T]	-	2	22
UG Diploma		20	0	6	4	4	16	8	6	8	4	6	88
Exit Option – Award of UG Diploma in Major with 88 Credits and an additional 4 Credits core NSQF course/Internship or Continue Major & Minor													
5.5/300 [3 rd Year]	V	[8T+4T/P]	[2T+2T/P]	[2T/P]	-	[2FP/CE P]	[2T]	-	-	-	-	-	22
	VI	[8T+4T/P]	[2T+2T/P]	[2T/P]	-	[4OJT]	-	-	-	-	-	-	22
UG Degree		44	8	8	4	10	18	8	6	8	4	6	132
Exit Option – Award of UG Degree in Major with 132 Credits or Continue Major & Minor													
6.0/400 [4 th Year]	VII	[6T+4T/P]	[2T+2T/P]	-	-	[4RP]	[4RM][T]	-	-	-	-	-	22
	VIII	[6T+4T/P]	[2T+2T/P]	-	-	[8RP]	-	-	-	-	-	-	22
UG Honors with Research		68	16	8	4	22	22	8	6	8	4	6	176
Four year UG Honors with Research Degree in Major and Minor with 176 credits													

6.0/400 [4 th Year]	VII	[10T+4T/P]	[2T+2T/P]	-	-	-	4 [RM] [T]	-	-	-	-	-	22
	VIII	[10T+4T/P]	[2T+2T/P]	-	-	4[OJT]	-	-	-	-	-	-	22
UG Honors Degree		76	16	8	4	14	22	8	6	8	4	6	176
Four year UG Honors Degree in Major and Minor with 176 credits													

Notes:

1. VSC, FP/OJT/CEP should be related to the Major subject
2. OE is to be chosen compulsorily from faculty other than that of the Major.
3. SEC to be selected from the basket of Skill Courses approved by college.
4. Student has to choose three subjects from the same faculty in First Year and at the start of Second year he has to opt one subject as Major subject and one another subject as Minor subject and the last one subject will be dropped by the student. Therefore, the student after completion of three year will be awarded degree in Major and Minor subject.
5. Student cannot select a subject as major or minor other than the subjects taken in first year
6. Frame each course having even number of credits such as 2 or 4 credit.
7. This UG credit structure is applicable for all the programme across all faculties, except the programmes required approval from apex bodies like AICTE, PCI, BCI, COA, NCTE, etc.

Credit Distribution Structure and Subject Titles

FYBA Economics – Semester I & II

Level/ Difficulty	Semester	Subject DSC-1 (Group A - Languages)	Subject DSC-2 (Group B)	Subject DSC-3 (Group C)	GE / OE	SEC	IKS	AEC	VEC	CC	Total
4.5/100 [1 st Year]	I	-	2 (T) + 2 (P) 1. ECO 101 T Indian Economy-I [2T] 2. ECO 102 P Indian Economy-II [2P]	-	2 (T) OE-101-ECO Indian Economic Policy - I [For Other Faculty]	2 (T) SEC-101- ECO - Tourism Economics	2 (T) Introdu ction to Indian Knowl edge System s (Generi c)	2 (T) Devel oping Comm unicati ve Comp etence in Englis h -I	2 Indian Constitut ion	--	22
	II	-	2 (T) + 2 (P) 1. ECO 151 T Indian Economy-III [2T] 2. ECO 152 P Indian Economy-IV [2P]	--	2 (P) OE-151-ECO Indian Economic Policy - II [For Other Faculty]	2 (T) SEC-151- ECO - Agribusiness	--	2 (T) Devel oping Comm unicati ve Comp etence in Englis h -II	2 Indian Constitut ion	2 NSS/N CC/Oth ers	22
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor Continue option: Students will select one subject among (subject I, subject II and subject III) as major and another as minor and third subject will be dropped.											

- Abbreviations -**
1. ECO – Economics
 2. MJ – Major Subject
 3. MJP - Major Subject Practical
 4. T – Theory
 5. P – Practical
 6. VSC - Vocational Skill Course
 7. IKS – Indian Knowledge System
 8. FP – Field Project
 9. OJT – On Job Training
 10. CEP – Community Engagement and Service / Program
 11. MN – Minor Subject
 12. OE – Open Elective / GE – General Elective
 13. OEP – Open Elective Practical
 14. SEC - Skill Enhancement Course
 15. AEC – Ability Enhancement Course
 16. VEC – Value Education Course
 17. CC - Co-curricular Courses

Examination Pattern:

A] Total 4 Credits - Theory

Total Marks: 100

Scheme of Examination:

- a. Internal Assessment 30 Marks (Minimum Marks 12 for passing)
- b. Semester End Exam 70 Marks (Minimum Marks 28 for passing)
- c. The details of Question Paper Pattern for offline Examination should be mentioned here.

Time (3 Hours), 4 Credit Course, Marks (70)

Q.1 Answer the following questions in one and two sentence each (any 5 out of 8) 10 Marks

Q.2 Answer the following questions in about 100 words (any 2 out of 3) 20 Marks

Q.3 Answer the following questions in about 200 words (any 1 out of 2) 20 Marks

Q.4 Short Note (any 4 out of 6) 20 Marks

B] Total 2 Credits - Theory

Total Marks: 50 Marks

Scheme of Examination:

- a. Internal Assessment 15 Marks (Minimum Marks 6 for passing)
- b. Semester End Exam 35 Marks (Minimum Marks 14 for passing)
- c. The details of Question Paper Pattern for offline Examination should be mentioned here.

Time (2 Hours), 2 Credit Course, Marks (35)

Q.1 Answer the following questions in one and two sentence each (any 4 out of 6) 8 Marks

Q.2 Answer the following questions in about 100 words (any 2 out of 3) 12 Marks

Q.3 Answer the following questions in about 200 words (any 1 out of 2) 10 Marks

Q.4 Short Note (any 1 out of 2) 5 Marks

C] Total 2 Credits - Practical

Total Marks: 50 Marks

Scheme of Examination:

- a. Internal Assessment 15 Marks (Minimum Marks 6 for passing)
- b. Practical Assessment 35 Marks (Minimum Marks 14 for passing)

Suggested internal assessment tools for UG courses:

The concerned teacher shall announce the units for which internal assessment will take place. ***Teachers should choose any three tools out of given below for Internal Assessment among that written test is mandatory.***

- i. Library notes
- ii. Students Seminar
- iii. Short Quizzes / MCQ Test
- iv. Home Assignments
- v. Tutorials / Practical
- vi. Oral test
- vii. Research Project
- viii. Group Discussion
- ix. Open Book Test
- x. Study Tour
- xi. Written Test
- xii. PPT presentation
- xiii. Field Visit
- xiv. Industrial Visit
- xv. Viva Voce

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries
7. Research Papers & Projects
8. E-content
9. ICT tools

Revised Syllabus as per NEP 2020

FYBA - ECONOMICS **SEMESTER - I**

- Subject List -

Sr. No.	Subject Type	Subject Code & Title	Credits		
			Theory	Practical	Total
1	Discipline Specific Course	1. ECO 101 T Indian Economy - I	2	-	2
2	Discipline Specific Course	2. ECO 102 P Indian Economy - II	-	2	2
3	Open Elective	OE-101-ECO Indian Economic Policy - I	2	-	2
4	Skill Enhancement Course	SEC-101-ECO Tourism Economics	2	-	2

*** 1 Credit = 25 Marks, 1 Credit (Theory) = 15 Hours, 1 Credit (Practical) = 30 Hours**

Syllabus

Class: FYBA Economics

Semester: I

Course Type: Discipline Specific Course [DSC]

Course Name: Indian Economy - I

Course Code: ECO-101-T

No. of Credits: 2 Credits [Theory]

No. of Hours: 30 Hours

Total Marks: 50 Marks

Preamble:

The NEP-2020 has adopted holistic and multidisciplinary approach towards undergraduate education. It allows the students the flexibility to combine multidisciplinary subjects by integrating vocational courses. In view of this, the curriculum of Indian Economy has been prepared. It focuses on consistent growth and development of students which help them to understand Challenges faced by Indian Economy. From this point of view, the curriculum of this course aims at imparting the knowledge of Population and Economic development to the students.

Course Outcomes:

After Completing this Course:

1. The Students shall be able to understand nature of Developed and Developing Economies.
2. Learners will understand major issues regarding economic development of India.
3. Ability to compare and contrast Indian Economy with other world economies.
4. After completing the course, the students will be able to appear for various competitive examinations.
5. To familiarize the students with the recent developments in the Indian Economy

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Introduction to Indian Economy	15
	1.1 - Economy: Meaning and Classification	
	1.2 - Developed and Developing Economies	
	1.3 - Indicators of Developed Economy	
	1.4 - Characteristics of Indian Economy as Developing Economy	
	1.5 - Major issues of Economic Development in India	

2	2. Agriculture, Industry and Service Sector In India	15
	2.1 - Sectoral Structure of an Economy	
	2.2 - Contribution in Economic Development of India: Agriculture, Industry and Service Sector	
	2.3 - Sectoral Distribution of Gross Domestic Product (GDP) and Employment in India	
	2.4 - Interdependence between Agriculture, Industry and Service Sectors	

References –

1. Agrawal A.N., Indian Economy Problems of Development and Planning, New Age International Publishers, New Delhi.
2. Gaurav Datt & Ashwani Mahajan (2022): 'Indian Economy' S. Chand Publishing Company Ltd., New Delhi.
3. V.K. Puri, S.K. Misra, 'Indian Economy', Himalaya Publishing House, Mumbai. (Latest Edition)
4. Gopal and Suman Bhakri (2013) Indian Economy Performance and Policies. Pearson Publication Delhi.
5. Uma Kapila (2023), Indian Economy: Performance and Policies.
6. Ministry of Finance, Government of India, Economic Survey, 2020
7. Department of Economic Affairs (Government of India).

Website-

1. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=NEp/xikgBgNtfA+sgFQAcA==>
2. <https://www.ibef.org/economy>
3. <https://www.worldbank.org/en/country/india/overview>

Syllabus

Class: FYBA Economics

Semester: I

Course Type: Discipline Specific Course [DSC]

Course Name: Indian Economy - II

Course Code: ECO-102-P

No. of Credits: 2 Credits [Practical]

No. of Hours: 60 Hours

Total Marks: 50 Marks

Preamble:

The NEP-2020 aims at incorporating the skills regarding vocational higher education. In order to make the students ready for job opportunities, the NEP -2020 assists the students to acquire requisite practical oriented skills. In the competitive era the curriculum must compensate the recent advancements with its pros and cons. From this point of view, the curriculum of course on Indian Economy, aims at imparting the skill-oriented education based on service, industry and agriculture sectors in the economy.

Course outcome -

1. Students will be able to understand the various aspects of Population.
2. The students will be able to acquire the practical knowledge of Occupational Distribution in India
3. The students will understand the challenges before industry, agriculture and Service Sector in India.
4. To help the students to prepare for varied competitive examinations

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Population in India.	15
	1.1 – Demographic Profile of India 1.1.1 - Size and Growth 1.1.2 - Sex Composition 1.1.3 - Age Composition 1.1.4 - Density of Population 1.1.5 - Rural-Urban Distribution	
	1.2. – Occupational Distribution of Indian Population	
	1.3 – Population as a Human Capital for Economic Development	

PRACTICAL

Unit No.	Practical Contents	Hours
Conduct Any three Practical from Following		
1	1 - Study of Demographic Structure of a Village / Ward / District in respect of. 1.1 – Sex Composition 1.2 – Age Composition 1.3 – Density 1.4 – Literacy Rate 1.5 – Birth and Death Rate 1.6 – Infant Mortality Rate 1.7 – Life Expectancy 1.8 - Per-Capita Income	45

Sr. No.	Practical Exam Pattern	Marks
1.	Internal Assessment - Teachers should choose any three tools out of given above for Internal Assessment	15
2.	Practical Assessment a] Practical work Book – 15 Marks b] Viva Voce / Presentation (Problem Solving / PPT / Poster) – 20 Marks	35
	Total	50

Syllabus

Class: - First Year - For other faculty
(*Science & Technology, Commerce & Management and Inter-Disciplinary Studies*)

Semester: I

Course Type: Open Elective (OE)

Course Name: Indian Economic Policy - I

Course Code: OE-101-ECO

No. of Credits: 2 Credits [Theory]

No. of Hours: 30 Hours

Total Marks: 50 Marks

Course Outcomes:

After Learning this course, the students will be able to-

1. The Students shall be able to understand nature of Developed and Developing Economies.
2. Learners will understand major issues regarding economic development of India.
3. Ability to compare and contrast Indian Economy with other world economies.
4. After completing the course, the students will be able to appear for various competitive examinations.
5. To familiarize the students with the recent developments in the Indian Economy

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Introduction to Indian Economy	15
	1.1 – Economy: Meaning and Classification	
	1.2 - Developed and Developing Economies	
	1.3 - Indicators of Developed Economy	
	1.4 - Characteristics of Indian Economy as Developing Economy	
	1.5 - Major issues of Economic Development in India	
	1.6 – Monetary and Fiscal Policy in India	
2	2. Agriculture, Industry and Service Sector In India	15
	2.1 – Sectoral Structure of an Economy	
	2.2 – Contribution in Economic Development of India: Agriculture, Industry and Service Sector	

	2.3 – Sectoral Distribution of Gross Domestic Product (GDP) and Employment in India	
	2.4 – Interdependence between Agriculture, Industry and Service Sectors	
	2.5 – New Economic Policy	

References –

1. Agrawal A.N., Indian Economy Problems of Development & Planning, New Age International Publishers, New Delhi.
2. Gaurav Datt & Ashwani Mahajan (2022): 'Indian Economy' S. Chand Publishing Company Ltd., New Delhi.
3. V.K. Puri, S.K. Misra, 'Indian Economy', Himalaya Publishing House, Mumbai. (Latest Edition)
4. Gopal and Suman Bhakri (2013) Indian Economy Performance and Policies. Pearson Publication Delhi.
5. Uma Kapila (2023), Indian Economy: Performance and Policies.
6. Ministry of Finance, Government of India, Economic Survey, 2020
7. Department of Economic Affairs (Government of India).

Website-

1. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=NEp/xikgBgNtfA+sgFQAcaA==>
2. <https://www.ibef.org/economy>
3. <https://www.worldbank.org/en/country/india/overview>

Syllabus

Class: FYBA Economics

Semester: I

Course Type: Skill Enhancement Course (SEC)

Course Name: Tourism Economics

Course Code: SEC-101-ECO

No. of Credits: 2 Credits [Theory]

No. of Hours: 30 Hours

Total Marks: 50 Marks

Course Outcomes:

After Learning this course, the students will be able to-

- 1) To understand the Role of Tourism in Economic Development
- 2) To understand Various Types of Tourism.
- 3) To understand Various Factors Affecting Tourism Economy.
- 4) To evaluate Socio-Economic Benefits of Tourism.
- 5) To analyse the Trends and Opportunities in Tourism.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. 1. Introduction to Tourism Economics	15
	1.1 - Tourism – Meaning, Types and Scope	
	1.2 - Tourism and Economic Growth	
	1.3 - Role of Tourism in Economic Development and Local Development	
	1.4 - Factors Affecting Tourism – Global to Local	
	1.5 - Socio-Economic Benefits of Tourism	
2	2. Tourism in India	15
	2.1 - Tourism in India: Nature and Growth	
	2.2 - Tourism and Opportunities in Rural Development	
	2.3 - Tourism and Local Development in India	
	2.4 - Government Policies for Tourism in India	
	2.5 - Government Institutes for Tourism – ITDC and MTDC – Functions and Packages.	

References –

1. Bhatia A. K, (1991), “*International Tourism; Fundamentals and Practices*”. Sterling Publishers Pvt. Ltd. New Delhi.
2. Bhatia A. K, (2012), “*Tourism Development: Principles and Practices*”, Sterling Publishers Pvt. Ltd. New Delhi.
3. Choudhari M. “*Tourism marketing*”, Oxford Higher Education, New Delhi.
4. Jack Randall, (2012), “*Agriculture Tourism*”, Discovery Publishing Pvt. Ltd.
5. Parkar Priya Rajesh, (2021), “*Agritourism: Guide for Beginners*”, Walnut Publication, India
6. “*Agro Tourism- Atithidevo Bhava*”, Agri Tourism Development Corporation
7. Mukhopadhyay Shipra, (2010), “*Tourism Economics*”, Ane Books India.
8. Annual Report, Ministry of Tourism, Government of India.
9. हडवळे मनोज, (2018), “कृषी पर्यटन- एक शेतीपुरक व्यवसाय”, सकाळ मिडिया प्रा. लि., पुणे

Website-

1. <https://agrotourismvishwa.in/government-of-maharashtra-approves-agri-tourism-policy2020/>
2. <https://agrotourismvishwa.in/interview-of-about-agri-tourism/>
3. <https://www.msdlulap.com/maharashtra-agro-tourism-online-registration/>
4. https://tourism.gov.in/sites/default/files/2024-08/MOT%20Annual%20Report_2023-24_English%20Final.pdf
5. <https://itdc.co.in/>
6. <https://www.mtdc.co/en/>

Revised Syllabus as per NEP 2020

FYBA - ECONOMICS SEMESTER - II

- Subject List -

Sr. No.	Subject Type	Subject Code & Title	Credits		
			Theory	Practical	Total
1	Discipline Specific Course	1. ECO-151-T Indian Economy - III	2	-	2
2	Discipline Specific Course	2. ECO-152-P Indian Economy - IV	-	2	2
3	Open Elective	OE-151-ECO Indian Economic Policy-II	-	2	2
4	Skill Enhancement Course	SEC-151-ECO Agribusiness	2	-	2

* 1 Credit = 25 Marks, 1 Credit (Theory) = 15 Hours, 1 Credit (Practical) = 30 Hours

Syllabus

Class: FYBA Economics

Semester: II

Course Type: Discipline Specific Course [DSC]

Course Name: Indian Economy - III

Course Code: ECO-151-T

No. of Credits: 2 Credits [Theory]

No. of Hours: 30 Hours

Total Marks: 50 Marks

Preamble:

The NEP-2020 has adopted holistic and multidisciplinary approach towards undergraduate education. It allows the students the flexibility to combine multidisciplinary subjects by integrating vocational courses. In view of this, the curriculum of Indian Economy has been prepared. It focuses on consistent growth and development of students which help them to understand Challenges faced by Indian Economy. From this point of view, the curriculum of this course aims at imparting the knowledge of Population and Economic development to the students.

Course Outcomes:

After Completing this Course:

1. The Students shall be able to understand nature of Developed and Developing Economies.
2. Learners will understand major issues regarding economic development of India.
3. Students will be able to understand the various aspects of Population.
4. Students will understand the relationship between economic development and occupational distribution.
5. After completing the course, the students will be able to appear for various competitive examinations.
6. Finally, the students will be able to develop analytical and entrepreneurship skills after completing the course.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Planning in India	15
	1.1 – Planning: Meaning, Concept, Need and Objectives.	
	1.2 - Objectives, Achievements and Failures of 12 th Five Year Plan	

	1.3 – NITI Aayog- Objectives and Structure	
	1.4 - Role of NITI Aayog	
	1.5 - Difference between Planning Commission and NITI Aayog	
2	2. Economy of Maharashtra	15
	1.1 – Salient Features of Economy of Maharashtra.	
	1.2 – Co-operative Movement – Progress, Problems & Prospectus.	
	1.3 – Role of Co-operative in Economic Development of Maharashtra.	
	1.4 – Regional Imbalance Causes & Preventive Measures.	
	1.5 – Unemployment - Types and Causes	
	1.6 – Water Management concept and utility	

References –

1. Agrawal A.N., Indian Economy Problems of Development and Planning, New Age International Publishers, New Delhi.
2. Gaurav Datt & Ashwani Mahajan (2022): 'Indian Economy' S. Chand Publishing Company Ltd., New Delhi.
3. V.K. Puri, S.K. Misra, 'Indian Economy', Himalaya Publishing House, Mumbai. (Latest Edition)
4. Gopal and Suman Bhakri (2013) Indian Economy Performance and Policies. Pearson Publication Delhi.
5. Uma Kapila (2023), Indian Economy: Performance and Policies.
6. Ministry of Finance, Government of India, Economic Survey, 2020
7. Department of Economic Affairs (Government of India).

Website-

1. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=NEp/xikgBgNtfA+sgFQAcA==>
2. <https://www.ibef.org/economy>
3. <https://www.worldbank.org/en/country/india/overview>
4. <https://www.niti.gov.in/>

Syllabus

Class: FYBA Economics

Semester: II

Course Type: Discipline Specific Course [DSC]

Course Name: Indian Economy - IV

Course Code: ECO-152-P

No. of Credits: 2 Credits [Practical]

No. of Hours: 60 Hours

Total Marks: 50 Marks

Preamble:

The NEP-2020 aims at incorporating the skills regarding vocational higher education. In order to make the students ready for job opportunities, the NEP -2020 assists the students to acquire requisite practical oriented skills. In the competitive era the curriculum must compensate the recent advancements with its pros and cons. From this point of view, the curriculum of course on Indian Economy, aims at imparting the skill-oriented education based on service, industry and agriculture sectors in the economy.

Course outcome -

1. The student will be able develop entrepreneurship skills.
2. The students will be able to acquire the practical knowledge of Occupational Distribution in India
3. The students will understand the challenges before industry, agriculture and Service Sector in India.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Poverty, Inequality and Unemployment	15
	1.1 – Meaning and Types of Poverty	
	1.2 - Poverty line : Need of Redefining	
	1.3 – Causes of Poverty in India	
	1.4 – Measures to Eradicate Poverty in India	
	1.5 – Unemployment - Types and Causes	
	1.6 – Measures to Reduce of Unemployment	

PRACTICAL

Unit No.	Practical Contents	Hours
Conduct Any three Practical from Following		
1	1. Study of Poverty, Inequality and Unemployment in Village / Ward in respect of. 1.1 – Status of Poverty 1.2 - Status of Poverty line 1.3 - Sectoral Distribution of Employment 1.4 - Measures to Eradicate Poverty 1.5 – Status of Unemployment 1.6 – Status of Wages ; Women and Men Wages 1.7 – Status of Child and Women Development Scheme 1.8 – Status of Government schemes for Education 1.9 – Status of Finance, education and health institutions	45

Sr. No.	Practical Exam Pattern	Marks
1.	Internal Assessment - Teachers should choose any three tools out of given above for Internal Assessment	15
2.	Practical Assessment a] Practical work Book – 15 Marks b] Viva Voce / Presentation (Problem Solving / PPT / Poster) – 20 Marks	35
	Total	50

Syllabus

Class: - First Year - For other faculty
(*Science & Technology, Commerce & Management and Inter-Disciplinary Studies*)

Semester: II

Course Type: Open Elective (OE)

Course Name: Indian Economic Policy - II

Course Code: OE-151-ECO

No. of Credits: 2 Credits [Practical]

No. of Hours: 60 Hours

Total Marks: 50 Marks

Course Outcomes:

After Learning this course, the students will be able to-

1. - Understand the Concept of Developed and Developing Economies and Status of Indian Economy.
2. - Discuss and debate the various aspects of Indian Economy.
3. - Understand Population Structure of India.
4. - Evaluate the performance of Indian Economy.
5. - Interpret various issues of Indian Economy.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Population in India	15
	1.1 – Demographic Profile of India 1.1.1 Size and Growth 1.1.2 Sex Composition 1.1.3 Age Composition 1.1.4 Density of Population 1.1.5 Rural-Urban Distribution	
	1.2. – Occupational Distribution of Indian Population	
	1.3 – Population as a Human Capital for Economic Development	

	1.4 – Population Control Policy in India	
	1.5 - Poverty 1.5.1 - Meaning and Types of Poverty 1.5.2 - Poverty line : Need of Redefining 1.5.3 - Causes of Poverty in India 1.5.4 - Measures to Eradicate Poverty in India	

PRACTICAL

Unit No.	Practical Contents	Hours
Conduct Any three Practical from Following		
1	1 - Study of Demographic Structure of a Village / Ward in respect of. 1.1 - Sex Composition 1.2 - Age Composition 1.3 - Density 1.4 - Literacy Rate 1.5 - Birth and Death Rate 1.6 - Infant Mortality Rate 1.7 - Life Expectancy 1.8 - Per-Capita Income 1.9 – Status of Poverty 1.10 - Status of Poverty line	45

Sr. No.	Practical Exam Pattern	Marks
1.	Internal Assessment - Teachers should choose any three tools out of given above for Internal Assessment	15
2.	Practical Assessment a] Practical work Book – 15 Marks b] Viva Voce / Presentation (Problem Solving / PPT / Poster) – 20 Marks	35
	Total	50

Syllabus

Class: FYBA Economics

Semester: II

Course Type: Skill Enhancement Course (SEC)

Course Name: Agribusiness

Course Code: SEC-151-ECO

No. of Credits: 2 Credits [Theory]

No. of Hours: 30 Hours

Total Marks: 50 Marks

Course Outcomes:

After Learning this course, the students will be able to-

- 1) To understand the Nature of Agriculture Marketing in India
- 2) To Understand Agriculture Price Policy in India
- 3) To Know Digital Platforms for Agriculture Marketing in India.
- 4) To Analyse the Role of Agro-Processing Businesses in India

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Agriculture Marketing in India	16
	1.1 - Agriculture Marketing - Meaning and Concept	
	1.2 - Nature of Agriculture Marketing in India	
	1.3 - APMCs, Government Procurement and Export Trading	
	1.4 - Digital Platforms for Agriculture Marketing	
	1.5 Problems of Agriculture Marketing in India	
	1.6 - Agriculture Export Promotion Policies in India	
2	2. Agro-Processing Business	14
	2.1 - Introduction of Agro-Processing Business	
	2.2 - Size and Growth of Agro-Processing Industry in India	
	2.3 - Government Policies to Promote Agro-Processing Business – Farmer Producer Organizations (FPO)	
	2.4 - Success Stories in Agro-Processing Business	

References –

1. S. Reddy, P Raghuram, T.V. Neelkanth Sastry, I. Bhavani Devi, (2021), “*Agriculture Economics*”, CBS Publishers and Distributors.
2. S.S. Acharya & N. L. Agarwal, (2021), “*Agriculture Marketing in India*”, CBS Publishers and Distributors.
3. Shoji Lal Bairwa, Lokesh Kumar Meena, Meera Kumari, (2018), “*Agribusiness Management: Theory and Practice*”, Write and Print Publications.
4. V.T. Raju (2017), “*Economics of Farm Production and Management*”, Oxford & IBH Publishing Pvt. Ltd.
5. Gaurav Datt & Ashwani Mahajan, (2020), “*Indian Economy*”, S. Chand Publications.

Website-

1. <https://naarm.org.in/books/>
2. <https://cacp.da.gov.in/ViewContents.aspx?Input=1&PageId=36&KeyId=0>
3. <https://agmarknet.gov.in/>
4. <https://www.msamb.com/Export/Export>



SAVITRIBAI PHULE PUNE UNIVERSITY
(Formerly University of Pune)

S.Y.B.A. Economics Syllabus

(Choice Based Credit System and Semester System)

**Revised Syllabus will be implemented with effect from the
academic year 2020-2021**

Paper	Semester	Title of the Paper
G -2	III & IV	Financial System
S -1	III & IV	Micro Economics
S -2	III & IV	Macro Economics

SAVITRIBAI PHULE PUNE UNIVERSITY,PUNE
Choice Based Credit System (CBCS) Course Structure

Faculty of Humanities

B.A. Second Year Syllabus

Semester Pattern Effective from 2020-21
Subject: **Economics**

Semester	Core Course	Paper No	Name of Paper	Lectures / week	Total No. of Lectures	CA Marks	ESE Marks	Total	Credits
Semester III	Economics DSE – 1A	S1	Micro Economics - I	4	55	30	70	100	3
	Economics DSE – 2A	S2	Macro Economics- I	4	55	30	70	100	3
	Economics CC-1C	G2	Financial System - I	4	55	30	70	100	3
	SEC-I SEC -2A		Basic Concept of Research Methodology - I	3	45	15	35	50	2
	Total			15	210	105	245	350	11
Semester IV	Economics DSE – 1B	S1	Micro Economics- II	4	55	30	70	100	3
	Economics DSE – 2B	S2	Macro Economics- II	4	55	30	70	100	3
	Economics CC -1D	G2	Financial System- II	4	55	30	70	100	3
	SEC-II SEC -2B		Basic Concept of Research Methodology - II	3	45	15	35	50	2
	Total			15	210	105	245	350	11
Grand Total (Sem. III & IV)				30	420	210	490	700	22

SEC = Skill Enhancement Course
CC - Core Course
CA - Continuous Assessment
ESE -End Of Semester Examination

S.Y.B.A. Economics (Revised Syllabus)

Choice Based Credit System (CBCS)

G -2. Financial System

Preamble:

A financial system is a network of financial institutions, financial markets, financial instruments and financial services to facilitate the transfer of funds. It serves as a backbone of any economy. This paper aims to provide knowledge about the financial system in the country. It also aims to introduce international financial institutions operating in the global economy. The present era is the one with huge changes, development and challenges in every sector. This paper on financial system will also highlight some of the important changes taking place in the Indian financial sector.

Objectives (Course Outcomes) of the Paper:

- To understand fundamentals of modern financial system.
- To understand the recent trends and developments in banking system.
- To understand the role of the Reserve Bank of India in Indian financial system.
- To provide the knowledge of various financial and non-financial institutions.
- To provide the students the intricacies of Indian financial system for better financial decision making.

Method of Teaching:

Classroom lectures, Use of ICT, YouTube lectures, Online PPTs, Group Discussions, Teacher driven Power Point Presentations

Semester III
CC-1C - Financial System I

Unit	Name and Contents	Number of Lectures
1	Indian Financial System	12
1.1	Introduction: Meaning, Nature, Role and Importance of Indian Financial System.	
1.2	Structure of Indian Financial System.	
1.3	Characteristics and Functions of Components of Indian Financial System.	
2	Banking in India	10
2.1	Commercial Banks (Public Sector Banks, Private Sector Banks, Foreign Banks): Management, Organization and Functions.	
2.2	Regional Rural Banks and Co-operative Banks: Evolution, Management and Organization, Loan Management, Functions, Problems and Measures to solve the problem.	
3	Financial Markets in India	12
3.1	Classification of Financial Market.	
3.2	Indian Money Market: Features, Functions and Instruments.	
3.3	Indian Capital Market: Features, Functions and Instruments.	
3.4	Foreign Exchange Market: Role and Importance.	
4	Important Financial Institutions	14
4.1	Meaning and Importance of Financial Institutions.	
4.2	Stock Markets: NSE and BSE: Meaning & Functions.	
4.3	Non-Banking Financial Intermediaries: Meaning and Functions.	
4.4	Role and Functions of Financial Institutions in India with reference to UTI, LIC, GIC	

Semester IV
CC -1D - Financial System II

Unit	Name and Contents	Number of Lectures
1	Reserve Bank of India	12
1.1	Structure and Role of RBI in Indian Economy	
1.2	Major Functions of RBI.	
1.3	Monetary Policy: Tools and their Limitations.	
2	Other Financial Regulators in India	10
2.1	SEBI: Role and Functions.	
2.2	IRDA: Role and Functions.	
3	International Financial Institution	14
3.1	Role, Structure, Objectives and Functions of IMF.	
3.2	Role, Structure, Objectives and Functions of World Bank.	
3.3	Role, Structure, Objectives and Functions of Asian Development Bank.	
3.4	Role, Structure, Objectives and Functions of BRICS Bank.	
4	Recent Developments in Indian Financial Sector	12
4.1	Objectives and Outcomes of Changing Landscape of Banking Sector in India.	
4.2	Insolvency and Bankruptcy Code.	
4.3	Alternate Source of Finance.	
4.4	Risk Management in Banking Sector.	

Basic Reading List:

1. The Indian Financial System, Markets, Institutions and Services, Bharati V.Pathak, Kindle Edition.
2. Indian Financial System, Jaydeb Sarkhel, Seikh Salim, McGraw-Hill India Pvt. Ltd. Chennai, 2018.
3. Indian Banking, R. Parmehwaram & S. Natrajan , S. Chand Publishing, Delhi.

4. Non-Banking Financial Companies in India: Functioning & Reforms, Jafor Ali Akhan, New Century Publications, 2010
5. Indian Financial Markets, Ajay Shah, Michael Gorham and Susan Thomas, Elsevier, 2008.
6. The Story of the Reserve Bank of India, Rahul Bajoria, Kindle Editon.

Advanced Reading List:

1. Securities Market and Products: Mr. Sunder Sankaran, Taxman Publication Pvt. Ltd New Delhi.
2. Financial System & Economic Reforms: P. Mohan Rao, Deep & Deep Publication Pvt. Ltd. New Delhi 2008.
3. Indian Banking Towards 21st Century : Chawla A.S. & others, Deep & Deep Publications, New Delhi.
4. Black Money & Indian Economy: Bhadane J R, International Publications, 2018.
5. Financial Institutions And Markets: Jitendra Mahakund and L.M. Bhole, McGraw Hill India, 2017.

S.Y.B.A. Economics (Revised Syllabus)

Choice Based Credit System (CBCS)

S -1. Micro Economics

Preamble

As a foundation course, in this Paper, student is expected to understand the definition, nature and scope of economics, method and approaches to the study of Economics. The chapters incorporated in this Paper deal with the theory of consumer's behavior, theory of demand and supply, analysis of production function, cost and revenue analysis, market structures and the equilibrium of a firm and industry. In addition, the principles of factor pricing and commodity pricing and welfare economics have been included.

Objectives of the Paper:

- To develop an understanding about subject matter of Economics.
- To impart knowledge of microeconomics.
- To clarify micro economic concepts
- To analyze and interpret charts, graphs and figures
- To develop an understanding of basic theories of micro economics and their application.
- To demonstrate that the theories discussed in class will usually be applied to real-life situations.
- To help the students to prepare for varied competitive examinations

Method of Teaching:

Classroom lectures, Use of ICT, YouTube lectures, Online PPTs, Group Discussions, Teacher driven Power Point Presentations

	Semester III DSE – 1A - Micro Economics I	
Unit	Name and Contents	Number of Lectures
Unit 1	Introduction	10
1.1	Meaning, Nature, Scope, Importance of Micro economics	
1.2	Basic Economic Problems	
1.3	Tools of economic analysis- Functional Relationship, Schedules, Graphs and Equations.	
1.4	Variables- Dependent and Independent Variable, Endogenous and Exogenous	
Unit 2	Theory of Consumer Behavior	14
2.1	Utility – Meaning and Types Cardinal Approach: Law of Diminishing Marginal Utility, Law of Equi-Marginal Utility, Consumer’s Equilibrium	
2.2	Ordinal Approach: Indifference Curve Analysis- Meaning and Definition, Characteristics of Indifference Curve, Consumer’s Equilibrium	
Unit 3	Theory of Demand	12
3.1	Meaning of Demand, Determinants of Demand	
3.2	The Law of Demand & Its Exceptions, Market Demand	
3.3	Elasticity of Demand –Meaning and Types 3.3.1 Price Elasticity of Demand: Meaning, Types, Methods of Measurement 3.3.2 Income Elasticity of Demand: Meaning and Types 3.3.3 Cross Elasticity of Demand: Meaning and Types	
Unit 4	Supply and Production Analysis	
4.1	Meaning, Definition and Determinants of Supply	12
4.2	The Law of Supply	
4.3	Elasticity of Supply: Meaning and Types	
4.4	The Production Function: Meaning and Definition	
4.5	Total, Average and Marginal Production	

4.6	The Law of Variable Proportions	
4.7	The Law of Returns to Scale	
Semester IV DSE – 1B - Micro Economics II		
Unit 1	Cost and Revenue Analysis	8
1.1	Cost Concepts : Fixed Costs, Variable Costs, Total Cost, Average Cost, Marginal Cost, Economic Cost and Accounting Cost, Opportunity Cost	
1.2	Short-Run and Long Run Costs curves	
1.3	Revenue Concept: Total Revenue, Average Revenue & Marginal Revenue	
Unit 2	Market Structure	16
2.1	Meaning & Classifications of Market Structure	
2.2	Perfect Competition: Meaning, Characteristics, Equilibrium of Firm and Industry in Short Run and Long Run	
2.3	Monopoly: Meaning, Characteristics, Short and Long Run Equilibrium. Price Discrimination	
2.4	Monopolistic Competition: Meaning, Characteristics, Short & Long Run Equilibrium of firm and Industry, Selling cost- Meaning	
2.5	Oligopoly: Meaning and Characteristics	
2.6	Duopoly: Meaning and Characteristics	
Unit 3	Factor Pricing	16
3.1	Marginal Productivity Theory Of Distribution	
3.2	Rent: Ricardian Theory of Rent, Modern Theory of Rent, Quasi Rent	
3.3	Wages: Modern Theory of Wages, Supply Curve of Labour	
3.4	Interest: Keynesian Liquidity Preference Theory, Loanable Fund Theory	
3.5	Profit: Risk and Uncertainty Theory, Innovation Theory	
Unit 4	Introduction to Welfare Economics	08
4.1	Welfare Economics: Definition and Meaning	
4.2	Pigovian Welfare Economics	
4.3	Thought of Amartya Sen on Welfare Economics	

Reference Books:

1. Mansfield, E., Microeconomics, W.W. Norton and Company, New York.
2. Koutsoyiannis, A., Modern microeconomics, Macmillan, London.
3. Lipsey & Cristal, Introduction to Positive Economics, Oxford Press.
4. Jack Hirshlifer, Price Theory and Applications, Prentice Hall of India Pvt. Ltd. Delhi
5. Ahuja H.L. : Modern Micro Economics, S. Chand & Company Ltd New Delhi
6. Jhingan M.L., Micro Economic Theory, Virinda Publication, Delhi.
7. K.K. Dewett, Modern Economics Theory, S. Chand Publications, New Delhi.
8. KPM Sundaram and E.N.Sundaram, Micro Economics, S.Chand Publication, New Delhi.
9. Seth M.L. : Micro Economics, Lakshmi NarainAgrawal Publisher

S.Y.B.A. Economics (Revised Syllabus)

Choice Based Credit System (CBCS)

S -2. Macro Economics

Preamble -

Macroeconomics is the branch of economics that deals with the functioning of an economy as a whole. Macroeconomic analysis involves theoretical, empirical as well as policy-related aspects. The theoretical aspect of macroeconomics involves the conceptual as well as theoretical framework of macroeconomics. It deals with various macroeconomic concepts as well as various macroeconomic theories. The theoretical framework of macroeconomics focuses on functioning of an economy in its totality, determination of the level of national income and employment in an economy, role of aggregate demand as well as aggregate supply, role of money, determination of value of money, determination of general price level as well as rate of inflation and business cycles. The empirical aspect of macroeconomics applies macroeconomic theories to the study of real economies and tests the validity of macroeconomic theories. The policy-related aspect focuses on the role of fiscal and monetary policy in achieving macroeconomic objectives with the help of various policy instruments.

This curriculum integrates conceptual, theoretical, empirical and policy-related aspects of macroeconomics. This curriculum introduces the undergraduate students to the field of macroeconomics and enables them to learn the functioning of the economy in a systematic manner.

Objectives –

- To introduce students to the historical background of the emergence of macroeconomics
- To familiarize students with the differences between microeconomics and macroeconomics
- To familiarize students with various concepts of national income
- To familiarize students with keynesian macroeconomic theoretical framework of consumption and investment functions
- To introduce students to the role of money in an economy.
- To introduce students to the conceptual and theoretical frameworks of inflation, deflation and stagflation, Business Cycle .

- To familiarize students with the conceptual and theoretical framework of business cycles
- To introduce students to the role of monetary and fiscal policies in fulfilling the macroeconomic objectives of stability, full employment and growth.
- To introduce students to the various instruments of monetary and fiscal policies

Method of Teaching:

- Classroom lectures, Use of ICT, You Tube lectures, Online PPTs, Group Discussions, Teacher driven Power Point Presentations

Semester III DSE – 2A - Macro Economics I		
Unit	Name and Contents of the Chapter	Number of Lectures
Unit 1	Introduction	12
1.1	Meaning, Nature and Scope of Macro Economics	
1.2	Importance and Limitations of Macro Economics	
1.3	The difference between Micro Economics and Macro Economics	
Unit 2	National Income	12
2.1	Meaning and Importance of National Income	
2.2	Various Concepts of National Income – GDP, GNP, NNP, PCI, Personal Income, Disposable Income	
2.3	Methods of National Income Measurement Difficulties in the Measurement of National Income	
2.4	Circular Flow of National Income	
Unit 3	Theory of Employment and Output	12
3.1	Classical Theory of Employment , Say’s Law of Market.	
3.2	Keynes’ Criticism on Classical Theory	
3.3	Keynesian Theory of Employment – Aggregate Supply Price and	

	Aggregate Demand Price, Employment Determination	
Unit 4	Consumption and Investment	12
4.1	Consumption Function – Meaning, Various Concepts - APC, MPC, Psychological Law of Consumption, Factors Influencing Consumption Function	
4.2	Saving - APS, MPS. Investment – Meaning, Types, Marginal Efficiency of Capital	
4.3	The Concept of Multiplier; The Principle of Acceleration	
Semester IV DSE – 2B - Macro Economics II		
Unit 1	Money	12
1.1	Money – Meaning and Functions	
1.2	Value of Money – Meaning, Quantity Theory of Money, Cash Balance Approach	
1.3	Supply of Money – Various Measures of RBI	
Unit 2	Inflation	12
2.1	Inflation – Meaning, Types, Causes – Demand Pull and Cost Push Inflation, Effects	
2.2	Measures to Control Inflation	
2.3	Deflation – Meaning, Causes and Effects	
2.4	Philips Curve, Stagflation – Meaning	
Unit 3	Business Cycles	12
3.1	Meaning, Features and Phases of Business Cycle	
3.2	Causes and Effects of Business Cycle	
3.3	Keynes’ Theory of Business Cycle	
3.4	Control of Business Cycles – Monetary and Fiscal Controls	

Unit 4	Macroeconomic Policies	12
4.1	Objectives of Macroeconomic Policies	
4.2	Monetary Policy - Meaning, Instruments, Advantages and Limitations	
4.3	Fiscal Policy - Meaning, Instruments, Advantages and Limitations	

Basic Reading List –

1. David Colander, Macro Economics, McGraw Hill Education Private Limited (Latest Edition)
2. D. N. Dwivedi, Macro Economics: Theory and Policy, McGraw Hill Education Private Limited (Latest Edition)
3. H. L. Ahuja, Macro Economics: Theory and Policy, S. Chand & Company Limited. (Latest Edition)
4. M. L. Jhingan, Macro Economic Theory, Vrinda Publications Private Limited (Latest Edition)
5. Wavare Anil Kumar & V.Kumbhar ,(2019)Macro Economics,Ruby Publisher, Kolhapur, MS, India.
6. N. Gregory Mankiw, Principles of Macroeconomics, Cengage Learning (Latest Edition)
7. Olivier Blanchard & David Johnson, Macroeconomics, Pearson (Latest Edition)
8. Rudiger Dornbusch, Stanley Fischer & Richard Startz, Macroeconomics, Tata McGraw Hill Education Private Limited (Latest Edition)
9. Sampat Mukherjee, Macroeconomics: A Global Text, New Central Book Agency Private Limited (Latest Edition)
10. Stephen Williamson, Macroeconomics, Pearson (Latest Edition)
11. Kute Santosh & Rithe M. , Macro Economics, Prashant Publication,Jalgaon,MS,India
12. श्रीधर देशपांडे आणि विनायक देशपांडे, समष्टी अर्थशास्त्रीय विश्लेषण, हिमालय पब्लिशिंग हाउस(Latest Edition)

Advanced Reading List

1. Ben Fine & Ourania Dimakou, Macroeconomics: A Critical Companion, Pluto Press (Latest Edition)
2. Brian Snowdon & Howard Vane (2003), The Development of Modern Macroeconomics: A Rough Guide, in Macroeconomics: A Reader, (Ed.) Brian Snowdon and Howard Vane, Routledge

3. Brian Snowdon & Howard Vane, *Macroeconomics: A Reader*, Routledge (Latest Edition)
4. Brian Snowdon & Howard Vane, *Modern Macroeconomics: Its Origins, Developments and Current State*, Edward Elgar (Latest Edition)
4. David Romer, *Advanced Macroeconomics*, McGraw-Hill (Latest Edition)
5. Dilip Nachane, *Critique of the New Consensus Macroeconomics and Implications for India*, Springer (Latest Edition)
6. John McDonald, *Rethinking Macroeconomics: An Introduction*, Routledge (Latest Edition)
7. Michel De Vroey, *A History of Macroeconomics: From Keynes to Lucas and Beyond*, Cambridge University Press (Latest Edition)
8. N. Gregory Mankiw, *Macroeconomics*, Worth Publishers (Latest Edition)
9. Roger Backhouse, *Interpreting Macroeconomics: Explorations in the History of Macroeconomic Thought*, Routledge (Latest Edition)
10. Sampat Mukherjee, *Analytical Macroeconomics: From Keynes to Mankiw*, New Central Book Agency Private Limited

SKILL DEVELOPMENT ACTIVITIES

(Any Three of the following)

(IMPORTANT NOTES - At the end of the course three point/ activities each should be selected for each semester (III & IV semester) from the different points given in the appendix.

The important questions and issue in your area should be considered and the issue / activities related to the subject should be given to the student accordingly . Such as Agriculture Sector ,farmers ,Cooperative Sector ,Small Scale Industries etc.)

1. Prepare a chart showing the steps of research.
2. Prepare a chart showing the sampling technique
3. Prepare Charts showing sources of primary data.
4. Prepare a chart showing sources of secondary data.
5. Construct a questionnaire to measure student's attitude towards the purchase of two wheelers / readymade garments etc.
6. Collect the data related to any schemes of your locality and present in front of the students.
7. Construct a questionnaire for collection of primary data on any Social issue.

Savitribai Phule Pune University
Skill Enhancement Course (SEC):
SYBA (Economics)
Basic Concept of Research Methodology

Credits: 02

Periods: 45

Marks: 50

	Course outline: The course will be given in the form of lectures and practical work .Lectures will focus on research, especially with regard to sampling methods, data collection and data preparation. The course will focus on the practical implementation of diverse sample techniques. Students are expected to collect and classify the data. Aims and objectives of course: • To develop the understanding of the basic concept of research. • To develop the understanding of the basic framework of sampling and data collection.. • To develop the understanding of various sampling methods and techniques. • To identify various sources of information for data collection. • To develop the understanding of the conducting survey on various issues. Learning outcomes of course : On completion of the course, the student shall be able to • Demonstrate his/her understanding of sampling methods and the ability to use collection of data • Identify the appropriate sample techniques for different kinds of research questions • Identify the appropriate source of data in relation to the collection of research data. • Able to classify and present the collected data in the form of graph, bar diagram, chart etc	
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Semester III
Skill Enhancement Course (SEC): I

SYBA (Economics) - SEC -2A
Basic Concept of Research Methodology

Unit	Name and Contents	Number of Lectures
Unit 1	Introduction Of Research	10
1.1	Meaning and Definition of Research	
1.2	Types Of Research i)Basic or Pure or Fundamental Research ii)Applied Research iii)Action Research	
1.3	Importance Of Economics Research	
Unit 2	Research Design	10
2.1	Meaning of Research Design	
2.2	Need of Research Design	
2.3	Types of Research Design i)Exploratory Design ii)Descriptive Design iii)Experimental Design	
2.4	Concepts of Hypothesis and Importance	
Unit 3	Data Collection	10
3.1	Meanings and Definition of Data Collection	
3.2	Primary Data	
3.3	Secondary Data Sources	
SKILL DEVELOPMENT ACTIVITIES	SKILL DEVELOPMENT ACTIVITIES Continuous Assessment - (C. A.): To compete any Three Skill Development Activities from the prescribed syllabus, each activity for 05 marks	15
SEMESTER- IV SEC -2B - Skill Enhancement Course (SEC)-II		
Unit 1	Data Analysis	8
1.1	Meaning and Definition of Data Analysis	
1.2	Nature And Importance	
1.3	1.3.1 Graphs	
	1.3.2 Tabulations	

Unit 2	Measures of Central Tendencies	8
2.1	Definition of Mean	
2.2	Definition of Medium	
2.3	Definition of Mode	
2.4	Meaning of Dispersion Definition -Range, Median Deviation, Quartile Derivation, Standard Derivation	
2.5	Concept of Percentages	
2.6	Concepts:- i) Frequency Distribution ii)Cumulative Frequency iii) Class Boundaries iv) Midpoint v) Class Width	
Unit 3	Research Report	14
3.1	Meanings And Objective of Research Report	
3.2	Concepts Of Case Study	
3.3	Characteristics of Good Research Report Writing	
3.4	Objective of Research Report	
3.5	Types Of Research Report	
3.6	Concepts of i)Appendices ii) Review Of Literature iii)Bibliography And References iv)Recommendation v)Hypothesis Testing	
SKILL DEVELOPMENT ACTIVITIES	SKILL DEVELOPMENT ACTIVITIES Continuous Assessment - (C. A.): To compete any Three Skill Development Activities from the prescribed syllabus, each activity for 05 marks	15

Recommended Books:

1. P.H. Karmel and M. Polasek (1978), Applied Statistics for Economists, 4th edition, Pitman.
2. M.R. Spiegel (2003), Theory and Problems of Probability and Statistics (Schaum Series).
3. Cochran, William, G. (2008), Sampling Techniques, Third Edition, Wiley-India, ISBN 978 -81-265-1524-0.Reprint: 2008.
4. Bethlehem, J. (2009), Applied Survey Methods: A Statistical Perspective, Wiley.
5. Khandare V.B. and S.Yadav (2015) ,Statistical Methods,Chinmay Publication,Aurangabad.

6. Uwe Flick (2012), *Introducing Research Methodology: A Beginner's Guide to Doing a Research Project*, Sage Publications.
7. S.P.Gupta (2012), *Statistical Methods*, 42nd edition, Sultan chand and sons.
8. Ranjit Kumar (2014), *Research Methodology: A Step-by-Step Guide for Beginners*, 4th Edition, Sage Publications.



SAVITRIBAI PHULE PUNE UNIVERSITY

(Formerly University of Pune)

T.Y.B.A. Economics Syllabus

(Choice Based Credit System and Semester System)

**Revised Syllabus will be implemented with effect from the
academic year 2021-2022**

T.Y.B.A. Economics

(Sem V & VI)

Semester	Paper Name	Subject Code	Title of the Paper
V	Economics General - III		Indian Economic Development- I
	Economics Special - III		International Economics-I
	Economics Special - IV		Public Finance- I
	Skill Enhancement Course (SEC-3A)		Business Management- I
VI	Economics General - III		Indian Economic Development- II
	Economics Special - III		International Economics- II
	Economics Special - IV		Public Finance- II
	Skill Enhancement Course (SEC-3A)		Business Management- II (Project Report)

T.Y.B.A. Economics
General Paper-III: Indian Economic Development-I
(Course Code:)
Semester V

Preamble:

The course will be useful for learners aiming towards careers in the government sector, policy analysis and the social sector. This course would take an overview of aspects of economic development with special reference to India.

The course aims to introduce the learner to the main concepts in economic and human development, equip them compare and contrast different economies; recognize various indicators of economic and human development. The course will also provide a broad outline of the Sustainable Development Goals.

Course Learning Outcomes

At the end of the course the learner will have ability -

- To relate and recognize the concept and indicators of Economic Development.
- To describe and analyze the concept and indicators of Human Development.
- To explain the characteristics of Developing and Developed Countries.
- To describe the constraints to the process of Economic Development.

Unit No.	Name and Sub Titles of the Topic	No. of Lectures
1	Economic Development and Growth	10
	1.1 Economic Development: Meaning, Definition and Indicators	
	1.2 Economic Growth: Meaning, Definition and Indicators	
	1.3 Need and Importance of Economic Development	
2	Developed and Developing Countries	14
	2.1 Concepts of Developed and Developing Countries	
	2.2 Characteristics of Developed Countries	
	2.3 Characteristics of Developing Countries : Economic, Demographic, Technological, Social and Political	
	2.4 India as an Emerging Economy	
3	Constraints to Development Process	12
	3.1 Vicious Circle of Poverty	
	3.2 Capital Constraints	
	3.3 Technology Constraints	
	3.4 Socio- Cultural Constraints	
	3.5 Political and Administrative Constraints	
	3.6 External Bottlenecks	
4	Human Resources and Economic Development	12
	4.1 Role of Human Resources in Economic Development	
	4.2 Human Development Index and India	
	4.3 Concepts of Physical Quality of Life Index:	
	4.3.1 Gender Development Index	
	4.3.2 Gender Inequality Index	
	4.3.3 Multidimensional Poverty Index	

Recommended Books -

- Ragnar Nurkse, Problem of Capital Formation in Underdeveloped Countries.
- Sen Amartya (1970), Growth Economics, Penguin.
- Zhingan M.L.(1982), The Economics of Development and Planning. Vrinda Publication (P) Ltd.
- Adelman, I. (1961), Theories of Economic Growth and Development, Stanford University Press, Stanford.
- Avhad Suhas (2015), 'Economics of Growth and Development' (Marathi Edition) Success Prakashan, Pune
- Behrman, S. and T.N.Srinivasan,(1995) Handbook of Development Economic, Vol. 1 to 3, Elsevier, Amsterdam,
- Chenery H. and T.N.Srinivasan, (1989) Handbook of Development Economics Vo1&2, Elsevier. Amsterdam.
- Dasgupta p. (1993) An Enquiry into Well Being and Destitution.
- Dhage S.K. (2015), Indian Economy (Marathi Edition) K.S. Publication, Pune.\
- Wavare A. (2017), Development and Planning Economics (Vikas va Niyojanache Arthshastra - Marathi Edition)
- Datir R.K.(2013), Vikas ani Paryavarniy Arthshastra, Nirali Prakashan, Pune.
- Rasal Rajendra (2020), Indian Economy (Marathi), Success Publication Pune, 7th edn.
- Ghatak,S.(1986), An Introduction to Development Economics, Allen and Unwin, London,
- Ghosh. B.N.(1982) Economic Development and Planning National Book House.
- Griliches M., D.H. Perkins, M.Romer and D.R.Snodgrass (1992) Economic of Development (3rd Edition) W.W.Norton, New York.
- Patil J.F.(2014), Growth And Development economics (Vruddhi Va Vikasache Arthshastra, Phadke Prakashan - Marathi Edition)
- Higgins, Benjamin. (1959) Economic Development, W.W.Norton , New York
- Jennifer A. Elliott, (2013), An Introduction to Sustainable Development (Fourth Edition), Routledge Publication, London and New York.
- Kindleberger C.P.(1977), Economic Development (3rd Edition) McGraw Hill, New York.
- Jagdish Bhagwati, The Economics Of Underdeveloped Countries.
- Mahata J.K.(1964) Economic of Growth, Asia.
- Meier and Baldwin(1970) Economic Development, Asia .
- Mahata J.K.(1971) Economic Development , Chaitanya.
- Kute Santosh and Rithe (2019) ,Demography , Prashant Publication Jalgaon.
- Mishra &Puri, Development and Planning- Theory And Practice, Himalaya.
- Meier, G.M. (1995) Leading Issue in Economic Development, 6ed, Oxford University Press ,New Delhi,
- Todaro M.P. (1996) Economic Development (6th Edition) Longman, London.
- UNDP, Human Development Report [Latest]
- World Development Reports
- India Development Reports

T.Y.B.A. Economics
General Paper- III: Indian Economic Development-II
(Course Code:)

Semester VI

Preamble:

This course would take an overview of the process of Economic Planning and the Development Goals. The course aims to introduce the learner to the main concepts in Economic Planning, equip them with understanding of the planning process in India and changing in recent times and familiarize them to the Sustainable Development Goals. The Course also reviews the relation between Economic Development and Environment.

Course Learning Outcomes

At the end of the course the learner will have ability-

- To describe and explain the process of Economic Planning.
- To describe and examine the changing structure of planning process in India.
- To describe and explain the relation between Economic Development and Environment.

Unit No.	Name and Sub Titles of the Topic	No. of Lectures
1	Economic Planning	12
	1.1 Economic Planning – Meaning, Definition and Features	
	1.2 Need of Economic Planning	
	1.3 Objectives of Economic Planning in India	
2	National Institution for Transforming India Aayog (NITI Aayog)	12
	2.1 NITI Aayog- Objectives and Structure	
	2.2 Role of NITI Aayog	
	2.3 Difference between Planning Commission and NITI Aayog	
3	Sustainable Development	12
	3.1 Sustainable Development : Meaning and Importance	
	3.2 17 SDGs (Sustainable Development Goals)	
	3.3 Measures for Sustainable Development	
	3.4 Current Scenario of SDG in India	
4	Environment and Economic Development	12
	4.1 Relation between Environment and Economic Development	
	4.2 Environment and Sustainable Development	
	4.3 Environmental Policies in India:	
	4.3.1 National Conservation Strategy (1992) - Highlights	
	4.3.2 National Environmental Policy (2006) - Highlights	
	4.4 Global Warming	

Recommended Books -

- Ragnar Nurkse, Problem of Capital Formation in Underdeveloped Countries.
- Sen Amartya (1970) Growth Economics, Penguin.
- Zingales M.L. (1982) the Economics of Development and Planning. Vrinda Pub.(P) Ltd.
- Adelman, I. (1961) Theories of Economic Growth and Development, Stanford University Press, Stanford.
- Avhad Suhas (2015), 'Economics of Growth and Development' (Marathi Edition) Success Prakashan, Pune
- Behrman, S. and T.N Srinivasan,(1995) Handbook of Development Economics, Vol. 1 to 3, Elsevier, Amsterdam,
- Chenery H. and T.N.Srinivasan, (1989) Handbook of Development Economics Vo1&2, Elsevier. Amsterdam.
- Dasgupta p. (1993) an Enquiry into Well Being and Destitution.
- Datir R.K. (2013) Vikas ani Paryavarniy Arthshastra, Nirali Prakashan, Pune.
- Ghatak,S.(1986) An Introduction to Development Economics,Allen and Unwin, London,
- Ghosh. B.N.(1982) Economic Development and Planning National Book House.
- Griliches M., D H. Perkins, M.Romer and D.R.Snodgrass (1992) Economic of Development (3rdEdition) W.W.Norton, New York.
- Higgins, Benjamin. (1959) Economic Development, W.W.Norton , New York
- Jennifer A. Elliott, (2013), an Introduction to Sustainable Development (Fourth Edition), Routledge Publication, London and New York.
- Kindleberger C.P. (1977) Economic Development (3rd Edition) McGraw Hill, New York.
- Jagdish Bhagwati,The Economics Of Underdeveloped Countries.
- Mahata J.K. (1964) Economic of Growth, Asia.
- Meier and Baldwin (1970) Economic Development, Asia .
- Mehata J.K.(1971) Economic Development , Chaitanya.
- Mishra &Puri, Development and Planning- Theory And Practice, Himalaya.
- Meier, G.M. (1995) Leading Issue in Economic Development,6ed,Oxford University Press ,New Delhi,
- Todaro M.P. (1996) Economic Development (6th Edition) Longman, London.
- UNDP, Human Development Report [Latest]
- World Development Reports
- India Development Reports

T.Y.B.A. Economics
Special Paper - III: International Economics-I
(Course Code:)

Semester - V

Preamble:

This course provides the students a thorough understanding and deep knowledge about the concept of international economics and international trade. The contents of the paper spread over various modules, lay stress both on theory and applied nature of the subject. Besides this, the contents prepare the students to know the important theories of international trade. The paper also covers the meaning, types, importance of terms of trade and causes of unfavorable terms of trade to developing countries like India.

Course Learning Outcomes

At the end of the course the learner will have Ability

- To relate and recall the concepts of International Economics and International Trade.
- To describe and apply the theories of international trade.
- To explain and comprehend the issues relating to Terms of trade and Balance of Payment.

Unit No.	Name and Sub Titles of the Topic	No. of Lectures
1	Introduction	12
	1.1 International Economics- Meaning, Scope and Importance	
	1.2 Inter-regional and International Trade	
	1.3 Importance of International Trade	
2	Theories of International Trade	12
	2.1 Theory of Absolute Cost Advantage and Theory of Comparative Cost Advantage	
	2.2 Heckscher-Ohlin Theory	
	2.3 Leontief's Paradox	
	2.4 Intra-Industry Trade	
3	Terms of Trade	12
	3.1 Meaning, Types and Importance of Terms of trade	
	3.2 Determinants of Terms of trade	
	3.3 Causes of Unfavorable Terms of trade to Developing Countries	
4	Balance of Payments	12
	4.1 Balance of trade and Balance of payments- Concepts	
	4.2 Balance of payments - Components	
	4.3 Disequilibrium of Balance of Payments, Causes and Consequences	
	4.4 Measures to correct Disequilibrium in the Balance of Payments	

Recommended Books -

1. Kenan, P.B. (1994), the International Economy, Cambridge University Press, London.
2. Kindlberger, C.P. (1973), International Economics, R.D. Irwin, Homewood.
3. Krugman, P.R. and M. Obstfeld (1994), International Economics: Theory and Policy, Glenview, Foresman.
4. Salvatore, D.L. (1997), International Economics, Prentice-Hall, Upper Saddle River, N.J.
5. Sodersten, Bo (1991), International Economics, Macmillan Press Ltd., London.
6. International Economics, M.L. Jhingan
7. Bhagwati, J. (Ed.) (1981), International Trade, Selected Readings, Cambridge University Press, Mass.
8. Greenaway, D. (1983), International Trade Policy, Macmillan Publishers Ltd., London.
9. Joshi V. and I.M.D. Little (1998), India's Economic Reforms, 1999-2001, Oxford University Press, Delhi.
10. Panchmukhi, V.R. (1978), Trade Policies of India: A Quantitative Analysis, Concept Publishing Company, New Delhi.
11. Dhage S.K. (2015), International Economics (English Edition) K.S. Publication, Pune.
12. Kulkarni B.D. and Dhamdhare S.V. (2007), International Economics (Antarrashtriya Arthashastra - Marathi Edition) Dimand Publication, Pune.
13. Wavare A. , International Economics (Anatarrashtriya Arthashastra - Marathi Edition) Education Publication, Aurangabad
14. Patel, S.J. (1995), Indian Economy towards the 21st Century, University Press Ltd., India.
15. Rasal, Rajendra, International Economics (Marathi), Success Publication Pune.

Reports:

1. Ministry of Commerce and Industry, Government of India, Recent Annual Report
2. Government of India, Economic Survey Latest
3. Reserve Bank of India, Annual Report

T.Y.B.A. Economics
Special Paper - III: International Economics-II
(Course Code:)

Semester – VI

Preamble:

This course provides the students a thorough understanding and deep knowledge about India's foreign trade and trade policies. The contents of the paper spread over various modules, lay stress both on theory and applied nature of the subject that have registered rapid changes during the last few decade. Besides this, the contents prepare the students to know the foreign exchange market, provisions in FEMA and convertibility of rupee. The paper also covers the Indian government's policy towards foreign capital and role of multinational corporations in India and regional and international co-operation. This paper has become relatively more relevant from the policy point of view under the present waves of globalization and liberalization.

Course Learning Outcomes:

At the end of the course, the learner will have-

- Ability to relate and explain the concept of Exchange Rate and Foreign Exchange Market.
- Ability to describe the trends in Growth, Composition and Direction of India's Foreign Trade.
- Ability to comprehend the issues relating to Foreign Capital and Regional and International Co-Operation.

Unit No.	Name and Sub Titles of the Topic	No. of Lectures
1	India's Foreign Trade and Policy	12
	1.1 Role of Foreign Trade in Economic Development	
	1.2 India's Foreign Trade- Growth, Composition and Direction since 2000	
	1.3 Free Trade v/s Protection - Case For and Case Against	
	1.4 Highlights of India's Foreign Trade policy Since 2015	
	1.5 Evaluation of Policy of Special Economic Zones in Export Promotion	
2	Foreign Capital	12
	2.1 Role of Foreign Capital in Economic Development	
	2.2 Types of Foreign Investment	
	2.3 Foreign Investment Policy in India since 1991	
	2.4 Problems of Foreign Capital	
3	Foreign Exchange	12
	3.1 Exchange Rate : Concept; Fixed & Flexible Exchange Rate -Merits and Demerits	
	3.2 Foreign Exchange Market- Meaning, Structure and Functions	
	3.3 Convertibility of the Rupee	
	3.4 Foreign Exchange Management Act, 1999, Main Provisions	
4	Regional and International Co-operation: Nature and Functions of-	12
	4.1 South Asian Association for Regional Cooperation (SAARC)	
	4.2 Brazil, Russia, India, China and South Africa (BRICS)	
	4.3 European Economic Community (EEC)	
	4.4 World Trade Organization (WTO)	

1. Recommended Books -

2. Kenan, P.B. (1994), the International Economy, Cambridge University Press, London.
3. Kindlberger, C.P. (1973), International Economics, R.D. Irwin, Homewood.
4. Krugman, P.R. and M. Obstfeld (1994), International Economics: Theory and Policy, Glenview, Foresman.
5. Salvatore, D.L. (1997), International Economics, Prentice-Hall, Upper Saddle River, N.J.
6. Sodersten, Bo (1991), International Economics, Macmillan Press Ltd., London.
7. International Economics , M.L. Jhingan
8. Bhagwati, J. (Ed.) (1981), International Trade, Selected Readings, Cambridge University Press, Mass.
9. Greenaway, D. (1983), International Trade Policy, Macmillan Publishers Ltd., London.
10. Joshi V. and I.M.D. Little (1998), India's Economic Reforms, 1999-2001, Oxford University Press, Delhi.
11. Panchmukhi, V.R. (1978), Trade Policies of India: A Quantitative Analysis, Concept Publishing Company, New Delhi.
12. Patel, S.J. (1995), Indian Economy towards the 21st Century, University Press Ltd., India.

Reports:

1. Ministry of Commerce and Industry, Government of India, Recent Annual Report
2. Government of India, Economic Survey Latest
3. Reserve Bank of India, Annual Report

T.Y.B.A. Economics
Special Paper – IV: Public Finance -I
(Course Code:)
Semester – V

Preamble:

The role and functions of the Government in an economy has been hanging with the passage of time. The term 'Public Finance' has traditionally been applied to involve the use of revenue and expenditure measures along with the budgetary policy is an important part to understand the basic problems of use of resources, distribution of Income etc. The course will be useful for students aiming towards careers in the government sector, policy analysis, banking and business. This course would take an overview of government finances with special reference to India. The course aims to introduce the learner to the main concepts in public finance, equip them with an analytical grasp of government taxes: direct and indirect taxes and familiarize students with the main issues in government expenditure and debt.

Objectives:

1. To make students to analyze the role of Public Finance in Economic Development.
2. To know the sources of Revenue, Expenditure and Debt of Govt. of India.
3. To make students competent to become success in competitive examination.

Course Learning Outcomes

At the end of the course the learner will have ability-

- To relate and recognize the Nature and Scope of Public Finance.
- To describe and analyze the concept of Public Revenue and its components.
- To explain types of Public Expenditure and reasons for rising Public Expenditure.
- To explain the types of Public Debt and its effects.

Unit No.	Name and Sub Titles of the Topic	No. of Lectures
1	Introduction to Public Finance	12
	1.1 Meaning, Nature, Scope and Importance of Public Finance	
	1.2 Public Finance versus Private Finance	
	1.3 Role of Public Finance in Economic Development	
	1.4 Principle of Maximum Social Advantage: Musgrave's Approach	
2	Public Revenue	12
	2.1 Sources of Public Revenue	
	2.2 Meaning of Tax, Types of Taxes- Direct Tax and Indirect Tax, Merits and Demerits	
	2.3 Goods and Service Tax: Concept and Characteristics; Need for GST in India	
	2.4 Concepts: Impact of Tax, Incidence of Tax, Shifting of Tax and Taxable Capacity	
3	Public Expenditure	12
	3.1 Meaning and Principles of Public Expenditure	
	3.2 Classification of Public Expenditure	
	3.3 Reason for Increasing Public Expenditure	
	3.4 Wagner's Law of Public Expenditure	

4	Public Debt	12
	4.1 Meaning, Sources and Importance of Public Debt	
	4.2 Methods of Repayment of Public Debt	
	4.3 Burden of Public Debt	
	4.4 The Fiscal Responsibility and Budget Management Act 2003-Highlights	

Recommended Books

1. Andley and Sundaram- Theory and Practice of Public Finance.
2. Bhatia H.L “Public Finance “ Vikas Publishing House, 18th edition
3. Jayaram Hiregange, Deepak Rao (2017), India GST for Beginners, White Falcon Pub.
4. Government of India (2017). GST-Concept and Status
5. Singh S.K, Public Finance in Theory and Practice, S. Chand, New Delhi.
6. Ozerkar S.R.,Rajaswa (Marathi), Vidya Prakashan, Ruikar Marg Nagpur
7. Deo and Zamre, Rajaswa (Marathi) Pimpalpure and Co, Publishers, Nagpur.
8. Buchanan J. M.,, Public Principles of Public debt, Irwin, Homewood, III, USA.
9. Herber, B.P., Modern Public finance, AITBS, New Delhi.
10. Hicks Ursula (1961) “Public Finance” Digswell Place, James Nishbet & Co. Ltd.
11. Musgrave R. A. (1959) “The Theory of Public Finance: A study in Public Economics” McGraw Hill Logakwha Ltd.
12. Musgrave R. A. & Musgrave P. B “Public Finance: In Theory & Practice” McGraw Hill Logakwha Ltd.
13. Prest, A.R. and Barr N.A., Public Finance in Theory and Practice, ELBS, London.
14. Bhadane Jaywant R, (2020) GST Smart Taxation System, International Publication
15. Taylor Philip C (1968) “The Economics of Public Finance” Oxford Univeristy & IBH Publishing Co.
16. Alam, S, (2016) GST and the States, Sharing tax administrations, Economic and Political Weely, 51 (31) (Article)
17. Ministry of Finance, Government of India (Oxford Press), Economic Survey 2020.
18. Dhamdhare S.V. (2019) , Sarvajanic Ayvay (Marathi Edition) ,Dimond Publication,Pune.
19. Khandare Vilas (2004) , Money Banking And Finance, Ravi Printers ,Aurangabad .

Websites:

<https://data.gov.in>
<https://www.gst.gov.in>
<https://www.incometaxindia.gov.in>

T.Y.B.A. Economics
Special Paper – IV: Public Finance -II
(Course Code:)
Semester – VI

Objectives:

1. To make students able to analyze Budget process of India.
2. To make the students aware about Role and working of Finance Commission.
3. To make students competent to become success in competitive examination.

Course Learning Outcomes

At the end of the course the learner will have ability

- To explain and assess the components and instruments of Fiscal Policy.
- To relate to the concepts of Budget and its components.
- To describe and analyze the concept of Deficit Financing and its effects.
- To describe and explain the Centre and State Financial Relationship.

Unit No.	Name and Sub Titles of the Topic	No. of Lectures
1	Fiscal Policy	12
	1.1 Fiscal Policy- Meaning, Instruments and Objectives	
	1.2 Fiscal Policy in Developing Countries	
	1.3 Limitations of Fiscal Policy	
	1.4 Review of Fiscal Policy in India Since 2011	
2	Budget	12
	2.1 Budget- Meaning, Nature and Objectives	
	2.2 Classification of Budget	
	2.3 Preparation of Indian Central Budget	
	2.4 Gender Budget- Meaning and Importance.	
3	Deficit Financing	12
	3.1 Deficit Financing- Meaning and Objectives	
	3.2 Role of Deficit Financing in Developing Countries	
	3.3 Trends in India's Deficit Financing Since 2011	
	3.4 Effects of Deficit Financing	
4	Centre-State Financial Relationship	12
	4.1 Centre-State Financial Relationship: Constitutional Provisions	
	4.2 Conflict in the Centre-State Financial Relationship	
	4.3 Role of the Finance Commission	
	4.4 Recommendations of 15 th Finance Commission	

Recommended Books

1. Andley and Sundaram- Theory and Practice of Public Finance.
2. Bhatia H.L “Public Finance “ Vikas Publishing House, 18th edition
3. Jayaram Hiregange, Deepak Rao (2017), India GST for Beginners, White Falcon Pub.

4. Government of India (2017). GST-Concept and Status
5. Bhadane Jaywant R, (2020) GST Smart Taxation System, International Publication
6. Singh S.K, Public Finance in Theory and Practice, S. Chand, New Delhi.
7. Ozerkar S.R.,Rajaswa (Marathi), Vidya Prakashan, Ruikar Marg Nagpur
8. Deo, and Zamre, Rajaswa (Marathi) Pimpalpure and Co, Publishers, Nagpur.
9. Buchanan J. M., Public Principles of Public debt, Irwin, Homewood, III, USA.
10. Herber, B.P., Modern Public finance, AITBS, New Delhi.
11. Hicks Ursula (1961) “Public Finance” Digswell Place, James Nishbet & Co. Ltd.
12. Musgrave R. A. (1959) “The Theory of Public Finance: A study in Public Economics” McGraw Hill Logakwha Ltd.
13. Musgrave R. A. and Musgrave P. B “Public Finance: In Theory & Practice” McGraw Hill Logakwha Ltd.
14. Prest, A.R. and Barr N.A., Public Finance in Theory and Practice, ELBS, London.
15. Taylor Philip C (1968) “The Economics of Public Finance” Oxford University and IBH Publishing Co.
16. Alam, S, (2016) GST and the States, Sharing tax administrations, Economic and Political Weely, 51 (31) (Article)
17. Ministry of Finance, Government of India (Oxford Press), Economic Survey 2020.
18. Khandare Vilas ,Povale ,Takale,(2012) , Economics Of Agriculture Development ,Omkar Printers, Aurangabad.
19. Dhamdhare S.V. (2019) , Sarvajanic Ayyavay (Marathi Edition) ,Dimond Publication,Pune.

Websites:

<https://data.gov.in>

<https://www.gst.gov.in>

<https://www.incometaxindia.gov.in>

T.Y.B.A. Economics
Skill Enhancement Course
Business Management

Sem ester	CC Paper	Paper No.	Name of Paper	Lectures / Week	Total Lect.	CA Marks	ESE Marks	Total	No. of Credits
V	SEC -III SEC-3A		Business Management- I	03	30	15	35	50	2
VI	SEC -IV SEC-3A		Business Management - II Project	03	30	15	35	50	2

SEC -Skill Enhancement Course; CC -Core Course; CA - Continuous Assessment;
ESE -End of Semester Examination

T.Y.B.A. Economics
Skill Enhancement Course
SEC 3A: Business Management-I
(Course Code:)
Semester – V

Course Learning Outcomes:

At the end of the Course, the Learner will have the following skills:

- Management of Business.
- Business planning and decision making
- Leadership Skills- Ability to work in teams at the same time, ability to show leadership qualities

Unit No.	Name and Sub Titles of the Topic	No. of Lectures	Skill Enhancement Exercises
1	Business Management	6	• Discussion/ Practical/ Field Study
	1.1 Nature and Scope of Management		
	1.2 Characteristics of Management		
	1.3 Need & Importance of Study of Management		
	1.4 Process of Management		
2	Business Planning and Decision Making	6	• Case Studies / Mini Projects / Individual /Team Presentations. • Practical Exercises in Decision Making Process/ Problem Solving
	2.1 Nature of Planning		
	2.2 Steps in Planning Process		
	2.3 Types of Business Planning		
	2.4 Study of Planning Process		
	2.5 Steps in Decisions Making Process		
	2.6 Factors affecting decision Making		

3	Schemes of Government : Make in India Start-up India Stand up India Mudra Loans Dairy Management Scheme Fruits Management Development Programme Agriculture Products Sell Management	6 2 + 2 Guest Lecture	• Visit to SSS/ Interview with Mudra Beneficiary. • Study of Street Vendors/ Hawkers/ Mini Enterprises etc. • Exhibitions Business Plan Ideas Competitor
4	Workshop: Workshop on Entrepreneurship Development Training Programme	8	2 -Half-Day Work - shops -4 hours each OR 1- One Day Workshop - 8 hours

Recommended Books

1. Stephen R. Covey, The 7 Habits of Highly effective People (1989), Guerilla Marketing.
2. Harvard Business Review, Management Tips, hbr.org/books.
3. Pandey, I.M. Financial Management, Persons 12th edn.
4. Saksena, S.C., Principles of Business Management (2019), Sahitya Bhawan Publi.Agra.
5. Kalkar Parag and Ajinath Doke, Vyavsay Vyavsthapan, Nirali Prakashan, Pune.
6. Vasistha, Neeru, Principles of Management, Taxmann.
7. Hannagan, Tim. Management Concepts and Practices, Macmillan India Ltd.
8. Government of India, Official Websites.

T.Y.B.A. Economics
Skill Enhancement Course
SEC-3A: Business Management-II (Project Report)
(Course Code:)
Semester – VI

Course Learning Outcomes:

At the end of the Course, the Learner will have the following skills:

- Analytical Skills – Ability to analyze data collected and interpret in the most logical manner
- Project Report Writing Skills- Ability to comprehend and illustrate/demonstrate findings
- Presentation Skills – PPT/Poster- Ability to illustrate findings in the most appealing manner
- Leadership Skills: Ability to show leadership skills with business ideas or work on business ventures as a practical example

Unit No.	Name and Sub Titles of the Topic	No. of Lectures	Skill Enhancement Exercises
1	Case Study	2	Preview to Students for Project Report
	Guest Lecture – Local Entrepreneur – Success Stories / Struggles/ Historical Reviews/ Start-ups, etc		
2	Project Interim Presentation	14	Initial Mid Semester Presentation (15 marks)
	Detailed Study of ANY Business Enterprise under the Guidance of Subject Teacher OR Presentation of a Business Idea		
3	Project Final Presentation	14	Final Presentation Viva (35 Marks) Int. Examiner - 10 Ext. Examiner - 10 Report- 15
	Presentation with PPT or Poster or Exhibition of Business Ideas/ Reports		

Recommended Books

1. Stephen R. Covey, The 7 Habits of Highly effective People (1989), Guerilla Marketing.
2. Harvard Business Review, Management Tips, hbr.org/books.
3. Pandey, I.M. Financial Management, Persons 12th Edn.
4. Saksena, S.C., Principles of Business Management (2019), Sahitya Bhawan Publi.Agra.
5. Kalkar Parag and Ajinath Doke, Vyavsay Vyavsthapan, Nirali Prakashan, Pune.
6. Vasistha, Neeru, Principles of Management, Taxmann.
7. Hannagan, Tim. Management Concepts and Practices, Macmillan India Ltd.
8. Government of India, Official Websites.



Savitribai Phule Pune University

(Formerly University of Pune)

Faculty of Humanities
Board of Studies in Economics

New Syllabus for Affiliated Colleges of SPPU

M.A. Economics Part - II

[Semester III & IV]

**Choice Based Credit System Syllabus
NEP 2020**

To be implemented from Academic Year 2024-2025

INTRODUCTION:

M.A in Economics Program (Pattern 2023/CBCS/NEP2020) will be introduced in the following order:

- a) First Year PG 2023-2024
- b) Second Year PG 2024-2025
- ✓ M. A. Degree Programme will consist of four semesters divided into two Years.
- ✓ The First Year (Semester I and II), Second Year (Semester III and IV), Choice Based Credit System
- ✓ Examination will be held for each semester. Continuous Internal Assessment (CIA) will have 30% weightage and Semester End Assessment (SEA) will carry 70% weightage. Internal assessment tools used for previous semester should be avoided for the next Semester.
- ✓ It covers in-depth study of Economics as a major subject at post-graduation level with focus on the advanced economic theory, different streams in the subject of Economics like micro, macro, public economics, international economics, agricultural economics, rural and urban development, demography, financial systems and market, its application, policy making and contemporary changes in the subject.

OBJECTIVES OF M.A. IN ECONOMICS PROGRAMME ARE:

- 1) To develop a strong foundation of advanced economic theory aligned with the graduation and honours program.
- 2) To help students to gain the comprehensive understanding of the policy making for rural and urban economy along with national and international level.
- 3) To help students in understanding the intricacies of policy making process from local to global level.
- 4) To build the theoretical foundations of Economics and its inter and multidisciplinary relationship with respect to pure and other social sciences.
- 4) To develop an understanding about the role of the national and international governments/institutions in building consensus about the policies that help in welfare.
- 5) To make aware the students about the interrelations between economy and society and develop a critical thinking about policy making, growth and development and sustainability.

PROGRAMME SPECIFIC OUTCOMES (PSOS):

- PSO - 1. Knowledge of Economic Theories:** Graduates of M.A. in Economics will possess a strong understanding of economic theories, including microeconomics, macroeconomics, econometrics, and other specialized areas of economics.
- PSO - 2. Analytical Skills:** Graduates will be able to apply economic concepts and theories to analyse real-world economic issues, such as market behaviour, policy implications, and economic trends. They should also be able to critically evaluate economic research and data using statistical and econometric techniques.
- PSO - 3. Research and Writing Skills:** Graduates will have developed advanced research and writing skills, including the ability to conduct independent research, analyse economic data, and communicate their findings effectively through written reports, policy briefs, and other forms of economic writing.
- PSO - 4. Policy Analysis:** Graduates will be able to assess the impact of economic policies on various stakeholders and evaluate their effectiveness in achieving desired outcomes. They should also be able to propose evidence-based policy recommendations to address economic challenges and promote economic growth.
- PSO - 5. Quantitative Skills:** Graduates will develop a strong foundation in quantitative methods, including statistical and econometric techniques, and be able to apply these skills to analyse economic data and conduct empirical research.
- PSO - 6. Communication Skills:** Graduates will be able to communicate complex economic concepts and findings to different audiences, including policymakers, business leaders, and the general public, in a clear and concise manner.
- PSO - 7. Critical Thinking:** Graduates will develop critical thinking skills and be able to analyse economic problems from multiple perspectives, consider trade-offs, and propose innovative solutions based on economic principles and evidence.
- PSO - 8. Professional Ethics:** Graduates will understand and adhere to the professional ethics and standards of the economics, including academic integrity, objectivity, and confidentiality in research and policy analysis.
- PSO - 9. Professional Development:** MA Economics programs often include professional development components, such as internships or seminars, to prepare students for careers in economics.

Syllabus Designing Committee

MA – I – Economics, Semester – I & II

Sr. No.	Name of Professor	BoS Member / Member
1	Dr. Sunil P. Ugale	Chairman
2	Dr. Vilas B. Adhav	BoS Member
3	Dr. Amita Yadwadkar	BoS Member
4	Dr. Gorakshanath K. Sanap	BoS Member
5	Dr. Baban M. Sonawane	BoS Member
6	Dr. Nitin D. Ade	BoS Member – Coordinator
7	Dr. Madhav H. Shinde	BoS Member
8	Dr. Parmeshwar S. Gadkar	BoS Member
9	Dr. Somnath V. Patil	BoS Member
10	Dr. Jaywant R. Bhadane	BoS Member
11	Dr. Amol A. Gaikwad	BoS Member
12	Dr. Ramdas K. Gadge	BoS Member
13	Dr. Suresh Manid	BoS Member
14	Mr. Jignesh C. Furiya	BoS Member
15	Dr. Ajit Bhandakkar	BoS Member
16	Dr. Santosh K. Dalavi	Member
17	Dr. Basavraj C. Patil	Member
18	Dr. Jayashri P. Jadhav	Member
19	Dr. Subhash S. Agale	Member
20	Dr. D. S. Talule	Member
21	Dr. Hanumant P. Shinde	Member
22	Prof. Sham L. Satarle	Member
23	Dr. Manasi Kurtkoti	Member
24	Dr. Ramesh S. Desai	Member
25	Dr. Pratap J. Phalphale	Member
26	Dr. Bejmi Gregari Lobo	Member
27	Dr. Mohan Kamble	Member

**Credit distribution structure for Two Years PG
M.A. Economics, Part – I & II**

With effect from Academic Year 2023-2024

Level	Semester	Credits Related to Major		RM	OJT	RP	Total
		Mandatory / Core	Electives				
6.0	I	12 (T)+2 (P)	4 (T)	4	0	0	22
	II	12 (T)+2 (P)	4 (T)	0	4	0	22
Total Credit – 1 Years / 2 Semester		28	8	4	0	0	44
6.5	III	12 (T)+2 (P)	4 (T)	0	0	4	22
	IV	10 (T)+2 (P)	4 (T)	0	0	6	22
Total Credit - 2 Years / 4 Semester		54	16	4	4	10	88

Abbreviations – 1. T – Theory
2. P – Practical
3. RM - Research Methodology
4. OJT: On Job Training (Internship)
5. FP - Field Project
6. RP - Research Project

**Credit distribution structure and Subject Title for M.A. Economics
– Semester III & IV**

With effect from Academic Year 2024-2025

Level	Semester	Credits Related to Major		RM	OJT	RP	Total
		Mandatory/Core	Electives				
6.5	III	1. EC0-601-MJ- Macro Economic Analysis I - [4T] 2. EC0-602-MJ-- Economic Growth & Development I- [4T] 3. EC0-603-MJ- Indian Financial System I- [4T] 4. EC0-604-MJP- Indian Financial System II [2P]	1. EC0-611-MJ- Demography- [4T] or 2. EC0-612-MJ- Mathematical Economics - [4T] or 3. EC0-613-MJ- Rural Development - [4T]	-	-	ECO-631-RP- Research Project [4]	22
6.5	IV	1. EC0-651-MJ- Macro Economic Analysis II - [4T] 2. EC0-652-MJ- Economic Growth & Development II- [4T] 3. EC0-653-MJ- Economics of Environment I [2T] 4. EC0-654-MJP- Economics of Environment II [2P]	1. EC0-660-MJ- Public Policy- [4T] or 2. EC0-661-MJ- Urban Economics - [4T] or 3. EC0-662-MJ- Econometrics [4T]	-	-	ECO-681-RP- Research Project [6]	22
Total Credit - 1 Years / 2 Semester		26	8	-	-	10	44

Abbreviations – 1. ECO – Economics

2. MJ – Major Subject

3. MJP - Major Practical Subject

4. RP - Research Project

Examination Pattern:

A] Total 4 Credits – Theory Subject

Total Marks: 100

Scheme of Examination:

- a. Internal Assessment 30 Marks (Minimum Marks 12 for passing)
- b. Semester End Exam 70 Marks (Minimum Marks 28 for passing)

Pattern for Semester End Assessment in both the semesters:

Time (3 Hours), 4 Credit Course, Marks (70)

Q.1 Answer any one out of two. (15 Marks)

Q.2 Answer any one out of two. (15 Marks)

Q.3 Answer any one out of two. (15 Marks)

Q.4 Answer any one out of two. (15 Marks)

Q.5 Write Short Note (Any two out of four) (10 Marks)

B] Total 2 Credits – Theory Subject

Total Marks: 50 Marks

Scheme of Examination:

- a. Internal Assessment 15 Marks (Minimum Marks 6 for passing)
- b. Semester End Exam 35 Marks (Minimum Marks 14 for passing)

Pattern for Semester End Assessment in both the semesters:

Time (2 Hours), 2 Credit Course, Marks (35)

Q.1 Answer any one out of two. (15 Marks)

Q.2 Answer any one out of two. (15 Marks)

Q.3 Write Short Note (Any one out of two) (5 Marks)

C] Total 2 Credits - Practical Subject

Total Marks: 50 Marks

Scheme of Examination:

- a. Internal Assessment - 15 Marks
- b. Practical Assessment - 35 Marks

Suggested assessment tools for PG courses:

The concerned teacher shall announce the units for which internal assessment will take place. Teachers should choose any three tools out of given below for Internal Assessment among that written test of 10 marks is mandatory.

- i. Lecture/Library notes
- ii. Seminar presentation
- iii. Short Quizzes / MCQ Test
- iv. Home Assignments
- v. Tutorials
- vi. Oral test
- vii. Group Discussion
- viii. Study Tour
- ix. Written Test
- x. Open Book Test
- xi. Field Visit
- xii. Industrial Visit
- xiii. Book / Article Review

Teaching Methodology:

1. Classroom Teaching
2. Guest Hours
3. Discussions
4. Surveys
5. Power Point Presentation
6. Visit to Institutions
7. Research Papers & Projects
8. E-content & ICT tools

New Syllabus as per NEP 2020

MA – II ECONOMICS
SEMESTER - III

Savitribai Phule Pune University
(Formerly University of Pune)

MA - ECONOMICS

SEMESTER - III

- Subject List -

Sr. No.	Subject Type	Subject Code & Title	Credits		
			Theory	Practical	Total
1	Mandatory	EC0-601-MJ- Macro Economic Analysis I	4	-	4
2	Mandatory	EC0-602-MJ- Economic Growth & Development I	4	-	4
3	Mandatory	EC0-603-MJ- Indian Financial System I	4	-	4
4	Mandatory	EC0-604-MJP- Indian Financial System II	-	2	2
5	Elective	EC0-611-MJ- Demography	4	-	4
	Elective	EC0-612-MJ- Mathematical Economics			
	Elective	EC0-613-MJ- Rural Development			
6	Research Project	ECO-631-RP- Research Project	-	4	4
Total			16	06	22

Syllabus

Class: M.A. - II Economics

Semester: III

Course Type: Credits Related to Major – Mandatory / Core

Course Name: Macro Economic Analysis - I

Course Code: ECO 601 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

Macroeconomic or aggregative economic analysis establishes the functional relationship between various aggregates of the economy. Aggregative analysis assumed such a great significance in recent times that a prior understanding of macroeconomic theoretical structure is considered essential for proper comprehension of different issues and policies. Macroeconomics now is not only a scientific method of analysis but also a body of empirical economic knowledge. The course equips the students at the postgraduate level to understand systematic facts and theoretical developments for empirical analysis,

Course Objectives:

- To provide a thorough understanding of the principles of macroeconomics and the application of macroeconomic concepts in real-life situations.
- To discuss the modern developments in macroeconomics.

Program Outcome:

After Completing this Course, the students will be;

- Able to analyse and demonstrate knowledge of the basic theories/laws in macroeconomics.
- Able to evaluate macroeconomic concepts, models and its use in policy making and real life situations.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Approaches to Macro Economics	14
	1.1 - Meaning, Nature, Scope, Importance & limitations of Macro Economics	
	1.2 - Classical Approach-Introduction and main features	

	1.3 - Keynesian Approach-Introduction and main features	
	1.4 – Neo-classical Approach-Introduction and main features	
2	2. National Income and Social Accounting	16
	2.1 - Meaning & Concepts of National Income – GDP, GNP, NDP, NNP, Nominal & Real National Income.	
	2.2. - Circular Flow of Income in two, three and four sector economy, Withdrawals & Injections	
	2.3 - Different forms of national income accounting- 1. Social Accounting - Concept & Importance 2. Flow of funds Accounting 3. Balance of payments Accounting	
	2.4 - Matrix presentation of Social Accounting	
3	3. Money	14
	3.1 - Meaning, Evolution and Functions of Money	
	3.2 - Money and Near Money	
	3.3 - Quantity Theory of Money, Cash Balance Approach	
	3.4 - The Liquidity Theory of Money	
4	4. Demand and Supply of Money	16
	4.1 - Demand for Money- Classical and Keynesian Approaches	
	4.2 - Post Keynesian Theories of Demand for Money, Tobin's Approach, Baumol's Inventory Theoretic Approach, Friedman's Theory of Demand for Money.	
	4.3 - A Behavior Model of Money Supply Determination.	
	4.4. RBI approach to Money Supply-High Powered Money and Money Multiplier; Money Supply and Open Economy.	
	4.5. Control of Money Supply.	

Basic Reading List:

1. August Swan Enberg (2005) 'Macroeconomics Demystified' A Self Teaching Guide, Mcgraw Hill Education
2. Ackley,G.(1978), Macro Economics : Theory and Policy, Macmillan, New York.
3. Agrawal Vanita, Macroeconomics: Theory and Policy, Pearson Publication, New Delhi.
4. Ahuja H.L., Macroeconomics: Theory and Practice, S. Chand & Co. New Delhi.

5. Blackhouse, R. and A. Salansi (Eds.) (2000) Macroeconomics and the Real World (2 Vols.), Oxford University Press, London. Dornbusch,
6. Campbell R. McConnell, Stanley L. Brue, (2001) Macroeconomics: Principles, Problems and Policies', McGraw Hill, Inc, New York.
7. Froyen Richard T (2006) 'Macroeconomics– Theories and Policies' Pearson Education; 8th edition
8. Gupta S.B. (1997) 'Monetary planning for India' OUP
9. Jha, R. (1991), Contemporary Macroeconomic Theory and Policy, Wiley Eastern Ltd., New Delhi.
10. Mankiw Gregory (2007) 'Macroeconomics' Worth, New York
11. Rao, V.K.R.V. (1983) India's National Income : 1950 to 1980, Saxe Publications, New Delhi
12. Gupta, S.B. (1995), Monetary Planning in India, OUP, New Delhi.
13. Sampat Mukherjee (2013), 'A Global Text-Macroeconomics', New Central Book Agency
14. Soumyen Sikdar (2006) 'Principles of Macroeconomics' Oxford University Press

Press Recommended Readings:

1. Branson, W.A. (1989), Macroeconomic Theory and Policy, (3rd Edition), Harper and Row, New York.
2. Culbertson, J.M. (1968), Macroeconomic Theory and Stabilization Policy, McGraw Hill, Kogekosh, Tokyo.
3. Dusenbery, J.S. (1949), Income Saving and the Theory of Consumer Behavior, Harvard University Press, Harvard.
4. Edey, M. and A.T. Peacock (1967), National Income and Social Accounts, Hutchinson University Library, London
5. Dornbusch, Fischer, Startz (1988) 'Macroeconomics', TMH (2012)
6. Friedman, M. (1957), The Theory of Consumption Function, Princeton University Press Princeton.
7. Friedman, M. (1956), Studies in the Quantity Theory of Money, The University of Chicago Press, Chicago
8. Glahe, Fred, R. (1973), Macroeconomics: Theory and Policy, Harcourt Brace Jovanovich, Inc, New York.
9. Harris Lawrence (1980) 'Monetary Theory' McGraw Hill Inc.
10. Keynes, J.M. (1936), 'The General Theory of Employment Interest and Money', 7 Macmillan, London.
11. Ruggles, R. and N. Ruggles (1956), National Income Accounts and Income Analysis, McGraw Hill New York.
12. Shapiro, E. (1996) Macroeconomic Analysis, Galgotia Publications, New Delhi.

13. D. Wrightsman 'An Introduction to Monetary Theory and Policy' The Free Press New York 1983
14. Bhise V.B, Khandare V.B & Babar, (2014) Macro Economics, Chinmay Publication Aurangabad.
15. Kute S & Rithe M, Macro Economics, Prashant Publication Jalgaon, MS, India.

Recommended Journals:

1. Applied Economics- Taylor & Francis Online
2. Journal of Macroeconomics-Elsevier
3. Macroeconomics and Finance in Emerging Market Economies- Taylor & Francis Online
4. The Indian Economic Journal- Sage Journal

Syllabus

Class: M.A. - II Economics

Semester: III

Course Type: Credits Related to Major – Mandatory / Core

Course Name: Economic Growth and Development - I

Course Code: ECO 602 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

The course makes an attempt to provide an introduction to the economics of Growth and Development and at the same time provide an understanding of the analytical rigor of the subject. Growth and Development-I is a core course that covers meaning and concept of Economic Growth and Development, measuring the economic growth and development, theories of economic growth and development, poverty, inequality and unemployment and role human capital in economic development. Growth and development-I will try to clear the concepts regarding the economic growth and development and provides basic knowledge to the students to get engaged in the activities.

Course Objectives:

1. To enable learning and understanding of the basic concepts and process to measure the growth and economic development etc.
2. To analyze and evaluate the obstacles in the process of economic growth and development

Course Outcome:

After Completion of the Course, the Students will be;

1. Able to apply the concepts of economic growth and compare international comparison of economic development, etc.
2. Able to analyze and demonstrate knowledge of the economic growth and development theories of economic growth and development

Unit No.	Unit Title and Contents	Hours
1	1. Concepts of Growth and Development	15
	1.1 - Concepts of Growth and Development	
	1.2 - Measuring Economic Development: Income and Alternative Measures	

	1.3 – International Comparison of Incomes: PPP and Exchange Rate Approaches	
	1.4 – Developing Economies – Concepts	
	1.5 – Barriers to Economic Development	
2	2. Theories of Economic Development and Growth	15
	2.1 - Classical Theory of Economic Development: Adam Smith	
	2.2. - The Harrod-Domar Model	
	2.3 - Solow model of economic growth	
	2.4 - The Big push theory	
	2.5 - The New (Endogenous) Growth Theory	
3	3. Poverty, Inequality and Unemployment	15
	3.1 – Poverty – Meaning, Uni-dimensional & Multi-dimensional Poverty, Multi-Dimensional Poverty Index of NITY Ayog, Measures to Reduce Poverty.	
	3.2 - Measuring Inequality, Lorenz Curve, Gini Coefficient, Functional Distribution, trends in inequality.	
	3.3 – Unemployment; Meaning and Types, Disguised Unemployment, Trends in Unemployment and Measures to Reduce Unemployment	
4	4. Human Capital and Economic Development	15
	4.1 -Human Capital; Meaning and Concept, Role of Human Capital in Economic Development	
	4.2 - Human Capital Approach of Development	
	4.3 - Optimum Population, Costs and Benefits of Population Growth, Growing Population and Urbanization.	
	4.4 – Human Development – Quality of life, HDI, Investment in Health, Education and Training	

Basic Reading List:

1. Basu Kaushik (1998) Analytic Development Economics: The Less Developed Economy Revisited', OUP
2. Behrman, S. and T.N. Srinivasan (1995), Handbook of Development Economics, Vol. 3, Elsevier, Amsterdam.

3. Felix Raj, Sampat Mukherjee, Mallinath Mukherjee, Amitava Ghose, Ranjanendra N. Nag (2007) “Contemporary Development Economics from Adam Smith to Amartya Sen”, New Central Book Agency Private Limited
4. Gillis, M., D.H. Perkins, M. Romer and D.R. Snodgrass (1992), Economics of Development, (3rd Edition), W.W. Norton, New York.
5. Kindleberger, C.P. (1977), Economic Development, (3rd Edition), McGraw Hill, New York
6. Meier Gerald M. and James E. Rauch, “Leading Issues in Economic Development” Oxford University Press, 2006
7. Ray Debraj (1998) “Development Economics”, Oxford University Press
8. Solow Robert M. (2000) “Growth Theory An Exposition” Oxford University Press
9. Thirlwall, A.P. (1999), (6th Edition), Growth and Development, Macmillan, U.K.
10. Todaro, M.P. (1996), (6th Edition), Economic Development, Longman, London.

Recommended Readings:

1. Banerjee Abhijit V, Esther Duflo (2013) ‘Poor Economics: Rethinking Poverty & the Ways to End it’ Penguin
2. Barro Robert J. and Xavier Sala-i-Martin (2004) “Economic Growth ” Prentice Hall of India Brown, M. (1966), On the Theory and Measurement of Technical Change, Cambridge University Press, Cambridge, Mass.
3. Chenery, H. and T.N. Srinivasan (Eds.) (1989), Handbook of Development Economics, Vols.1 & 2, Elsevier, Amsterdam
4. Dasgupta, P. (1993), An Enquiry into Well-being and Destitution, Clarendon Press, Oxford.
5. Gillis, M., D.H. Perkins, M. Romer and D.R. Snodgrass (1992), Economics of Development,(3rd Edition), W.W. Norton, New York.
6. Meier, G.M. (1995), Leading Issues in Economic Development, (6th Edition), Oxford University Press, New Delhi.
7. Nayyar Deepak (2019) ‘Resurgent Asia’ OUP
8. Todaro Michael (1981) “Economics for A Developing World”, Longman, London.
- 9 Wavre Anilkumar & Londhe M , Economics of Development and Planning , (2019) Educational Publishers , Jalgaon , MS, India.

Reports:

1. Human Development Report, 1995-2009, UNDP, OUP Latest Reports
2. RBI Bulletin (latest issues)
3. World Development Report, Latest Reports
4. World Development Indicators, World Bank, OUP, Latest Reports

Syllabus

Class: M.A. - II Economics

Semester: III

Course Type: Credits Related to Major – Mandatory / Core

Course Name: Indian Financial System-I

Course Code: ECO 603 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

The financial system is the strong economic backbone of the global economy. The interaction between financial institutions and major financial instruments provides an important perspective on finance and the financial system. Financial institutions play an important role in the development process of the economy. By examining how financial institutions came into being, their roles and functions, students will gain a richer and more intuitive understanding of modern financial markets and institutions. This is the basis of the curriculum. This course is ideal for anyone who wants to increase their knowledge and skills in finance.

Course Outcome:

After completion of this course the students will be able;

1. To understand fundamentals of modern financial system.
2. To understand financial system and its relationship with economic development
3. To Analyze international financial environment
4. To understand The Indian Financial market.
5. To evaluate Reforms in Indian Financial System
6. To understand the role of the Reserve Bank of India in Indian financial system.
7. To provide the knowledge of various financial and non-financial institutions.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Financial System in India	14
	1.1 –Financial System – Meaning, Role of Financial System in Economic Development,	

	1.2 –Structure of Indian Financial System, Financial Institutions, Financial Markets, Financial Instruments.	
	1.3 – Development of Indian Financial System, Financial Sector Reforms in India.	
2	2. Reserve Bank of India 2.1 – Objective and Functions of RBI. 2.2. – Autonomy of Reserve Bank of India; Advantages and Limitations. 2.3 – Role of RBI in Indian Economy – Note Issuing, Government Banker, Banker’s bank, supervisory authority, etc. 2.4 - Monetary policy of RBI – Recent Developments and Challenges.	14
3	3. Banking Institutions in India 3.1 – Evolution of Banking in India, Performance of Commercial Banks, RRBs and Co-operative Banks in India. 3.2 - Role of banks in economic development, Credit Creation and Profitability of banks, 3.3 – Policies for development of Banking in India – Nationalization of banks – meaning and objectives, Mergers 3.4 – Banking sector reforms – Profitability and NPAs of banks in India, Modern technology in banking sector of India.	16
4	4. Financial Markets in India 4.1 - Classification of Financial Market in India. 4.2 - Indian Money Market: Features, Significance Functions and Instruments, Defects of the Indian Money Market 4.3 - Capital Market: Constituents of Capital Market, Structure, Role and Financial Instruments of Capital Market 4.4 - Credit Rating Services: Meaning, Need, Benefits & Rating Agencies in India. (CRISIL, ICRA,CARE)	16

Basic Reading List:

1. Bhole, L. M., Jitendra Mahakud (2017) ‘Financial Institutions and Markets’ Tata McGraw Hill, ND
2. Das S. C. (2015) ‘The Indian Financial System: Markets, Instruments, Institutions, Services and Regulations’ PHI Learning

3. Pathak, Bharati (2009) 'The Indian Financial System, Pearson Education
4. Frederic Mishkin and Stanley Eakins (2006) 'Financial Markets and Institutions', Pearson 5th Ed
5. Gurusamy S. (2004) "Financial Markets and Institutions", Vijay Nicole Imprints
6. Machiraju H.R. (2006) 'Indian Financial System, Vikas Publications, ND
7. Khan M.Y. "Indian Financial System", New Delhi: Tata McGraw-Hill Pub. Co

Recommended Readings:

1. Bhasin, Niti (2014) "Indian Financial System: Evolution and Present Structure" New Century Publications.
2. Chandavarkar Anand (1996) "Central Banking in Developing Countries" St. Martin's Press, USA
3. D. Muralidharan (2009) 'Modern Banking Theory and Practice,' PHI Learning Pvt. Ltd. New Delhi
4. Harker, P.T., S. A. Zenios (2000) 'Performance of Financial Institutions', CUP, UK
5. Indian Institute of Banking and Finance (2018) 'Central Banking', Macmillan Publishers, India
6. Indian Institute of Banking and Finance (2017) 'Information Systems for Banks', Taxmann Publishers, India
7. Prasad, K.N.(2001) 'Development of India's Financial System,' Sarup and Sons, New Delhi
8. Saha Siddhartha (2017) 'Indian Financial Systems and Markets, McGraw Hill Education
9. Sharma, K.C. (2007) 'Modern Banking in India,' Deep and Deep Publications New Delhi
10. Vasudevan A. (2003) "Central Banking in Emerging Economies" Academic Foundation

Reports:

1. RBI Annual Reports, Monthly Reviews, Occasional Papers (www.rbi.org.in)
2. Reports on Currency and Finance
3. Economic and Political Weekly

Syllabus

Class: M.A. - II Economics

Semester: III

Course Type: Credits Related to Major – Mandatory / Core

Course Name: Indian Financial System-II

Course Code: ECO 604 MJP

No. of Credits: 2 Credits [Practical]

No. of Hours: 60 Hours

Total Marks: 50 Marks

Preamble

The financial system is the strong economic backbone of the global economy. The interaction between financial institutions and major financial instruments provides an important perspective on finance and the financial system. Financial institutions play an important role in the development process of the economy. By examining how financial institutions came into being, their roles and functions, students will gain a richer and more intuitive understanding of modern financial markets and institutions. This is the basis of the curriculum. This course is ideal for anyone who wants to increase their knowledge and skills in finance.

Course Outcome:

After completion of this course the students will be able;

1. To understand fundamentals of modern financial system.
2. To understand financial system and its relationship with economic development
3. Analyze international financial environment
4. To understand The Indian Financial market.
5. To evaluate Reforms in Indian Financial System
6. To understand the role of the Reserve Bank of India in Indian financial system.
7. To provide the knowledge of various financial and non-financial institutions.
8. To understand the Indian Share Markets.

PRACTICAL WORK

Unit No.	Practical Work Contents	Hours
1	1. Practical	30
	1.1 – Study of Financial Institutions in India	

	1.2 - Study of Stock Market in India	
	1.3 - Study of Multi Commodity Exchange (MCX).	
	1.4 - Analysis of SEBI – BSE & NSE	
	1.5 - Study of Bank Nifty Components	
	1.6 - Study of Nifty 50	

Note: Students should prepare the Practical Work Book.

Sr. No.	Practical Exam Pattern	Marks
1.	Internal Assessment - Teachers should choose any three tools out of given above for Internal Assessment	15
2.	Practical Assessment a] Practical work Book – 15 Marks b] Viva Voce / Presentation (Problem Solving / PPT / Poster) – 20 Marks	35
	Total	50

Basic Reading List:

1. Bhole, L. M., Jitendra Mahakud (2017) 'Financial Institutions and Markets' Tata McGraw Hill, ND
2. Das S. C. (2015) 'The Indian Financial System: Markets, Instruments, Institutions, Services and Regulations' PHI Learning
3. Pathak, Bharati (2009) 'The Indian Financial System, Pearson Education
4. Frederic Mishkin and Stanley Eakins (2006) 'Financial Markets and Institutions', Pearson 5th Ed
5. Gurusamy S. (2004) "Financial Markets and Institutions", Vijay Nicole Imprints
6. Machiraju H.R. (2006) 'Indian Financial System, Vikas Publications, ND
7. Khan M.Y. "Indian Financial System", New Delhi: Tata McGraw-Hill Pub. Co

Recommended Readings:

1. Bhasin, Niti (2014) "Indian Financial System: Evolution and Present Structure" New Century Publications.
2. Chandavarkar Anand (1996) "Central Banking in Developing Countries" St. Martin's Press, USA

3. D. Muralidharan (2009) 'Modern Banking Theory and Practice,' PHI Learning Pvt. Ltd. New Delhi
4. Harker, P.T. ,S. A. Zenios (2000) 'Performance of Financial Institutions', CUP, UK
5. Indian Institute of Banking and Finance (2018) 'Central Banking', Macmillan Publishers, India
6. Indian Institute of Banking and Finance (2017) 'Information Systems for Banks', Taxmann Publishers, India
7. Prasad, K.N.(2001) 'Development of India's Financial System,' Sarup and Sons, New Delhi
8. Saha Siddhartha (2017) 'Indian Financial Systems and Markets, McGraw Hill Education
9. Sharma, K.C. (2007) 'Modern Banking in India,' Deep and Deep Publications New Delhi
10. Vasudevan A. (2003) "Central Banking in Emerging Economies" Academic Foundation

Reports:

1. RBI Annual Reports, Monthly Reviews, Occasional Papers (www.rbi.org.in)
2. Reports on Currency and Finance
3. Economic and Political Weekly

Recommended Journals:

1. Prajnan [NIBM],
2. Journal of Banking and Finance- Elsevier
3. Journal of Money, Credit and Banking- Wiley Online
4. Journal of Banking and Financial Technology-Springer

Syllabus

Class: M.A. - II Economics

Semester: III

Course Type: Credits Related to Major – Elective

Course Name: Demography

Course Code: ECO 611 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

The main objective of this paper is to make the students aware of the importance of population in economic development and the various theories that explain the growth of population in a country. The paper also enlightens the students on the quantitative and the qualitative aspects and characteristics of the population through various demographic techniques. In recent times, the gender aspect of the population has acquired importance and these have also been included in the framework of study. Fertility and Aging are also vital characteristics of the undergoing structural change. Their study is essential to understand the dynamics of this change. The paper exposes the students to sources of population and related characteristics and also to the rationale, need and evolution of population policy.

Course Objectives:

1. To provide an understanding of Demography and its application under various topics under economics.
2. To demonstrate the practical and the applied aspects of Demography and the study of Population and its relation to Economics.

Course Outcome:

After Learning this course, the students will be;

1. Able to develop, demonstrate and examine various topics under Demography.
2. Able to evaluate and examine subject areas in economics bringing out the relation to population studies and demography.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Demography	10
	1.1 – Demography: Meaning and Concept, Demography and Economics, Development of Population Studies.	
	1.2 – The Optimum Population Theory, The Malthusian theory of Population.	
	1.3 – Post-Malthusian Theories of Population, The Theory of Demographic Transition	
2	2. Growth of Population: World Scenario	16
	2.1 – Stages of Population Growth – Primitive, Pre-Industrial	
	2.2. - World Population Growth and Distribution, Growth of population in Developed and Developing Countries.	
	2.3 - Measures of Population Growth - International Comparison of Population.	
3	3. Population and Development	20
	3.1 – Technological Change and Population, Effects of Development on Population Growth and vice versa.	
	3.2 - Population and Natural Resources- Environment, Population, Savings and Economic Growth.	
	3.3 - Population and Labour force- Labour Force Participation & Work Force Participation.	
	3.4 - Population Policy, 2000 in India.	
4	4. Demography of India	14
	4.1 – Phases of Growth of Population in India, Size and Growth of Population in India.	
	4.2 –Birth rate –factors affecting Fertility, Causes and Measures to reduce birth rate in India,	
	4.3 – Mortality in India, Causes and Measures to reduce Mortality	
	4.4 – Age and Sex Structure- Determinants, Rural – Urban Distribution.	

Basic Reading List

1. Bogue, D.J. (1971), Principles of Demography, John Wiley, New York
2. Bhende, Asha A., Tara Kanitkar (2013) *Principles of Population Studies*, Himalaya Publishing House, Mumbai
3. Mujumdar P. K (2013) “Indian’s Demography: Changing Demographic Scenario in India”, Rawat Publications
4. Sinha V.C., Easo Zacharia (1986) ‘Principles of Demography’ Allied Publishers, 2nd Edition
5. Srinivasan Krishnamurthy (2017) “Population Concerns in India: Shifting Trends, Policies and Programs” Sage Publications
6. Srinivasan, K. and A. Shariff (1998), India: Towards Population and Demographic Goals, Oxford University Press, New Delhi

Reports

1. Census of India, Census Commissioner and Registrar General of India, Government of India, New Delhi, Latest Census
2. Family Welfare Programme in India, Year Book 2012, Government of India
3. National Family Health Survey, Government of India & IIPS, Mumbai, Recent Reports
4. National Population Policy 2000, Government of India
5. United Nations (1973) “Determinants and Consequences of Population Trends”

Recommended Books

1. Agarwala S.N. (1972), “India’s Population Problem”, Tata McGraw-Hill Co
2. Bose, A. (1996), “India’s Basic Demographic Statistics”, B.R. Publishing, New Delhi
3. Chakraborti Rajagopal D (2004) “The Greying of India: Population Ageing in the Context of Asia” Sage Publications
4. Chenery H., T.N. Srinivasan (Eds.) (1989), “HandBook of Development” Economics, Vol.1 & 2 Elsevier, Amsterdam
5. Choubey, P.K. (2000), “Population Policy in India”, Kanishka Publications, New Delhi
6. Dasgupta Sukti, Sher Singh Verick (2016) “Transformation of Women at Work in Asia: An Unfinished Development Agenda” Sage Publications
7. Easterlin Richard A (1987) “Population and Economic change in Developing Countries”, National Bureau of Economic Research, University of Chicago Press
8. G Giridar (Ed) (2014) “Population Aging In India” Cambridge University Press

9. Gulati, S.C. (1988), “Fertility in India: An Econometric Study of a Metropolis”, Sage, New Delhi. Economics
10. Seth Mira (2001) “Women and Development: The Indian Experience”, Sage 20
11. Simon, J.L. (1992), “Population and Development in Poor Countries”, Princeton University Press.
12. Srinivasan, K. (1998), “Basic Demographic Techniques and Applications”, Sage, New Delhi
13. Kute S & Rithe M, Demography, (2017), Prashant Publication, Jalgaon MS, India.

Recommended Journals:

1. Antyajaa – Indian Journal of Women and Social Change - Sage
2. Demography – Springer
3. Economic and Political Weekly
4. Journal of Population Research - Springer
5. Journal of Demographic Economics - Cambridge
6. Management and Labour Studies- Sage
7. Population and Development Review – Wiley Online
8. Population Studies – Taylor and Francis Online

Syllabus

Class: M.A. - II Economics

Semester: III

Course Type: Credits Related to Major – Elective

Course Name: Mathematical Economics

Course Code: ECO 612 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

The role of Mathematics is equally important in Economics. The use of Mathematics can provide a better understanding of various areas under Economics with mathematical applications to economic theories and with the help of modelling techniques. Mathematical applications help understand, discuss and appreciate micro and macroeconomics concepts and theories better. Besides, applied economics make use of mathematical applications to provide more elaborate and enhanced understanding of challenges in the real world.

Course Objectives:

1. To provide an understanding of Mathematics and its application under various topics under economics.
2. To demonstrate the practical and the applied aspects of economics with the help of Mathematics.

Course Outcome:

After Learning this course, the students will be;

1. Able to develop, demonstrate and examine various topics under economics with the help of Mathematics.
2. Able to evaluate and examine subject areas in economics with the mathematical economics.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Nature of Mathematical Economics	15
	1.1 – Introduction & Meaning, Mathematical Economics versus Nonmathematical Economics.	
	1.2 - The concept of Sets, Real Number System, Ingredients of Mathematical Models – variables, constants, parameters, Equations and Identities.	
	1.3 - Power of Number; Logarithms and their Properties, Introduction to Algebra, Linear and Quadratic Equations.	
	1.4 – Types of Functions – Constant, Polynomial, Rational, Non algebraic, Logarithmic Functions, Extensions of function - More than two independent variables	
2	2. Equilibrium Analysis in Economics	10
	2.1 – Equilibrium: Meaning	
	2.2. – Partial Equilibrium – Linear Model, Non-linear Model and General Model.	
	2.3 - Market Demand, Supply Curves, Total Revenue, Cost Functions	
	2.4 – Indifference Curves, General Production Function, Isoquants	
	2.5 – Production Possibility Frontiers and its use in Economics	
3	3. Matrix Algebra	10
	3.1 – Meaning, Matrices and Vectors, Elementary operations of Addition and subtractions of matrices, Scalar Multiplication etc.	
	3.2 - Transpose and Inverse of Matrices, Rank of a Matrix, Finding Inverse Matrix.	
	3.3 – National Income Model, Solution of Simultaneous Equation using Matrices.	
4	4. Differential Calculus	15
	4.1 – Meaning, Concept of Derivative, Concept of Limit – Limit Theorems, Continuity at a point, Over and Interval.	

	4.2 - Rules of Differentiation Including Product, Quotient, and Chain Rule, Partial Differentiation.	
	4.3 –Differentials and Derivatives, Total Derivatives, Derivatives of Implicit Functions.	
	4.4 - Profit Maximization in the different types of Markets	
	4.5 - Price Discrimination by Monopolist to Maximize Profits	
5	5. Integration	10
	5.1 - Indefinite integral of Algebraic, Exponential and Logarithmic Functions	
	5.2 - Define Integrals	
	5.3 - The relation between Average and Marginal concepts	
	5.4 - Capital values under Continuous Interest	

Basic Reading List:

1. Chaing A. C (2017) 'Fundamental Methods of Mathematical Economics' McGraw Hill Education
2. Edward Dowling (2011) 'Schaum's Outline of Introduction to Mathematical Economics' 3rd Edition (Schaum's Outlines), McGraw Hill Education
3. Simon Carl P. and Blume Lawrence (1994) 'Mathematics for Economists' W. W. Norton & Co.

Recommended Books:

1. Hoy (2012) Mathematics for Economics, Prentice Hall India
2. Pemberton Malcolm, Nicholas Ray (2016) 'Mathematics for Economists' Manchester University Press
3. Rosser M. J. (1993) 'Basic Mathematics for Economists' Routledge
4. Sydsaeder Knut, Hammond p., Strom A. (2013) 'Essential Mathematics for Economics' Pearson Education
5. Yamane Taro (1981) 'Mathematics for Economists: An Elementary Survey' Prentice Hall India Learning Private Ltd.

Recommended Journals:

1. Indian Journal of Pure and Applied Mathematics-Springer
2. Journal of Mathematical Economics- Elsevier

Syllabus

Class: M.A. - II Economics

Semester: III

Course Type: Credits Related to Major – Elective

Course Name: Rural Development

Course Code: ECO 613 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

Rural Economics is a specialized area in economics studying rural economies, both farm as well as non-farm. Rural Economics provides an understanding of the various aspects of rural economies on production, growth, development and livelihood with a relevant theoretical background. The subject discusses rural economic structure, rural infrastructure as well as rural employment. Various topics are discussed and analyzed that concern sustainable development of rural economies.

Course Objectives:

1. To develop an understanding of rural economics in the theoretical as well as practical context.
2. To discuss and debate the various issues and challenges faced by rural economies with reference to the farm and non-farm sector, the growth and development of rural economies, etc.

Course Outcome:

After Learning this Course, the Students will Develop -

1. Ability to analyze and evaluate the subject with reference to various aspects of rural economies.
2. Ability to develop an understanding of the rural sector with its intricacies and imperfections and to be able to construct intellectual dialogue on the challenges of agriculture w.r.t. the Indian Economy.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Rural Economy: An Introduction	10
	1.1 - Definition of a Rural Economy, Characteristics of Rural Economy.	
	1.2 – Difference between Rural & Urban Economy.	
	1.3 – Basic Elements of Rural Development, Some Dilemmas in Development.	
2	2. Theories of Rural Development	15
	2.1 – Rural Development – Classical Approach	
	2.2. – Modernization theory, Dependency Theory of Rural Development.	
	2.3 – Lewis Model of Rural Development, Human Capital Model, Gandhian Model of Rural Development	
3	3. Rural Development – Determinants and Challenges	20
	3.1 – Determinants of Rural Development – Resources – Natural & Physical, Changes in Output, Technology, Infrastructure, Organizations and Institutions.	
	3.2 – Role of Agriculture, Rural Industries, Panchayati Raj Institutions in Rural Development.	
	3.3 – Challenges before Rural Development – Agriculture Distress, Finance, Irrigation, Poverty, Unemployment & Migration	
	3.4 - Education & Health in Rural Areas, Status of Infrastructure.	
4	4. Rural Development Policies in India	15
	4.1 – Rural Development Policies – National Forest Policy, Land Reforms, Agriculture Price Policy, Rural Credit Policy, National Agriculture Policy, Policy for Cooperatives.	
	4.2 – Poverty and Unemployment Alleviation Programmes – Public Distribution System, IRDP, MGNAREGA, PM - Awas Yojana.	

	4.3 Social Welfare Oriented Programmes. Self-Help Groups Promotion.	
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Basic Reading List:

1. Datt Gaurav and Ashwini Mahajan: Datt and Sundharam's Indian Economy, S. Chand and Company Private Limited, New Delhi. (Available in Hindi also)
2. Green, Gary Paul (2013): Handbook of Rural Development, Edward Elgar Publishing Limited.
3. Guinjoan Eloi, Anna Badia, Antoni Tolla (2016): The New Paradigm of Rural Development: Theoretical Considerations and Reconceptualization Using the "Rural Web" Boletín de la Asociación de Geógrafos Españoles N0 17-2016; pages 495-500. ISSN 0212-9426.
4. Puri and Mishra: Indian Economy, Himalay Publishing House. (Available in Hindi also)
5. Ray, Christopher (2001): Culture Economies: A Perspective on Local Rural Development in Europe, Center for Rural Economy, New Castle University, UK.
6. Van der Ploeg, J.D. and Terry Marsden (2008): Unfolding Webs: The Dynamics of Regional Rural Development, Royal Van Gorcum, Assen, The Netherlands.

Recommended Books:

1. Katar Singh & Anil Shishodia (2023), Rural Development: Principles, Policies and Development, Atlantic Publishers and Distributors (P) Ltd.
2. K. R. Gupta (2004), Rural Development in India, Atlantic Publishers and Distributors (P) Ltd
3. M. Ghosh (2013), Rural Development in India: Challenges and Prospects, Serials Publication
4. B K Prasad (2003), Rural Development: Concept Approach and Strategy, Sarup & Sons Publishers.

Recommended Journals:

1. Artha Vijnana, Gokhale Institute of Politics and Economics.
2. Arthamimansa, Vidarbha Arthashastra Parishad, Maharashtra.
3. Arthasamwad, Marathi Arthashastra Parishad, Maharashtra.
4. Indian Economic Review, Department of Economics, Delhi School of Economics.
5. Labour and Development, V.V. Giri National Labour Institute.
6. The Indian Journal of Economics, Department of Economics, University of Allahabad.

Syllabus

Class: M.A. - II Economics

Semester: III

Course Type: Credits Related to Major – Research Project

Course Name: Research Project

Course Code: ECO 631 RP

No. of Credits: 4 Credits [Project]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble:

Students who complete their post-graduation in Economics are mentally equipped to pursue research in the same discipline. It is generally accepted that research is nothing but extension and application of knowledge in a certain specialized field. Therefore students who do their post-graduation, as internal students will be given an opportunity to get exposed to a few elements of social research and also they are expected to complete a small research project under the expert guidance and supervision, Elementary knowledge of research methodology shall consolidate and deepen their understanding of various branches of Economics.

Preparing a Research Project Proposal is intended to train them in scientific thinking and art of systematic presentation. It is essentially a job-oriented exercise to enable them to take up the exciting field of social and economic research.

Course Objectives:

1. To enable an understanding of Research and its methods under various areas of economics.
2. To demonstrate the practical and the applied aspects of research in relation to Economics.

Course Outcome:

1. Ability to develop, demonstrate and examine topics under Economics to pursue research.
2. Ability to evaluate and examine subject areas in economics and explore possibilities of research.

Part I: III Semester students shall submit a Research Project Proposal minimum 2500 words & maximum 3,000 words or 10-15 pages in three copies to the Head of the Department on or before 15th September. The Research Project Proposal shall be prepared under the guidance of an internal postgraduate recognized teacher.

Part II: An internal supervisor shall assess each Research Project Proposal for out of 30 marks, based on the outline and quality of the Research Project Proposal.

Viva voce: Research Project Proposal - 30 Marks, A viva voce examination of each candidate shall be held where he/she will have to make a presentation of the Research Project Proposal. A panel of two referees shall be formed out of whom one shall be an internal examiner. The viva voce shall carry 40 marks. Internal & external examiners shall give out of 20 marks each. The copies of Research Project Proposal and the record of the viva voce examination shall be maintained by the center for two more academic years for inspection.

Tentative Format for Research Project Proposal / Outline

1. Introduction
2. Review of Relevant Literature
3. Importance of Study
4. Statement of Problem
5. Hypothesis
6. Objectives of Study
7. Research Methodology
 - A. Research Method
 - B. Tools of Data Collection
 - i) Primary Data
 - ii) Secondary Data
 - C. Selection of Sample
 - D. Techniques of Analysis of Data
10. Scope & Limitations of the study
11. Scheme of Chapter (Tentative)
 1. Introduction
 2. Research Methodology
 3. Review of Literature
 4. Profile of Study Area
 5. Data Analysis
 6. Finding & Suggestion
 7. Bibliography
 8. Appendix

Evaluation Method

Sr. No.	Research Project Proposal	Marks
1	Internal Assessment – Research Project Proposal - Research problem, Relevant Literature, Methodology, contents and quality of the Research Project Proposal	30
2	Project Assessment a] Research Project Proposal - 30 Marks b] Viva Voce / Presentation – 40 Marks [Internal Examiner 20 + External Examiner 20]	70
Total		100

References:

- 1) Wilkinson and Bhandarkar - Methodology and Techniques of Social research - Pauline, Young - Scientific Social Surveys and Research
- 2) Goode and Hatt - Methods in Social Surveys and Research
- 3) Krishnaswamy K.N. and Appalyer Sivakumar (2009): Management Research Methodology, Pearson Education Publication,. N. Delhi
- 4) Sharma Prasad and Satyanarayana (ed) Research Methods in Social Sciences
- 5) Moser and Kalton - Survey Methods in Social Investigations
- 6) Sadhu and Singh - Research Methodology in Social Sciences
- 7) Kurein C. T. A guide to research in Economics.
- 8) Devendra Thakur - Research Methodology in Social Sciences
- 9) Basotia G.R. Sharma K.K.- Research Methodology
- 10) Kothori C.R. Research methodology New era Publication

New Syllabus as per NEP 2020

MA - II ECONOMICS
SEMESTER - IV

Savitribai Phule Pune University

(Formerly University of Pune)

MA II - ECONOMICS SEMESTER - IV

- Subject List -

Sr. No.	Subject Type	Subject Code & Title	Credits		
			Theory	Practical	Total
1	Mandatory/Core	EC0-651-MJ- Macro Economic Analysis - II	4	-	4
2	Mandatory/Core	EC0-652-MJ- Economic Growth & Development - II	4	-	4
3	Mandatory/Core	EC0-653-MJ- Economics of Environment - I	2	-	2
4	Mandatory/Core	EC0-654-MJP - Economics of Environment - II	-	2	2
5	Elective	EC0-660-MJ- Public Policy	4	-	4
	Elective	EC0-661-MJ- Urban Economics			
	Elective	EC0-662-MJ- Econometrics			
6	Research Project	ECO-681-RP- Research Project	-	6	6
Total			14	08	22

Syllabus

Class: M.A. - II Economics

Semester: IV

Course Type: Credits Related to Major – Mandatory / Core

Course Name: Macro Economic Analysis - II

Course Code: ECO 651 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

Macroeconomics or aggregative economics analysis establishes the functional relationship between various aggregates of the economy. Aggregative analysis assumed such a great significance in recent times that a prior understanding of macroeconomic theoretical structure is considered essential for proper comprehension of different issues and policies. Macroeconomics now is not only a scientific method of analysis but also a body of empirical economic knowledge. The course equips the students at the postgraduate level to understand systematic facts and theoretical developments for empirical analysis,

Course Objectives:

- To provide a thorough understanding of the principles of macroeconomics and the application of macroeconomic concepts in real-life situations.
- To discuss the modern developments in macroeconomics.

Course Outcome:

Students will Develop -

- Ability to analyze and demonstrate knowledge of the basic theories/laws in macroeconomics.
- At the end of the course, the student should be able to evaluate macroeconomic concepts, models and its use in real life situations.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Consumption and Investment	14
	1.1 - Meaning and Concepts of Consumption Function (APC, MPC)	
	1.2 - Psychological Law of Consumption	
	1.3 - Factors Influencing Consumption Function	

	1.4 - Investment – Meaning, Gross and Net Investment, Autonomous and Induced Investment	
	1.5 - Marginal Efficiency of Capital	
	1.6 - Investment Multiplier, Acceleration Principle	
2	2. IS-LM Curve Model	16
	2.1 - Introduction – The Structure of Model	
	2.2. - Derivation of IS Curve and LM Curve – Shifts in IS Curve and LM Curve, Causes of shifts in IS and LM Curve	
	2.3 - Simultaneous Equilibrium in Goods Market and Money Market – Extension IS-LM model with government sector Fiscal Policies	
3	3. Inflation And Deflation	16
	3.1 - Inflation Meaning and Types, Demand Pull and Cost Push Inflation	
	3.2 - Inflation and Unemployment – Philips Curve , Relation between short -run Philips Curve and long-run Philips Curve	
	3.3 - Deflation Meaning , Causes and Effects	
	3.4 - Stagflation and Supply – Side Economics – Stagflation in India 1991, Causes of Stagflation	
	3.5 - Supply -Side Economics – Taxation and Labor Supply, Incentive to Save and Investment, the Tax wedge – tax revenue and Laffer Curve , a critical appraisal of supply of supply side Economics	
4	4. Classical Macro Economics and Open Economy Issues	14
	4.1 - Introduction – Meaning of Rational Expectations – Barrow's view	
	4.2 - The Neo-Classical Model	
	4.3 - The Role of the Monetary and Fiscal Policy	
	4.4 - Rational Expectations and The Real Business Cycles	
	4.5 - Open Economy – Balance of Trade – Balance of Payments – Mundel – Fleming Model, Exchange Rate Regimes.	

Basic Reading List:

1. August Swan Enberg (2005) 'Macroeconomics Demystified' A Self Teaching Guide, Mcgraw Hill Education
2. Ackley,G.(1978), Macro Economics : Theory and Policy, Macmillan, New York.
3. Agrawal Vanita, Macroeconomics: Theory and Policy, Pearson Publication, New Delhi.
4. Ahuja H.L., Macroeconomics: Theory and Practice, S. Chand & Co. New Delhi.
5. Blackhouse, R. and A. Salansi (Eds.) (2000) Macroeconomics and the Real World (2 Vols.), Oxford University Press, London. Dornbusch,
6. Campbell R. McConnell, Stanley L. Brue, (2001) Macroeconomics: Principles, Problems and Policies', McGraw Hill, Inc, New York.
7. Froyen Richard T (2006) 'Macroeconomics– Theories and Policies' Pearson Education; 8th edition
8. Gupta S.B. (1997) 'Monetary planning for India' OUP
9. Jha, R. (1991), Contemporary Macroeconomic Theory and Policy, Wiley Eastern Ltd., New Delhi.
10. Mankiw Gregory (2007) 'Macroeconomics' Worth, New York
11. Rao, V.K.R.V. (1983) India's National Income : 1950 to 1980, Sage Publications, New Delhi
12. Gupta, S.B. (1995), Monetary Planning in India, OUP, New Delhi.
13. Sampat Mukherjee (2013), 'A Global Text-Macroeconomics', New Central Book Agency
14. Soumyen Sikdar (2006) 'Principles of Macroeconomics' Oxford University Press

Press Recommended Readings:

1. Branson, W.A. (1989), Macroeconomic Theory and Policy, (3rd Edition), Harper and Row, New York.
2. Culbertson, J.M. (1968), Macroeconomic Theory and Stabilization Policy, McGraw Hill, Kogekosh, Tokyo.
3. Dusenbery, J.S. (1949), Income Saving and the Theory of Consumer Behaviour. Harvard University Press, Harvard.
4. Edey, M. and A.T. Peacock (1967), National Income and Social Accounts, Hutchinson University Library, London
5. Fisher, Dornbusch, Schamalensee (1988) 'Economics' McGraw Hill International Edition ; 2nd edition
6. Friedman, M. (1957), The Theory of Consumption Function, Princeton University Press Princeton.
7. Friedman, M. (1956), Studies in the Quantity Theory of Money, The University of Chicago Press, Chicago

8. Glahe, Fred, R.(1973), Macroeconomics: Theory and Policy, Harcourt Brace Jovanovich, Inc, New York.
9. Harris Lawrence (1980) 'Monetary Theory' McGraw Hill Inc.
10. Keynes, J.M. (1936), 'The General Theory of Employment Interest and Money', 7 Macmillan, London.
11. Ruggles, R. and N. Ruggles (1956), National Income Accounts and Income Analysis, McGraw Hill New York.
12. Shapiro, E.(1996) Macroeconomic Analysis, Galgotia Publications, New Delhi.
13. D. Wrightsman 'An Introduction to Monetary Theory and Policy' The Free Press New York 1983
14. Bhise V.B , Khandare V.B & Babar , (2014) Macro Economics ,Chinmay Publication Aurangabad.
15. Kute S & Rithe M, Macro Economics, Prashant Publication Jalgaon, MS, India.

Recommended Journals:

1. Applied Economics- Taylor & Francis Online
2. Journal of Macroeconomics-Elsevier
3. Macroeconomics and Finance in Emerging Market Economies- Taylor & Francis Online
4. The Indian Economic Journal- Sage Journal

Syllabus

Class: M.A. - II Economics

Semester: IV

Course Type: Credits Related to Major – Mandatory / Core

Course Name: Economic Growth and Development - II

Course Code: ECO 652 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble:

This paper includes growth and development, social and sartorial aspects of development, importance of agriculture and industry, the rationale and pattern of industrialization in developing countries. The other important issues related to development

Such as policy environment, infrastructure –linkages, role of international trade, role of monetary and fiscal policies, investment criteria and relevance for planning have been included. This paper deals with the theoretical aspects of the process of growth and development including the role of agriculture and industry as well as the role of the state

Course Outcomes:

- 1) The sectoral aspects of growth and development and policies will help the students to understand the social and political aspects of economic development
- 2) The students will be able to undertake cross country analysis for the policies formulated by the international financial institutions.
- 3) New Institutional Economics will help in understanding the role of institutions in economic development and help in analysing the public policy formation.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Sectoral Interdependence	15
	1.1 Role of Agriculture in Development, Barriers to Agriculture Development.	
	1.2 Reforms in Agriculture Sector – Land Reforms, Size of land holding, Technology in Agriculture sector.	

	1.3 Role of Industrial & Service Sectors in Development, Growth in Sectoral Output, Interdependence of Agriculture, Industry and Service Sectors.	
	1.4 Financing for Development – Keynesian Approach, Quantity Theory Approach, Financial System and Economic Development	
2	2. Technology and Development	15
	2.1 Role of Technology in Development, Technical Progress - Capital and Labour-Saving technical progress, neutral technical progress.	
	2.2 Techniques of Production – Labour Intensive and Capital Intensive, Employment versus Output, Technology and Developing Countries.	
	2.3 Investment in Human Capital – Education, Research and Development, Invention and Innovation.	
3	Development and Environment	15
	3.1 Economics and Environment, Concept of Sustainable Development and Environment Accounting	
	3.2 Environment Relationships to Population, Poverty, and Economic Growth	
	3.3 Environmental values, Measuring Environmental Values, Harvesting of Renewable and Non-renewable Resources	
	3.4 Global Warming and Climate Change – Impact upon Economic Development	
4	4. Development Strategies	15
	4.1 Planning Commission, Five Year Planning Model, NITY Ayog	
	4.2 New Economic Reforms, 1991 – Economic Stabilization & Structural Adjustment Programme, New Industrial Policy.	
	4.3 Agriculture Price Policy and New Agriculture Policy, Poverty and Unemployment Alleviation Programmes	
	4.4 Social Welfare-Oriented Programmes	

References –

1. James M. Cypher, James L. Dietz, The Process of Economic Development, Theory, Institutions, Applications and Evidence, Routledge

2. Chakravarti, S. (1982), Alternative approaches to the Theory of Economic Growth, Oxford University Press, New Delhi.
3. Ray Debraj, Development Economics, Oxford India.
4. Chenery, H. and t. N. Srinivasan (Eds.) (1989), Handbook of Development Economics, vols. 1 & 2, Elsevier, Amsterdam.
5. Analytical Development Economics: The Less Developed Economy Revisited, Kaushik Basu, Oxford India
6. Meier G.M, Rauch J.E., Leading Issues in Economic Development, 8th Edition, Oxford University Press
7. Behrman, S. and T. N. Srinivasan (1995), Handbook of Development Economics, Vol. 3, Elsevier, Amsterdam.

Websites:

1. <https://www.worldbank.org/>
2. <https://www.imf.org/en/Data>
3. <https://academic.oup.com/cje>
4. <https://www.adb.org/>

Recommended Journals -

1. Economic Development and Cultural Change- Chicago Press.
2. IMF Economic Review- Palgrave Macmillan
3. Review of World Economics-Springer

Syllabus

Class: M.A. - II Economics

Semester: IV

Course Type: Credits Related to Major – Mandatory / Core

Course Name: Economics of Environment

Course Code: ECO 653 MJ

No. of Credits: 2 Credits [Theory]

No. of Hours: 30 Hours

Total Marks: 50 Marks

Preamble:

This practical is designed to understand economics of changes in environment. Presently the changes in environment are causing economic development all over the world. Therefore, it is necessary to understand the side effects of global warming on human being and economic development process. The students will study, understand the changes in climate and bring it to the field stakeholders especially the farmers.

Course Objectives:

1. To create environmental awareness among the students.
2. To understand the economic consequences of global warming.
3. To provide the information to public especially the farmers.

Course Outcome:

This practical will strengthen the environmental values among the students. The practical will aware the students on economics of environment. Moreover, the students will disseminate the importance of environment and the side effects of environment degradation to the public.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Environmental Economics	15
	1.1 - Meaning of environmental economics	
	1.2 - Role of environment in economic development	

	1.3 - Climate change and performance of economic sectors	
	1.4 - Economic development and environment cost	
	1.5 - Weather forecasting; role in economic activities.	
2	2. Environmental Challenges	15
	2.1 - Environment and Agricultural Development – Technological Change –Use of Water, Fertilizers, Pesticides – Groundwater and Forest Depletion	
	2.2 - Environment and Industrial Development – Pollution, Urbanization	
	2.3 - Global Environmental Issues – Depletion of Ozone Layer, Green House Effect, Global Warming, Climate Change, Loss of Bio-diversity	
	2.4 - Global warming and its effects on Indian economy	
	2.5 - Prevention of environment degradation, international agreements on environment protection.	

Reading List:

1. Baumol, W.J. & Oates, W.E. (1997), The Theory of Environmental Policy, Prentice Hall, Englewood-cliffs
2. Bhattacharya, R. N. (2006), Environmental Economics: An Indian Perspective, Oxford University Press, New Delhi
3. Field, Barry & Field, Martha (2016), Environmental Economics: An Introduction, McGraw-Hill Education, New York.
4. Managi, Shunsuke & Kuriyama, Koichi (2017), Environmental Economics, Routledge, London and New York
5. Singh, Katar & Shishodia, Anil (2010), Environmental Economics: Theory and Applications, Sage Publications, New Delhi
6. Smith, Stephen (2011), Environmental Economics: A Very Short Introduction, Oxford University Press, New York
7. Ulaganathan, Sankar (2006), Environmental Economics, OUP, New Delhi

Recommended Books:

1. Ali, S.A. (1979), Resources for Future Economic Growth, Vikas Publishing House, New Delhi.
2. Charles Peering (1987) Economy and Environment Cambridge University Press, New York.
3. Dorfman, R & N. Dorfman (Eds.) (1977), Economics of the Environment. W.W. Norton, New York.

4. Hanley, Nick; Shogren, Jason & White, Ben (2004), Environmental Economics in Theory and Practice, McMillan India Limited, Delhi

Recommended Journals:

1. Journal of Environmental Economics and Management
2. Review of Environmental Economics and Policy
3. Environmental and Resource Economics
4. Ecological Economics
5. Annual Review of Resource Economics
6. Land Economics

Syllabus

Class: M.A. - II Economics

Semester: IV

Course Type: Credits Related to Major – Mandatory / Core

Course Name: Economics of Environment

Course Code: ECO 654 MJP

No. of Credits: 2 Credits [Practical]

No. of Hours: 60 Hours

Total Marks: 50 Marks

Preamble:

This practical is designed to understand economics of changes in environment. Presently the changes in environment are causing economic development all over the world. Therefore, it is necessary to understand the side effects of global warming on human being and economic development process. The students will study, understand the changes in climate and bring it to the field stakeholders especially the farmers.

Course Objectives:

1. To create environmental awareness among the students.
2. To understand the economic consequences of global warming.
3. To provide the information to public especially the farmers.

Course Outcome:

This practical will strengthen the environmental values among the students. The practical will aware the students on economics of environment. Moreover, the students will disseminate the importance of environment and the side effects of environment degradation to the public.

PRACTICAL WORK

Unit No.	Unit Title and Contents	Hours
1	1. Practical work	60
	2.1 - Making assignment on environment and its economics	
	2.2. - Conducting field visit and collecting information on side effects of environmental degradation and measures to control the degradation.	
	2.3 - Preparing a mini project on the work done.	

Note: Students should prepare the Practical Work Book.

Assessment Method

Sr. No.	Practical Exam Pattern	Marks
1.	Internal Assessment - Teachers should choose any three tools out of given above for Internal Assessment	15
2.	Practical Assessment a] Practical work Book – 15 Marks b] Viva Voce / Presentation (Problem Solving / PPT / Poster) – 20 Marks	35
	Total	50

Reading List:

1. Baumol, W.J. & Oates, W.E. (1997), The Theory of Environmental Policy, Prentice Hall, Englewood-cliffs
2. Bhattacharya, R. N. (2006), Environmental Economics: An Indian Perspective, Oxford University Press, New Delhi
3. Field, Barry & Field, Martha (2016), Environmental Economics: An Introduction, McGraw-Hill Education, New York.
4. Managi, Shunsuke & Kuriyama, Koichi (2017), Environmental Economics, Routledge, London and New York
5. Singh, Katar & Shishodia, Anil (2010), Environmental Economics: Theory and Applications, Sage Publications, New Delhi
6. Smith, Stephen (2011), Environmental Economics: A Very Short Introduction, Oxford University Press, New York
7. Ulaganathan, Sankar (2006), Environmental Economics, OUP, New Delhi

Recommended Books:

1. Ali, S.A. (1979), Resources for Future Economic Growth, Vikas Publishing House, New Delhi.
2. Charles Peering (1987) Economy and Environment Cambridge University Press, New York.
3. Dorfman, R & N. Dorfman (Eds.) (1977), Economics of the Environment. W.W. Norton, New York.
4. Hanley, Nick; Shogren, Jason & White, Ben (2004), Environmental Economics in Theory and Practice, McMillan India Limited, Delhi

Recommended Journals:

1. Journal of Environmental Economics and Management
2. Review of Environmental Economics and Policy
3. Environmental and Resource Economics
4. Ecological Economics
5. Annual Review of Resource Economics
6. Land Economics

Syllabus

Class: M.A. - II Economics

Semester: IV

Course Type: Credits Related to Major – Elective

Course Name: Public Policy-I

Course Code: ECO 660 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

Public Policy is a specialized area in social sciences, with special reference to economics along with political science and sociology; the subject covers the study of public policy, the process and perspectives of policy making and the analysis and evaluation of Public Policy. The study of Public Policy provides an understanding of the various aspects of policy making on theories, concepts, process, methods, analysis and evaluation. The subject discusses public policy in historical perspective, the concepts of public policy, the methodologies for implementation as well as evaluation along with the impact of globalization on public policy.

Course Objectives:

1. To develop an understanding of public policy in the theoretical as well as practical context.
2. To discuss and debate the various aspects of public policy and policy making

Course Outcomes:

After learning this course, the students will be;

1. Able to analyze and evaluate the subject with reference to various aspects of Public Policy.
2. Able to develop an understanding of the public policy, its perspectives and processes and to be able to construct intellectual dialogue on the policy making and policy analysis and evaluation

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Introduction to Public Policy	14
	1.1 - Concept, Meaning and Definitions of Public Policy	
	1.2 - Historical Emergence and Relevance of Public Policy	
	1.3 - Nature and Scope of Public Policy	
	1.4 - Perspectives of Policy Making, Impact of Globalization on Policy making	
2	2. Public Policy Making	16
	2.1 – Institutionalism, Process of Policy Making	
	2.2 – Policy as a Political Tool	
	2.3 - Public Choice	
	2.4 - Strategic Planning	
3	3. Policy Implementation and Evaluation	12
	3.1 - Policy Implementation – Meaning, Concept and Methods	
	3.2 - Policy Evaluation - Concept and Methods	
4	4. Economics of Public Policy	18
	4.1 - Types of Public Policy Analysis – Empirical, Normative, Retrospective and Prospective, Descriptive and Prescriptive	
	4.2 - Actors in Public Policy Analysis - Government, Media, Civil Society, Multinational Agencies, Transnational Agencies, International Donor Agencies	
	4.3 - Constraints in Public Policy Analysis- Economic Constraints, International Constraints, Social and Cultural Constraints, Political Constraints/Feasibility	
	4.4 - Emerging Trends – Ombudsman, Local Bodies, Whistle Blowers, Citizens Organizations	

Basic Reading List:

1. Anderson James. E., (2010) Public Policy-Making: An Introduction”, Cengage Learning, 7th Edition
2. Birkland Thomas A., (2005), An Introduction to The Policy Process: Theories, Concepts, And Models of Public Policy Making, Armonk;
3. Chandler. Dye Thomas (2008), Understanding Public Policy, Singapore, Pearson Education
4. Chakrabarti Rajesh, Kaushiki Sanyal (2016) “Public Policy in India” OUP India
5. Mathur Kuldeep (2015) Public Policy and Politics in India: How Institutions Matter” OUP India
6. McCool, Daniel C. (ed.), (1995), “Public Policy Theories, Models, and Concepts: An Anthology”, NJ: Prentice-Hall
7. Moran Michael, Martin Rein, Robert E. Goodin (2018) “The Oxford Handbook of Public Policy” OUP
8. Saumitra Mohan (2018) “Indian Policy and Development: A Manual for National Schemes and International Policies” McGraw Hill Education

Recommended Books:

1. Ashford, Doug (ed.), (1992), “History and Context in Comparative Public Policy”, Ithaca, NY: University of Pittsburgh Press.
2. Bergerson, Peter J. (ed.), (1991), “Teaching Public Policy: Theory, Research and Practice”, Westport, RI: Greenwood Press
3. Dahl, Robert and Charles Lindblom, (1976), “Politics, Economics and Welfare”, New York, Harper
4. Dror.Y, (1989), “Public Policy making Re-examined”, Routledge, 2nd Edition
5. Hill Michael, (2005), The Public Policy Process, Harlow, UK; Pearson Education, 5th Edition
6. Houghton Bardach, Eugene (1977), “The Implementation Game: What Happens After a Bill Becomes a Law”, Cambridge, MA: MIT
7. Howlett, Michael, and M. Ramesh, (1995), “Studying Public Policy: Policy Cycles and Policy Subsystems”, OUP, Toronto
8. Jones, C.O., (1970), “An Introduction to the Study of Public Policy”, Belmont, Prentice - Hall
9. Lerner, D. and H.D.Lasswell (eds.), (1951), “The Policy Sciences”, Stanford University Press
10. Lindblom, C.E., and E.J., Woodhouse, (1993), “The Policy making Process”, 3rd ed., Prentice - Hall

11. Nachmias, David, (1979), “Public Policy Evaluation: Approaches and Methods”, New York: St. Martin's Press
12. Jay M. Shafritz (ed) (1998), “International Encyclopedia of Public Policy and Administration”, Westview Press
13. John, Peter, (2012), “Analysing Public Policy”, Routledge, 2nd Edition
14. M.E. Sharpe Brewer, Gary D., and Peter de Leon (1983), “The Foundations of Policy Analysis”, Homewood, IL.: The Dorsey Press
15. Bellinger William K (2015) “The Economic Analysis of Public Policy” Routledge, 2nd Edition

Recommended Journals

1. Indian Journal of Public Policy and Administration - Sage
2. International Journal of Public Policy – Inderscience
3. Journal of Asian Public Policy –Taylor and Francis Online
4. Journal of Public Policy – Cambridge
5. Journal of Public Policy and Administration – Science Publishing Group
6. Science and Public Policy – Oxford Academic Journals

Syllabus

Class: M.A. - II Economics

Semester: IV

Course Type: Credits Related to Major – Elective

Course Name: Urban Economics

Course Code: ECO 661 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble

Urban Economics is a specialized area in economics studying urban economies. Urban Economics provides an understanding of the various aspects- conceptual and theoretical of urban economies. The subject discusses urban structure, urban infrastructure, urban development as well as labour and employment in urban spaces. Various contemporary topics are discussed and analyzed that concern sustainable development and livelihood creation in urban economies. It is also important to discuss the role of urban local bodies in the challenges of urbanization.

Course Objectives:

1. To develop an understanding of urban economics in the theoretical as well as practical context.
2. To elaborate and discuss on the various concepts and terminologies used in urban economies.
3. To discuss and debate the various issues and challenges faced by urban economies.

Course Outcome:

After Completing this Course, the Students will be;

1. Able to analyze and evaluate the subject with reference to various aspects of urban economies.
2. Able to develop an understanding of the urban spaces with its intricacies and imperfections and to be able to construct intellectual dialogue on the challenges of urbanization w.r.t. the Indian Economy.

At the end of this course a student will get an understanding of an Urban area, its special problems and the solutions adopted to deal with these problems.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Introduction to Urban Economics	12
	1.1 - Urban Economy – Concept and meaning, Process of Urbanization	
	1.2 - Growth of Urban Areas –Historical Perspective, Causes of Urbanization	
	1.3 - Urbanization and the drivers of Urban Economic Growth, Economics of Urban Growth	
2	2. Theories of Urban Growth	12
	2.1 - Classical Theories – The Von Thunen Model, Concentric Zone Model, Central Place Theory	
	2.2. - Modern Theories – Public Choice Theory, Planning Theory, Economics of Agglomeration	
3	3. Urban Problems and Governance	18
	3.1 – Types of Urban Local Bodies, Cantonment Board – Functions, Problems & limitations	
	3.2 - Slum Areas – Locations and Problems, Slum Development Policies, Local Body Finance	
	3.3 – Urban Poverty – Nature and Causes, Urban Transport – Types, Authorities and Problems	
	3.4 – Urban Labour Markets – Informal Employment	
4	4. Urban Development Policy in India	18
	4.1 - Urbanization in India – Growth of Urban Population, Migration	
	4.2 - Government Policies for Urban Development - Jawaharlal Nehru National Urban Renewal Mission (JNNURM)-2005, Atal Mission for Rejuvenation and Urban Transformation (AMRUT)-2015	
	4.3 – Pradhan Mantri Awas Yojana, Smart City Mission, National Urban Livelihood Mission, Heritage City Development and Augmentation (HRIDAY)	

Basic Reading List:

1. Ahrend, R., Lembcke, A. C., and Schumann, A. (2017). The Role of Urban Agglomerations for Economic and Productivity Growth. *International Productivity Monitor*, (32), 161.
2. Bhargava Gopal (2001): *Development of India's Urban, Rural and Regional Planning in 21st Century*, Gyan Publishing House, ISBN 9788121207140
3. Datt Gaurav and Ashwini Mahajan: *Datt and Sundharam's Indian Economy*, S. Chand and Company Private Limited, New Delhi. (Available in Hindi also)
4. Dwivedi Rishi Muni (2007): *Urban Development in India 1947 to 2007*. New Century Publications, New Delhi India. ISBN-10: 8177081233
5. Mani N (2016): *Smart Cities and Urban Development in India*, New Century Publications ISBN 9788177084320

Recommended Books:

1. Puri and Mishra: *Indian Economy*, Himalay Publishing House.
2. Patel Sujata and Kushal Deb (2009): *Urban Studies*, Oxford University Press. ISBN-10: 0198062524.
3. Arthur O'Sullivan (2018) *Urban Economics*, McGraw Hill; 9th edition.
4. Jene Jacobs (1970), *The Economy of Cities*, Mass Market Paperback.
5. Zenou Yves, *Urban Labour Economics*, Cambridge University Press.
6. Button K. J., *Urban Economics*, Palgrave Macmillan.
7. Maarten van Ham, Tiit Tammaru, et al. (2021), *Urban Socio-Economic Segregation and Income Inequality: A Global Perspective*, Springer Publishers.

Recommended Journals:

1. *Urban India*, National Institute of Urban Affairs
2. *Urbanisation*, Indian Institute for Human Settlement
3. *Indian Economic Review*, Department of Economics, Delhi School of Economics.
4. *Labour and Development*, V.V. Giri National Labour Institute.
5. *The Indian Journal of Economics*, Department of Economics, University of Allahabad.

Syllabus

Class: M.A. - II Economics

Semester: IV

Course Type: Credits Related to Major – Elective

Course Name: Econometrics

Course Code: ECO 662 MJ

No. of Credits: 4 Credits [Theory]

No. of Hours: 60 Hours

Total Marks: 100 Marks

Preamble:

Application of economic theory needs a reasonable understanding of economic relationships and relevant statistical methods. The syllabus of econometrics is to equip the students with an understanding of theoretical econometrics and the relevant applications of the econometric methods. This course covers various econometric methods applicable for testing empirical relationships in economics and those needed for applied economic research. An introductory module on time series methods has also been included in this course, which constitutes an important tool for analysis in economic studies.

Course Objectives:

1. To understand the econometric modelling and apply it in research in order to analyse the data
2. To demonstrate the practical and the applied aspects of econometrics involved in conducting empirical studies.

Course Outcome:

This course will develop analytical skills among the students. Applications of the skills in research to test the hypothesis, relationship among the variables and in data analysis for policy making can also be the outcome of the course.

UNITS AND CONTENTS

Unit No.	Unit Title and Contents	Hours
1	1. Introduction to Econometrics	14
	1.1 Meaning of Econometrics, Structure of Economic Data; Cross-Sectional, Time Series, Pooled, Panel Data,	

	1.2 - Regression Method; Linear & Non-Linear, Population Regression Function (PRF), Sample Regression Function (SRF),	
	1.3 - Ordinary Least Squares (OLS) Method, Classical Linear Regression Model; Assumptions.	
2	2. Regression Models	16
	2.1 - Simple Regression Model: Definition and Interpretation, Properties of OLS Estimators	
	2.2. - Hypothesis Testing; F-Statistics, T-Test, P-Value, Confidence Interval, Test of Significance	
	2.3 - Multiple Regression Model; Interpretation, Partial Correlation Coefficient, Goodness of Fit and Analysis of Variance (ANOVA)	
	2.4 - Violation of Classical Assumptions – Multicollinearity, Heteroscedasticity, Autocorrelation – Meaning & Remedies	
3	3. Qualitative Data Regression	14
	3.1 - What is Qualitative Data? Nature of Binary (Dummy) Variables, Single and Multiple Independent Dummy Variables,	
	3.2 - Binary Dependent Variable; Linear Probability Model	
	3.3 - Introduction to Logit and Probit Models, Panel Data; Meaning and Inferences.	
4	4. Time Series Data Analysis	16
	4.1 - Nature of Time-Series Data, Time Series Regression Models, Stochastic Process,	
	4.2 – Test of Stationarity, Unit Root Test, AR, MA And ARIMA Models, Approaches to Forecasting,	
	4.3 – Simultaneous Equation Models and Identification Problem; Rank and Order Condition	
	4.4 – Simple Regression Tools in MS Excel, Open-Source Software for Data Analysis - R	

Basic Reading List

1. Enders Walter (2018) 'Applied Econometric Time Series', (4th ed.) Wiley India
2. Gujarati, D. N., Porter, D. C. & Gunasekaran, S. (2009). Basic Econometrics. (5th ed.). Tata McGraw Hill

3. H. Stock James, W. Watson Mark (2017) 'Introduction to Econometrics' Pearson Education, Third Edition
4. Maddala G. S., Kajal Lahiri (2012) 'Introduction to Econometrics', John Wiley & Sons.
5. Jeffrey M. Wooldridge (2019), Introductory Econometrics: A Modern Approach, Cengage Learning Products, Canada.

Recommended Books:

1. Dominick Salvatore and Derrick Reagle (2011) Schaum's Outline of Statistics and Econometrics, Second Edition (Schaum's Outlines).
2. Dougherty, C. (2011) Introduction to Econometrics (4th ed). Oxford University Press.
3. Gujarati Damodar (2017) 'Econometrics by Example', Palgrave Macmillan, 2nd edition
4. Jeffrey M. Wooldridge (2008) 'Introductory Econometrics: A Modern Approach' South Western, Second Edition
5. Koutsoyiannis A. (2001) 'Theory of Econometrics' Palgrave Macmillan, Second Edition
6. Nachane, Dilip M. (2008). Econometrics: Theoretical Foundations and Empirical Perspective (1st ed.). Oxford Textbooks

Recommended Journals

1. Journal of Quantitative Economics, The Indian Econometric Society
2. Quarterly Journal of Economics, Oxford Academic.
3. Econometrica, The Econometric Society
4. Journal of Econometrics - Elsevier
5. The Econometrics Journal, The Royal Economic Society

Syllabus

Class: M.A. - II Economics

Semester: IV

Course Type: Credits Related to Major – Research Project

Course Name: Research Project

Course Code: ECO 681 RP

No. of Credits: 6 Credits [Project]

No. of Hours: 90 Hours

Total Marks: 150 Marks

Preamble:

Students who complete their post-graduation in Economics are mentally equipped to pursue research in the same discipline. It is generally accepted that research is nothing but extension and application of knowledge in a certain specialized field. Therefore students who do their post-graduation, as internal students will be given an opportunity to get exposed to a few elements of social research and also they are expected to complete a small research project under the expert guidance and supervision, Elementary knowledge of research methodology shall consolidate and deepen their understanding of various branches of Economics.

Preparing a small dissertation is intended to train them in scientific thinking and art of systematic presentation. It is essentially a job-oriented exercise to enable them to take up the exciting field of social and economic research.

Course Objectives:

1. To enable an understanding of Research and its methods under various areas of economics.
2. To demonstrate the practical and the applied aspects of research in relation to Economics.

Course Outcome:

1. Ability to develop, demonstrate and examine topics under Economics to pursue research.
2. Ability to evaluate and examine subject areas in economics and explore possibilities of research.

Part I: IV Semester students shall submit a Research Project minimum 10000 and maximum 12,000 words in two copies. The Research Project shall be prepared under the guidance of an approved teacher.

Part II: An internal supervisor shall assess each Research Project for out of 100 marks, based on the methodology, analysis, contents and quality of the dissertation.

Viva-voce: A viva voce examination of each candidate shall be held where he/she will have to make a presentation of the Research Project and defend the research. A panel of two referees shall be formed out of whom one shall be an internal examiner. The viva voce shall carry 50 marks. Internal & external examiners shall give out of 25 marks each. The copies of Research Project and the record of the viva voce examination shall be maintained by the center for two more academic years for inspection.

Tentative Format for Research Project / Dissertation

1. Introduction
2. Review of Relevant Literature
3. Importance of Study
4. Statement of Problem
5. Hypothesis
6. Objectives of Study
7. Research Methodology
 - A. Research Method
 - B. Tools of Data Collection
 - i) Primary Data
 - ii) Secondary Data
 - C. Selection of Sample
 - D. Techniques of Analysis of Data
10. Scope & Limitations of the study
11. Scheme of Chapter (Tentative)
 1. Introduction
 2. Research Methodology
 3. Review of Literature
 4. Profile of Study Area
 5. Data Analysis
 6. Finding & Suggestion
 7. Bibliography
 8. Appendix

1. Title page / Cover Page
 - 1.1 - Title page
 - a. Title of the project
 - b. Degree for which project is submitted.
 - c. Name of the candidate
 - d. Name and designation of the supervisor.
 - e. Name of the College
 - f. Month and year the project is presented
 - 1.2. Undertaking
 - 1.3. Certificate
 - 1.4. Acknowledgement
 - 1.5. Contents
 - 1.6. List of Tables
 - 1.7. List of Graphs, Maps & Diagrams
2. The Main Text / Chapter (Tentative)
 - 2.1. Introduction
 - 2.2. Research Methodology
 - 2.3. Review of Literature
 - 2.4. Profile of Study Area
 - 2.5. Data Analysis
 - 2.6. Hypothesis testing
 - 2.7. Conclusions / Finding
 - 2.8. Suggestion / Recommendations
3. Bibliography
4. Appendix
 - a. Questionnaire
 - b. Interview Schedule
 - c. Observation Schedule (optional)
 - d. Coding Frame (optional)
 - e. Any Other
5. Abbreviations
6. Photographs

General Guidelines

1. **Report length:** minimum of 80-100 pages
2. **Alignment:** Justify
3. **Font:** Times New roman
4. **Font size:** 12
5. **Line spacing:** 1.5
6. **No Page Border**

Evaluation Method

Sr. No.	Research Project	Marks
1	Research Project Methodology, analysis, contents and quality of the Research Project	100
2	Viva-voce / Oral [Internal Examiner 25 + External Examiner 25]	50
Total		150

References:

- 1) Wilkinson and Bhandarkar - Methodology and Techniques of Social research - Pauline, Young - Scientific Social Surveys and Research
- 2) Goode and Hatt - Methods in Social Surveys and Research
- 3) Krishnaswamy K.N. and Appalyer Sivakumar (2009): Management Research Methodology, Pearson Education Publication, N. Delhi
- 4) Sharma Prasad and Satyanarayana (ed) Research Methods in Social Sciences
- 5) Moser and Kalton - Survey Methods in Social Investigations
- 6) Sadhu and Singh - Research Methodology in Social Sciences
- 7) Kurein C. T. A guide to research in Economics.
- 8) Devendra Thakur - Research Methodology in Social Sciences
- 9) Basotia G.R. Sharma K.K.- Research Methodology
- 10) Kothori C.R. Research methodology New era Publication



Savitribai Phule Pune University, Pune

(Formerly, University of Pune)

Under Graduate Degree Program in Science

(Faculty of Science and Technology)

Revised Syllabi as per National Education Policy (2020) for

FYBSc Restructuring Pattern (Semester-I and II)

**(Applicable for Collges having Permission to Run Restructuring Pattern under UGC
Permission)**

To be implemented from

Academic Year 2024-2025

Framed by

BOARD OF STUDIES IN RESTRUCTURING PATTERN

Savitribai Phule Pune University,

Ganeshkhind, Pune -07.

CREDIT FRAME WORK FOR FYBSc RESTRUCTURING PATTERN SEMESTER – I and II (Level 4.5 / 100)

SEMESTER-I			
COURSE DETAILS	COURSE CODE	COURSE TITLE	CREDI T
Subject 1 – (1T + 1P) x 2 C = 4 C	Subject 1 T	As per Major Subjects (Botany, Zoology, Physics and Chemistry)	2 C
	Subject 1 P		2 C
Subject 2 – (1T + 1P) x 2 C = 4 C	Subject 2 T		2 C
	Subject 2 P		2 C
Subject 3 – (1T + 1P) x 2 C = 4 C	Subject 3 T		2 C
	Subject 3 P		2 C
Generic Elective (GE) / Open Elective (OE) – (1P = 2C)	OE-101-RE-T	Foundation-I	2C
Skill Enhancement Courses (SEC) – (1T / 1P = 2 C) (Any one from basket)	SEC-101- RE-T	Population Education – I	2C
	SEC-102- RE-T	Family Planning and Health Education - I	2C
	SEC-103- RE-T	National Service Scheme - I	2C
	SEC-104- RE-T	National Cadet Corp –I	2C
	SEC-105- RE-T	Sports – I	2C
Indian Knowledge Systems (IKS) – (1T = 2 C)	IKS-101-T	Generic	2 C
Ability Enhancement Course (AEC) – (1T = 2 C)	AEC-101-ENG-T	English	2 C
Value Education Courses (VEC) – (1T = 2 C)	VEC-101-ENV-T	Environmental Awareness	2 C
Total Credits (V1+V2+V3+V4+V5+V6)			22 C
SEMESTER-II			
Subject 1 – (1T + 1P) x 2 C = 4 C	Subject 1 T	As per Major Subjects (Botany, Zoology, Physics and Chemistry)	2 C
	Subject 1 P		2 C
Subject 2 – (1T + 1P) x 2 C = 4 C	Subject 2 T		2 C
	Subject 2 P		2 C
Subject 3 – (1T + 1P) x 2 C = 4 C	Subject 3 T		2 C
	Subject 3 P		2 C
Generic Elective (GE) / Open Elective (OE) – (1P = 2C)	OE-151-RE-P	Foundation-II	2C
Skill Enhancement Courses (SEC) – (1T / 1P = 2C) (Any one from basket)	SEC-151- RE-P	Population Education – II	2C
	SEC-152- RE-P	Family Planning and Health Education - II	2C
	SEC-153- RE-P	National Service Scheme - II	2C
	SEC-154- RE-P	National Cadet Corp –II	2C

	SEC-155- RE-P	Sports – II	2C
Ability Enhancement Courses (AEC) – (1T = 2C)	AEC-151-ENG-T	English	2 C
Value Education Courses (VEC) – (1T = 2C)	VEC-151-ENV-T	Environmental Awareness	2 C
Co-curricular Courses (CC) – (1T = 2C)	CC-151-T	Any one from basket	2 C
Total Credits (V1+V2+V3+V4+V5+V6)			22 C
Total Credit Total Credits for FYBSC - Semester I (22 C) + Semester II (22 C)			44 C

Exit Option: Award of UG Certificate Course with 44 Credits and an additional 4 Credits core NSQF course / Internship OR Continue with Major and Minor.

Continue option: Student will select one subject among the subject 1, subject 2 and subject 3 as Major and another as Minor and third subject will be dropped.

AIMS AND OBJECTIVES

- To develop employability oriented diversified course content.
- To introduce skill oriented specialized education.
- To expose students to basic and applied knowledge of skill course.

1. Title of the Course: B.Sc. Restructuring Pattern (03 years)

2. Syllabus revised as per National Education Policy (NEP) 2020 for the Colleges

Affiliated to Savitribai Phule Pune University, Pune

3. Faculty – Science (Science and Technology

4. To be implemented -For F.Y.B.Sc. (Semester I and Semester II), from August 2024.

Program Duration and Exit Options

The UG Program lasts for four years or six semesters. Student may leave the program after the third year if, he/she would like to receive a three-year undergraduate degree. If the student decides to withdraw after the first or second year, he/she will receive a UG Certificate or UG Diploma, depending on how many credits he/she is able to complete. Re-entering within three years to finish the degree program is allowed for students who leave with a UG certificate or UG diploma. A student must earn a minimum of 18 credits and a maximum of 26 credits each semester. It is recommended, nevertheless, that student should opt 22 credits per semester. This clause aims to give student the comfort of a flexible semester-based course load. However, Table 1 lists the minimum number of credits required to be earned in order to be awarded an Undergraduate Certificate/Undergraduate Diploma/Bachelor Degree/Bachelor's Degree.

Table1: Type of Awards and Stages of Exit

Sr. No.	Type of Award	Stage of Exit	Mandatory Credits
1.	Undergraduate certificate in Major core course subject (Botany/Physics/Chemistry/Zoology Subject) with Restructuring courses	After successful completion of First year Semesters	44
2.	Undergraduate Diploma in Botany/Physics/Chemistry/Zoology Subject with Restructuring courses	After successful completion of Second year Semesters	88
3.	Bachelor of Science in Botany/Physics/Chemistry/Zoology Subject with Restructuring courses	After successful completion of Third year Semesters	132

5. Eligibility Criteria –

The basic criteria for Under Graduate Degree (F.Y.B.Sc. Restructuring pattern programm) admission will be 10+2 criteria with Biology, Physics, Chemistry, Mathematics, Geography as Principal subjects OR MCVC OR Diploma courses related to concern sciences. Admissions will be given as per the selection procedure / policies adopted by the college keeping in accordance with the conditions laid down by the Savitribai Phule Pune University, Pune. Reservation and relaxation are as per the State Government rules.

6. Fee Structure – As per the norms of Savitribai Phule Pune University, Pune.

7. Duration of the Course

Certificate Course- 01 year (Completion of 02 Semesters)

Diploma Course- 02 years (Completion of 04 Semesters)

BSc Degree- 03 years (Completion of 06 Semesters)

8. No. of semesters – Two semesters per year

9. Medium of instructions and teaching: English

10. Course Implementation criteria for Theory and Practical:

- Each semester comprises of 15 weeks (12 weeks Actual Teaching + 3 weeks for Continuous Internal Evaluation).
- One Credit of the Theory** is equal to 15 clock hours (Teaching 1 hour per week for each credit, 12 hours Actual Teaching + 3 hours Continuous Internal Evaluation – Assignments, Tutorials, Practice, Problem solving sessions, Group discussion, Seminars and Unit Tests.
- One Credit of Practical** = 30 clock hours. (2 Contact hours per credit per week) One Credit = 30 clock hours (24 hours' Actual Table work + 6 hours for journal competition, and Continuous

Internal Evaluation of each practical).

d. **Practical for each course comprises of 02 Credits = 60 clock hours.** Therefore,

- Minimum 12 laboratory/ Filed sessions of 04 clock hours must be conducted in one semester.
- In case of short practical, two practical's should be conducted in one session.
- Each practical of 04 clock hours in the laboratory should consist of: Table performance for concerned practical, careful observations, calculation, writing results and conclusion, and submission of practical in written form.
- Pre-laboratory reading and post laboratory assignments should be given on each practical as a part of continuous internal evaluation.

11. Examination Pattern (For each Semester): The examinations will be conducted semester wise for both Theory as well as Practical courses.

- **Theory Paper of 02 Credits -**

- Internal Exam (15 M) + University Theory Exam (35 M) = Total 50 M
- Duration: For Internal exam = 40 Min. and For University Exam = 02 hours.

- **Practical Paper of 2 Credits -**

- Internal Exam (15 M) + University Practical Exam (35 M) = Total 50 M
- Duration: For Internal exam = 40 Min. and For University Exam = More than 04 hours.

12. Award of Class/Grade: The class / grade for the courses of each semester will be followed as per the norms and conditions laid down by SPPU, Pune.

13. ATKT Rules: As per the norms given by SPPU, Pune.

14. Important Note:

- a. There shall be at least a short tour/field visit/industrial visit (1-2 days) per year for all UG students. Tours are the part of curriculum and obligatory to each student, failing which they will not be considered eligible to appear for the practical examination. Under unavoidable circumstances, if the student fails to attend the tour, he/she have to produce justifiable evidence for not attending the tour. However, in lieu of tour the candidate will have to complete the work assigned by the Department.
- c. The documents to be produced by each student at the time of practical examination (at the end of each Semester) are:
 - Submission of practical records compulsory (Journals).
 - Submission of a Tour / Visit report duly signed by the concerned practical In-charge and Head of the Department.
 - Any submissions / assignments, etc. based on the practical course.

Question paper pattern for Theory (2 Credit courses)

A student will have to solve the question paper of 35 marks. The paper setter should set the paper on entire syllabus for total 60 marks, including optional questions. As the course is of 2 Credits (30 clock hour lectures), paper setter should allot two marks per lecture and accordingly, questions should be set for 30 lectures, 60 marks on entire syllabus.

Note: All questions are compulsory.

Time: 2 Hours

- | | |
|---|----------|
| Que. 1) Answer any five of the following in one sentence | 05 Marks |
| <ul style="list-style-type: none">• Six questions• Each for 1 mark | |
| Que. 2a) Write any one of the following | 06 Marks |
| <ul style="list-style-type: none">i.ii. | |
| Que. 2b) Write any one of the following | 04 Marks |
| <ul style="list-style-type: none">i.ii. | |
| Que. 3a) Solve any one of the following | 06 Marks |
| <ul style="list-style-type: none">i.ii. | |
| Que. 3b) Solve any one of the following | 04 Marks |
| <ul style="list-style-type: none">i.ii. | |
| Que. 4) Write notes on (Any four) | 10 Marks |
| <ul style="list-style-type: none">a.b.c.d.e.f. | |

Generic Elective (GE) / Open Elective (OE) - (1P = 2C)	OE-101-RE-T	Foundation-I	2C
Skill Enhancement Courses (SEC) - (1T / 1P = 2 C) (Any one from basket)	SEC-101- RE-T	Population Education – I	2C
	SEC-102- RE-T	Family Planning and Health Education - I	2C
	SEC-103- RE-T	National Service Scheme - I	2C
	SEC-104- RE-T	National Cadet Corp –I	2C
	SEC-105- RE-T	Sports – I	2C

Generic Elective (GE) / Open Elective (OE) - (1P = 2C)	OE-151-RE-P	Foundation-II	2C
Skill Enhancement Courses (SEC) - (1T / 1P = 2C) (Any one from basket)	SEC-151- RE-P	Population Education – II	2C
	SEC-152- RE-P	Family Planning and Health Education - II	2C
	SEC-153- RE-P	National Service Scheme - II	2C
	SEC-154- RE-P	National Cadet Corp –II	2C
	SEC-155- RE-P	Sports – II	2C

Savitribai Phule Pune University, Pune
BA Restructuring Pattern Syllabus (as per NEP-2020)
Syllabus from June 2024

Name of the Programme	:	B.Sc Restructuring
Class	:	FYBSc.
Semester	:	I
Name of Vertical Group	:	V3 GE/OE
Course Code	:	OE-101-RE-T
Course Title	:	Foundation Course -I (Study of Indian and Global Concepts)
No. of Credits	:	2
No. of Teaching Hours	:	30

Chapter-1: A Study of Global and Indian Concepts

1. Nationalism (राष्ट्रवाद)
2. Economic Imperialism (आर्थिक साम्राज्यवाद)
3. Socialism (समाजवाद)
4. Humanity (मानवता)
5. Liberty (स्वातंत्र्य)
6. Democracy (लोकशाही)
7. Globalization (जागतिकीकरण)
8. Liberalization (उदारीकरण)
9. Privatization (खाजगीकरण)
10. Religion (धर्म)

Chapter-2: Transformation Movements in Maharashtra

प्रकरण -२ : महाराष्ट्रातील परिवर्तन चळवळी

1. Social and Religious Movement in Maharashtra (महाराष्ट्रा) तील सामाजिक आणि धार्मिक चळवळ (
2. Prathana Samaj (प्रार्थना समाज)
3. Satyashodhak Samaj (सत्यशोधक समाज)
4. Classified Movements (वर्गीय चळवळ) व्ही(
5. Famine Movement (शेतकरी चळवळ)
6. Women's Movement (स्त्रीवादी चळवळ)
7. Educational Movement in Maharashtra (महाराष्ट्रातील शैक्षणिक चळवळ) व्ही(
8. Nature and Growth (स्वरूप आणि) विकास(

F. Y. B. Sc. Restructuring Pattern [Semester - I]**Course Category– Skill Enhancement Course (SEC)****Course Code – SEC-101- RE-T (Theory)****Course Title: Population Education – I****[No. of Credits: 2 C]****[No. of Lectures: 30 L]****Objectives of the Course:**

1.	To provide students with basic knowledge of Population projection and density
2.	To provide students with basic knowledge of measures of Fertility
3.	To provide students with basic knowledge of measures of Mortality.

Course Outcome:**By the completion of the course, student will be able to:**

COs1	:	Acquire the knowledge about the Population Projection.
COs 2	:	Calculate and compare various measures of Fertility.
COs 3	:	Calculate and compare various measures of Mortality.
COs 2	:	Carry out socioeconomic survey.

Topic No.	Topic Name	Sub Topic	No. of Hours
1.	Population Projection	a. Population Projection methods b. Arithmetic Increase Method, c. Geometric Increase Method	5
2	Measures of Fertility	i. Crude Birth Rate ii. General Fertility Rate iii. Age-Specific Fertility Rates iv. Total Fertility Rate v. Gross Reproduction Rate	5
3.	Measures of Mortality	i. Crude Death Rate ii. Age-Specific Death Rate iii. Maternal Mortality Rate iv. Infant Mortality Rate V. Cause-Specific Death Rate Standard Mortality Ratio	5
4.	Field Survey and report	Field Survey and report writing	5

References:

1. Agarwala, S. N. (1962). Age at Marriage in India, Allahabad: Kitab Mahal Pvt. Ltd.
2. Barclay, G. W. (1958). Techniques of Population Analysis, New York: John Wiley and Sons.
3. Mandal, R. B., Uyanga, J., and Prasad, H. (2007), Introductory Methods in Population Analysis, New Delhi: Concept Publishing Company.
4. Pathak, K. B., and Ram, F. (2013). Techniques of Demographic Analysis, Mumbai: Himalaya Publishing House.
5. Shryock, H. S. (1970). The Methods and Materials of Demography, New York: Academic Press.
6. Siegel, J. S., and Swanson, D. A. (2004). The Methods and Materials of Demography. Boston: Academic Press.
7. Taylor, P. J. (1977). Quantitative Methods in Geography. Boston: Houghton Mifflin Co.
8. Wilkinson, F. J., and Monkhouse, H. R. (1966). Maps and Diagrams: Their Compilation and Construction. London: Methuen and Co.

F. Y. B. Sc. Restructuring Pattern [Semester - I]**Course Category– Skill Enhancement Course (SEC)****Course Code – SEC-102- RE-T (Theory)****Course Title: Family Planning & Health Education - I****[No. of Credits: 2 C]****[No. of Lectures: 30 L]****Course Objectives: -**

1. Relate the basic health sciences and apply this knowledge in Health Promotion Education
2. The objectives of health education include providing knowledge, developing positive attitudes towards health issues, and promoting decision-making.
3. The goal of health education is to promote, maintain and improve individuals' and community health.

Course Outcomes: -

- CO1: Describe health related information to identifying the problems related to the health.
- CO2: To facilitate interactive learning experiences which provide students with the knowledge, skills, and attitudes necessary to make positive health-related choices.
- CO3: To enable students to make healthy behaviour changes regarding their physical, mental, emotional, social, and environmental health.
- CO4: To provide students with the knowledge and skills necessary to access valid and reliable health information and resources.

1. Introduction	[02]
a. Definition and Scope of health education,	
b. Branches of Health education	
2. Evolution and Basic Concepts of Public Health	[06]
a. History of Social Medicine and Community Health	
b. History of Public Health	
c. Social Development and Health	
d. Natural History of Disease	
e. Levels of Prevention	
f. Globalization and Its Impact on Health	
g. Roles and Responsibility of State, Community and Private Sector in Health	
3. Environment and Health	[05]
a. Environmental pollution and Health impacts	
b. Climate change and impact on health	
4. Nutrition and Diet	[09]
i. Ecology of malnutrition	
ii. Optimum nutrition, balanced diet, reference man and woman	
iii. Assessment of Nutritional status	
iv. Nutritional diseases and their management	
v. Food and nutrition security and related legislations	
vi. National Nutrition programs	

5. Health and Yoga**[06]**

- i. Meaning, Definition, Nature of Yoga, importance of yoga, Misconceptions
- ii. related with Yoga.
- iii. Types of Yoga

6. Health Services Organization**[02]*****Reference books.***

1. Health, Family Planning & Nutrition in India by Rameshwari Pandya
2. Health for all through Yoga- Dr. Ganesh Shanker Ghi
3. Nutrient requirement & Recommended Dietary Allowances for Indians, ICMR 1990.
4. Textbook of Human Nutrition. Bamji MS, Rao R.N. & Reddy V. Oxford & IBHPub Co. PVT LTD, New Delhi
5. Clinical Dietetics Manual – Indian Dietetics Association
6. Use of growth charts for promoting child nutrition. A review of global experiences by– C. Gopan & Meera Chaterjee, Nutrition Foundation of India, Special publication series-2
7. Hath Yoga Pradipika-Kaivalyadham
8. Asana, Pranayama, Mudra, Bandha

F. Y. B. Sc. Restructuring Pattern [Semester - I]
Course Category– Skill Enhancement Course (SEC)
Course Code – SEC-103- RE-T (Theory)

Course Title: National Service Scheme – I

[No. of Credits: 2 C]

[No. of Lectures: 30 L]

Objectives of the Course:

1.	To provide students with basic knowledge of National Service Scheme
2.	To provide students with basic knowledge of work of social reformists
3.	To provide students with basic knowledge of remedies to solve every problems.
4	To provide students with basic knowledge of remedies to repair and construction of roads.

By the completion of the course, student will be able to:

COs1	:	To provide students with basic knowledge of National Service Scheme
COs 2		To provide students with basic knowledge of work of social reformists
COs 3		To provide students with basic knowledge of remedies to solve every problems.
COs 2	:	Carry out socioeconomic survey.

Topic No.	Topic Name	Sub Topic	No. of Hours
Credit-I 1.	Concept of N.S.S	Brief History, Aims, and Objectives, Growth, Organizational structure and present status.	05
2	Need social work in human life.	Introduction to the work of social reformists like, Mahatma Phule, Savitribai Phule, D.K. Karve, Bhurao Patil, Mahatma Gandhi, .An Introduction to the life of Saints Gadgebaba etc	05
3.	Superstitions	Superstitions and modern Emergence of Superstitions, Factors Responsible to Superstitions and remedies to every can this problem.	05
Credit-II 4	Sanitation-	<i>Sanitation</i> refers to public health conditions related to clean drinking water and treatment and disposal of human excreta and sewage. Importance of sanitation.	05
5	Importance of Cleaning slums	Disposal of sewage in Villages, Cleaning of the campus	03
6	Role of N.S.S Volunteers in Repairs and Construction of Roads	Role of N.S.S Volunteers in Repairs and Construction of Roads	02
7	Tree Plantation	Tree Plantation- A tree plantation, forest plantation, plantation forest, timber plantation or tree farm is a forest	05

NEP-2020		planted for high volume production of wood, Food and cloths	2024-2025
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References:

1. National Service Scheme, The youth volunteer program for undergraduate students by Dr.D.S.Pawar.
2. National Service Scheme, The youth volunteer program for undergraduate students by Amit Kumar,J.N.Brijesh kumar Rathi.Semester I&II.
3. NSS And Youth Development (Paperback, Dr. Sunita Agarwalla)
4. 4. National Service Scheme Book Sem –I&II. by Amit jain.

F. Y. B. Sc. Restructuring Pattern [Semester - I]

Course Category– Skill Enhancement Course (SEC)

Course Code – SEC-104- RE-T (Theory)

Course Title: National Cadet Corp – I

[No. of Credits: 2 C]

[No. of Lectures: 30 L]

Objectives of the Course:

1.	To acquaint students with the NCC
2.	To make students aware about basic organisation of Army
3.	To explain the Badges and Ranks
4.	To understand National Integration Importance and Necessity

Course Outcome:

By the completion of the course, student will be able to:

COs1	:	Understand the NCC
COs 2	:	Explain basic organisation of Army
COs 3	:	Aware about Badges and Ranks
COs 4	:	Acquaint the knowledge about National Integration Importance and Necessity

Topics and Learning Points

Topic No.	Topic Name	Sub Topic	No. of Periods
1.	The NCC	• Aims and Objectives of NCC	03

NEP-2020		• Organisation, Training and NCC Song	2024-2025
2.	Basic Organisation of Army	• Introduction • Command and Control • Fighting Arms • Supporting Arms • Supporting Services	04
3.	Badges and Ranks	• Introduction • Commissioned Officers • Junior Commissioned Officer (JCO) • Non Commissioned Officer (NCO)	04

4.	National Integration	• Religions, Culture, Traditions and Customs of India • National Integration Importance and Necessity • National Interests, Objectives, Threats and Opportunities • Problems / Challenges of National Integration. • Unity in Diversity • Contribution of Youth in Nation Building	04
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References:

Books-

- ‘NCC: National Cadet Corps (Including Model Papers & Solved Questions)’ by R. Gupta’s
- ‘Handbook NCC’: Kanti Publication, Itawa (U.P.)
- ‘NCC Cadets Military Training’ by Vishnu Kant Sharma and Meena Sharma

F. Y. B. Sc. Restructuring Pattern [Semester - I]
Course Category– Skill Enhancement Course (SEC)
Course Code – SEC-105- RE-T (Theory)
Course Title: Sports- I

[No. of Credits: 2 C]

[No. of Lectures: 30 L]

Course Objectives:

1. To be sensitive student about emerging issue such as health and fitness, wellness technology and environment.
2. To inculcate good thinking and scientific temper among the student
3. To develop physical fitness and sport participation awareness about the student.
4. To develop the leadership quality, self confidence and organizational.

Course Out Comes:

1. To achieve health and fitness
2. Develop fitness and sport participation
3. Develop self confidence
4. Develop sport attitude

THEORY (Credit: 1)

- A) Introduction to physical Education and Sports.
- B) Introduction to Asian Games and Olympic Games.
- C) Introduction to Health Education and Hygiene
- D) Brief study of the Game. (Any Two)

(With reference to History of the Game, Equipment of the Game, Dimensions of the ground, Rules and Regulations of the Game, Basic Skills of the game, Techniques and Tactics of the Game)

1. Cricket
2. Football
3. Table Tennis
4. Volley Ball
- 5 Kho-Kho

Practical based activity (Participation in Sports) Credit : 01

- A) Exercises :
 - a) General and specific stretching, warming up and collingdown exercises of the game.
 - b) Various games skill development exercises
- B) General introduction to track and field events.
 - a) Throwing events
 - b) Jumping
 - c) Running events (short, Middle and Long distance Running)

Semester II

Generic Elective (GE) / Open Elective (OE) - (1P = 2C)	OE-151-RE-P	Foundation-II	2C
Skill Enhancement Courses (SEC) - (1T / 1P = 2C) (Any one from basket)	SEC-151- RE-P	Population Education – II	2C
	SEC-152- RE-P	Family Planning and Health Education - II	2C
	SEC-153- RE-P	National Service Scheme - II	2C
	SEC-154- RE-P	National Cadet Corp –II	2C
	SEC-155- RE-P	Sports – II	2C

Savitribai Phule Pune University, Pune
BSc Restructuring Pattern Syllabus (as per NEP-2020)
Syllabus from June 2024

Name of the Programme	:	B.Sc Restructuring
Class	:	FYBSc
Semester	:	II
Name of Vertical Group	:	V3 GE/OE
Course Code	:	OE-151-RE-P
Course Title	:	Foundation course - II (Contemporary Social Issues in India (Practical's Based Activity)
No. of Credits	:	2 (Practical based Activity)
No. of Teaching Hours	:	60 hrs

Chapter-1: Basic Concepts in Political Science, Political Issues

प्रकरण -१ : राज्यशास्त्रातील मूलभूत संकल्पना, राजकीय विषय

1. Indian Constitution Creation and Importance (भारतीय संविधान निर्मिती आणि महत्त्व)
2. Democracy (लोकशाही)- Definition and Types (व्याख्या आणि प्रकार), Merits and Demerits of Indian Democracy (भारतीय लोकशाहीचे गुण व दोष)
3. Human Rights and Responsibilities (मानवाधिकार आणि जबाबदा ्या.)
4. Local Governments) स्थानिक प्रशासन(

Chapter-2: Value Education

प्रकरण -२ : मूल्य शिक्षण

1. National Values
2. Democracy
3. Socialism
4. Secularism(
5. Equality)
6. Justice)
7. Liberty/ Freedom()
8. Fraternity)
9. Social Values)
10. Pity and Probity
11. Self Control)
12. Universal Brotherhood)
13. Professional Values)
14. Knowledge Thirst)
15. Sincerity)

16. Regularity)
17. Punctuality)
18. Faith)
19. Religious Values)
20. Personality)
21. Tolerance)
22. Wisdom)
23. Aesthetic Values)
24. Love
25. Appreciations
26. Respect to Literature and Fine Arts)

F. Y. B. Sc. Restructuring Pattern [Semester - II]**Course Category– Skill Enhancement Courses (SEC)****Course Code – SEC-151- RE-P (Practical)****Practical Course Title: Population Education – II****[No. of Credits: 2 C]****[No. of Lectures: 30 L]****Objectives of the Course:**

1.	To provide students with basic knowledge of Population projection and density
2.	To provide students with basic knowledge of measures of Fertility
3.	To provide students with basic knowledge of measures of Mortality.

Course Outcome:**By the completion of the course, student will be able to:**

COs1	:	Acquire the knowledge about the Population Projection.
COs 2		Calculate and compare various measures of Fertility.
COs 3		Calculate and compare various measures of Mortality.
COs 2	:	Carry out socioeconomic survey.

Topic No.	Topic Name	Sub Topic	No. of Hours
1.	Composition of Population	i. Age and Sex Pyramid	5
2	Calculation of Population Density	i. Arithmetic Density ii. Physiological Density iii. Agricultural Density.	5
3.	Measures of Human Resource	i. Human Development Index ii. Gender Development Index iii. Construction of Life Table	5
4.	Computer Applications in population data Representation	i. Collection of data ii. Data analysis using Microsoft excel/ SPSS iii. Graphical representation of population data	5

References:

1. Agarwala, S. N. (1962). Age at Marriage in India, Allahabad: Kitab Mahal Pvt. Ltd.
2. Barclay, G. W. (1958). Techniques of Population Analysis, New York: John Wiley and Sons.

- Population Analysis, New Delhi: Concept Publishing Company.
4. Pathak, K. B., and Ram, F. (2013). Techniques of Demographic Analysis,
Mumbai: Himalaya Publishing House.
5. Shryock, H. S. (1970). The Methods and Materials of Demography, New York:
Academic Press.
6. Siegel, J. S., and Swanson, D. A. (2004). The Methods and Materials of
Demography. Boston: Academic Press.
7. Taylor, P. J. (1977). Quantitative Methods in Geography. Boston: Houghton Mifflin Co.
8. Wilkinson, F. J., and Monkhouse, H. R. (1966). Maps and Diagrams: Their
Compilation and Construction. London: Methuen and Co.

F. Y. B. Sc. Restructuring Pattern [Semester - II]

Course Category – Skill Enhancement Courses (SEC)

Course Code – SEC-152- RE-P (Practical)

Practical Course Title: Family Planning & Health Education - II

[No. of Credits: 2 C]

[No. of Lectures: 30 L]

Course Objectives: -

1. Relate the basic Family Planning education and apply this knowledge in Family Planning education
2. The objectives of Family Planning education include providing knowledge, developing positive attitudes towards Family Planning issues, and promoting decision-making.
3. The goal of Family Planning education is to promote, maintain and improve individuals' and community health.

Course Outcomes: -

- CO1: Describe Family Planning related information to identifying the problems related to health.
- CO2: To facilitate interactive learning experiences which provide students with the knowledge, skills, and attitudes necessary to make positive health-related choices.
- CO3: To provide students with the knowledge and skills necessary to access valid and reliable health information and resources.

Theory (Credit.02)

1. Introduction

[03]

- a. Definition and Scope of Family Planning education,
- b. History of Family Planning

2. Human reproductive system.

[03]

- a. Male reproductive system
 - b. Female reproductive system
 - c. Reproductive Health Issues
- 3. Contraceptive services. [07]**
- a. Female and Male sterilization
 - b. Oral Contraceptive Pills (OCPs)
 - c. Reversible Methods of Birth Control
 - d. Hormonal Methods
 - e. Barrier Methods
 - f. Fertility Awareness-Based Methods
 - g. Emergency Contraceptive Pill (ECP)
 - h. Permanent Methods of Birth Control
- 4. Nutrition and Diet in pregnancy [05]**
- a. Definition, Nutrition and Diet
 - b. Types of Diet
 - c. Health Issues
- 5. Sexually transmitted Infections [05]**
- a. Human Immunodeficiency Virus (HIV)
 - b. Acquired Immune Deficiency Syndrome (AIDS)
 - c. Chlamydia.
 - d. Genital herpes.
 - e. Trichomoniasis.
- 6. Parturition and childcare [02]**
- 7. Population control [03]**
- 8. National program for Family Planning [02]**

Reference books

1. Health, Family Planning & Nutrition in India by Rameshwari Pandya
2. Family Planning Guidance Booklet for Community Health Officers(CHOs)
3. National family planning procedure manual
4. Family Planning: A Global Handbook for Providers : Evidence-based Guidance Developed Through Worldwide Collaboration by Johns Hopkins University (Author), World Health Organization (Author)
5. Handbook of Family Planning and Reproductive Health Care by Nancy Loudon (Author), Anna Glasier BSc MD DSc FRCOG FFPRHC OBE (Author)

Course Category– Skill Enhancement Courses (SEC)

Course Code – SEC-153- RE-P (Practical)

Practical Course Title: National Service Scheme – II

[No. of Credits: 2 C]

[No. of Lectures: 30 L]

Objectives of the Course:

1.	To acquaint knowledge about Nutrition.
2	To analyze the socio-economic religions aspects.
3.	To develop Role of N.S.S Students in Enhancement of school college Complex.
4.	To develop knowledge about Aim and Objectives of NSS.
5	To aware the Role of national service scheme.
6	To aware the Role of NSS Volunteers in backward/Tribal/ minority/people.

Course Outcome:

By the completion of the course, student will be able to:

COs1	:	To provide students with basic knowledge of Nutrition
COs 2		To provide students with basic knowledge of Village socio-economic religions aspects
COs 3		To provide students with basic knowledge of Role of N.S.S Students in Enhancement of school.
COs 2	:	To provide the information about Aims and Objectives of NSS.

Topics and Learning Points

Topic No.	Topic Name	Sub Topic	No. of Hours
Credit-I 1	Nutrition	Nutrition- Public Organization health system across nations is a conglomeration of all organized activities that prevent disease, prolong life and promote health and efficiency of its people.	05
2	Village socio-economic religions aspects.	Village socio-economic/educating& religions aspects. Religions can be identified and described using a number of common characteristics-Beliefs and teachings, Rituals, practices, events and celebrations, Leadership and rules, Customs and traditions	05
3.	Role of N.S.S Students in Enhancement of school	Role of N.S.S Students in Enhancement of school college Complex by organizing activities like cultural, Educational, sports, Debating etc	05

Credit II 4	Aim and Objectives of NSS	Aim and Objectives of NSS and Role of NSS Volunteers for nation developments. Identify needs. Problems and resources of the community. Plan Programmes and carry out the plans. relate his learning and experience towards finding solutions to the problems	05
5	Role of national service	. Scheme in Rural Development- NSS volunteers work in rural areas, adopted villages, Eradication of Gajar Grass/weeds, Survey of child health nursing, impact of social evils on Global level.	05
6	Role of NSS Volunteers in backward/Tribal/minority/people.	Role of NSS Volunteers in backward/Tribal/minority/people. Water availability resources, population regards the Family Planning, energy resources, Cropping Pattern.	05

References:

1. National Service Scheme, The youth volunteer program for undergraduate students by D.S.Pawar.
2. National Service Scheme, The youth volunteer program for undergraduate students by Amit Kumar, J.N. Brijesh Kumar Rathi. Semester I&II.
3. NSS And Youth Development (Paperback, Dr. Sunita Agarwalla)
4. National Service Scheme Book Sem –I&II. by Amit Jain.

F. Y. B. Sc. Restructuring Pattern [Semester - II]
Course Category– Skill Enhancement Courses (SEC)
Course Code – SEC-154- RE-P (Practical)

Practical Course Title: National Cadet Corp – I I

[No. of Credits: 2 C]

[No. of Lectures: 30 L]

Objectives of the Course:

1.	To acquaint students with Task and Role of Fighting Arm
2.	To make students aware about Task and Role of Supporting Arms and Services
3.	To explain the Modes of Entry to Army
4.	To understand Honours and Awards

Course Outcome:

By the completion of the course, student will be able to:

COs1	:	Understand Task and Role of Fighting Arm
COs 2	:	Explain Task and Role of Supporting Arms and Services
COs 3	:	Aware about Modes of Entry to Army
COs 4	:	Acquaint the knowledge about Honours and Awards

Topics and Learning Points

Topic No.	Topic Name	Sub Topic	No.of Periods
1.	Task and Role of Fighting Arm	- Infantry - Armour - The Mechanised Infantry	03
2.	Task and Role of Supporting Arms and Services	- Supporting Arms - Supporting Services	04
3.	Modes of Entry to Army	- Types of Commission - Entry Schemes (Men and Women) - JCO and Other Ranks	04

4.	Honours and Awards	• Introduction • Gallantry Awards • Non Gallantry Awards including NCC Awards • Order of Precedence for Wearing of Medals and Decoration	04
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References Books

- 'NCC: National Cadet Corps (Including Model Papers & Solved Questions)' by R. Gupta's
- 'Handbook NCC': Kanti Publication, Itawa (U.P.)
- 'NCC Cadets Military Training' by Vishnu Kant Sharma and Meena Sharma

F. Y. B. Sc. Restructuring Pattern [Semester - II]

Course Category– Skill Enhancement Courses (SEC)

Course Code – SEC-155- RE-P (Practical)

Practical Course Title: Sports- II

[No. of Credits: 2 C]

[No. of Lectures: 30 L]

Course Objectives:

5. To be sensitive student about emerging issue such as health and fitness, wellness technology and environment.
6. To inculcate good thinking and scientific temper among the student
7. To develop physical fitness and sport participation awareness about the student.
8. To develop the leadership quality, self confidence and organizational.

Course Out Comes:

5. To achieve health and fitness
6. Develop fitness and sport participation
7. Develop self confidence
8. Develop sport attitude

- A) Concept of Physical Education and Scope.
- B) Concept of Physical fitness.
- C) Infer colligate, intramural sport event organisation.
- D) Brief study of the Game (Any Two)

(With reference to History of the Game, Equipment of the Game, Dimensions of the ground, Rules and Regulations of the Game, Basic Skills of the game, Techniques and Tactics of the Game)

- Basketball
- Kho-Kho
- Kabaddi
- Badminton

Practical based Activity (Participation in Sports) Credit :01

1. Sports Activity on Ground related to theory syllabus

- Basketball
- Kho-Kho
- Kabaddi
- Badminton
- Athletics

2. Yoga Practical's.

- Books :
1. Fundamental Elements of Physical Education. By Kamlesh M.L.
 2. Principal & History of Physical Education and Sports By Singh D.K.
 3. A Text Book of Applied measurement Evaluation & Sport Selection by Kansal D.K.
 4. A Pioneer of Scientific and Physical Education by Swami Kuvalayananda
 5. PatanjaliYogDarshan by Swami Anandrushi
 6. Asanas by Swami Kuvalayananda.



Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Computer Science

(Faculty of Science & Technology)

S.Y.B.Sc. (Computer Science)

**Choice Based Credit System Syllabus
To be implemented from Academic Year
2020-2021**

S. Y. B. Sc.(Computer Science)**Semester III**
(Total credits=22)

Course type	Paper Code	Paper title	Credits	Evaluation		
				CA	UE	TOTAL
CC-VIII	CS 231	Data Structures and Algorithms – I	2	15	35	50
	CS 232	Software Engineering	2	15	35	50
	CS 233	Practical course on CS 231 and CS 232	2	15	35	50
CC-IX		Mathematics - I	2	15	35	50
		Mathematics - II	2	15	35	50
		Practical course in Mathematics	2	15	35	50
CC-X		Electronics - I	2	15	35	50
		Electronics - II	2	15	35	50
		Practical course in Electronics	2	15	35	50
AECC-I		Environment Science – I	2			
AECC-II		Language Communication – I	2			

Semester IV***(Total credits=22)***

Course type	Paper Code	Paper title	Credits	Evaluation		
				CA	UE	TOTAL
CC-XI	CS 241	Data Structures and Algorithms – II	2	15	35	50
	CS 242	Computer Networks - I	2	15	35	50
	CS 243	Practical course on CS 241 and CS 242	2	15	35	50
CC-XII		Mathematics - I	2	15	35	50
		Mathematics - II	2	15	35	50
		Practical course in Mathematics	2	15	35	50
CC-XIII		Electronics - I	2	15	35	50
		Electronics - II	2	15	35	50
		Practical course in Electronics	2	15	35	50
AECC-I		Environment Science – II	2			
AECC-II		Language Communication –II	2			

- Each theory Lecture time for S.Y. B.Sc Computer Science is of 50 min (3 lectures/ week for 2 credit course)
- Each practical session time for S.Y. B.Sc Computer Science is of 4 hrs 20 minutes (260 min)
- Practical batch size =12

Savitribai Phule Pune University S.Y.B.Sc. (Computer Science) Computer Science Paper - I Course Code: CS 231 Title : Data Structures and Algorithms – I		
Teaching Scheme 3 Lectures / week (50 mins duration)	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites: Basic knowledge of algorithms and problem solving Knowledge of C Programming Language		
Course Objectives 1. To learn the systematic way of solving problem 2. To understand the different methods of organizing large amount of data 3. To efficiently implement the different data structures 4. To efficiently implement solutions for specific problems 5. To apply linear data structures.		
Course Outcomes: On completion of the course, student will be able to 1. To use well-organized data structures in solving various problems. 2. To differentiate the usage of various structures in problem solution. 3. Implementing algorithms to solve problems using appropriate data structures.		
Course Contents		
Chapter 1	Introduction to Data Structures and Algorithm Analysis	4 lectures
1.1 Introduction 1.1.1 Need of Data Structure 1.1.2 Definitions - Data and information, Data type, Data object, ADT, Data Structure 1.1.3 Types of Data Structures 1.2 Algorithm analysis 1.2.1 Space and time complexity, Graphical understanding of the relation between different functions of n, examples of linear loop, logarithmic, quadratic loop etc. 1.2.2 Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω , Theta θ), Problems on time complexity calculation.		
Chapter 2	Array as a Data Structure	10 lectures
2.1 ADT of array, Operations 2.2 Array applications - Searching 2.2.1 Sequential search, variations - Sentinel search, Probability search, ordered list search 2.2.2 Binary Search 2.2.3 Comparison of searching methods 2.3 Sorting Terminology- Internal, External, Stable, In-place Sorting 2.3.1 Comparison Based Sorting - Lower bound on comparison based sorting, Methods- Bubble Sort, Insertion Sort, Selection Sort, Algorithm design strategies - Divide and Conquer strategy, Merge Sort, Quick Sort, complexity analysis of sorting methods.		

2.3.2 Non Comparison Based Sorting: Counting Sort, Radix Sort, complexity analysis. 2.3.3 Comparison of sorting methods		
Chapter 3	Linked List	10 lectures
3.1 List as a Data Structure, differences with array. 3.2 Dynamic implementation of Linked List, internal and external pointers 3.3 Types of Linked List – Singly, Doubly, Circular 3.4 Operations on Linked List - create, traverse, insert, delete, search, sort, reverse, concatenate, merge, time complexity of operations. 3.5 Applications of Linked List – polynomial representation, Addition of two polynomials 3.6 Generalized linked list – concept, representation, multiple-variable polynomial representation using generalized list.		
Chapter 4	Stack	6 lectures
4.1 Introduction 4.2 Operations – init(), push(), pop(), isEmpty(), isFull(), peek(), time complexity of operations. 4.3 Implementation- Static and Dynamic with comparison 4.4 Applications of stack 4.4.1 Function call and recursion, String reversal, palindrome checking 4.4.2 Expression types - infix, prefix and postfix, expression conversion and evaluation (implementation of infix to postfix, evaluation of postfix) 4.4.3 Backtracking strategy - 4 queens problem (implementation using stack)		
Chapter 5	Queue	6 lectures
5.1 Introduction 5.2 Operations - init(), enqueue(), dequeue(), isEmpty(), isFull(), peek(), time complexity of operations, differences with stack. 5.3 Implementation - Static and Dynamic with comparison 5.4 Types of Queue - Linear Queue, Circular Queue, Priority Queue, Double Ended Queue (with implementation) 5.5 Applications – CPU Scheduling in multiprogramming environment, Round robin algorithm		
Reference Books:		
1. Classic Data Structures-D. Samanta, Prentice Hall India Pvt. Ltd. 2. Fundamentals of Data Structures in C- Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, 2 nd Edition, Universities Press. 3. Data Structures using C and C++-Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Pearson Education 4. Data Structures: A Pseudo code approach with C, Richard Gilberg, Behrouz A. Forouzan, Cengage Learning. 5. Introduction to Data Structures in C-Ashok Kamthane, Pearson Education 6. Algorithms and Data Structures, Niklaus Wirth, Pearson Education		

Savitribai Phule Pune University S.Y.B.Sc. (Computer Science) Computer Science Paper -II Course Code: CS 232 Title : Software Engineering		
Teaching Scheme 3 lectures / week (50 mins duration)	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites ER Modeling		
Course Objectives 1. To get knowledge and understanding of software engineering discipline. 2. To learn analysis and design principles for software project development.		
Course Outcomes On completion of the course, student will be able to- 1. Compare and chose a process model for a software project development. 2. Identify requirements analyze and prepare models. 3. Prepare the SRS, Design document, Project plan of a given software system.		
Course Contents		
Chapter 1	Title : Introduction To Software Engineering and Process Models	8 lectures
1.1 Definition of Software 1.2 Nature of Software Engineering 1.3 Changing nature of software 1.4 Software Process 1.4.1 The Process Framework 1.4.2 Umbrella Activities 1.4.3 Process Adaptation 1.5 Generic Process Model 1.6 Prescriptive Process Models 1.6.1 The Waterfall Model 1.6.2 Incremental Process Models 1.6.3 Evolutionary Process Models 1.6.4 Concurrent Models 1.6.5 The Unified Process		
Chapter 2	Title : Agile Development	5lectures
2.1 What is Agility? 2.2 Agile Process 2.2.1 Agility Principles 2.2.2 The Politics Of Agile Development 2.2.3 Human Factors 2.3 Extreme Programming(XP) 2.3.1XP Values 2.3.2XP Process 2.3.3 Industrial XP		

2.4 Adaptive Software Development(ASD) 2.5 Scrum 2.6 Dynamic System Development Model (DSDM) 2.7 Agile Unified Process (AUP)		
Chapter 3	Title : Requirements Analysis	7 lectures
3.1 Requirement Elicitation, 3.2 Software requirement specification (SRS) 3.2.1 Developing Use Cases (UML) 3.3 Building the Analysis Model 3.3.1 Elements of the Analysis Model 3.3.2 Analysis Patterns 3.3.3 Agile Requirements Engineering 3.4 Negotiating Requirements 3.5 Validating Requirements		
Chapter 4	Title : Requirements Modeling	10 lectures
4.1 Introduction to UML 4.2 Structural Modeling 4.2.1 Use case model 4.2.2 Class model 4.3 Behavioral Modeling 4.3.1 Sequence model 4.3.2 Activity model 4.3.3 Communication or Collaboration model 4.4 Architectural Modeling 4.4.1 Component model 4.4.2 Artifact model 4.4.3 Deployment model		
Chapter 5	Title : Design Concepts	6lectures
5.1 Design Process 5.1.1 Software Quality Guidelines and Attributes 5.1.2 Evolution of Software Design 5.2 Design Concepts 5.2.1 Abstraction 5.2.2 Architecture 5.2.3 Patterns 5.2.4 Separation of Concerns 5.2.5 Modularity 5.2.6 Information Hiding 5.2.7 Functional Independence 5.2.8 Refinement 5.2.9 Aspects 5.2.10 Refactoring 5.2.11 Object Oriented Design Concepts 5.2.12 Design Classes 5.2.13 Dependency Inversion 5.2.14 Design for Test 5.3 The Design Model 5.3.1 Data Design Elements 5.3.2 Architectural Design Elements		

5.3.3 Interface Design Elements
5.3.4 Component-Level Diagram
5.4.5 Deployment-Level Diagram

Reference Books:

1. Software Engineering : A Practitioner's Approach - Roger S. Pressman, McGraw hill(Eighth Edition) ISBN-13: 978-0-07-802212-8, ISBN-10: 0-07-802212-6
2. A Concise Introduction to Software Engineering - Pankaj Jalote, Springer ISBN: 978-1-84800-301-9
3. The Unified Modeling Language Reference Manual - James Rumbaugh, Ivar Jacobson, Grady Booch ISBN 0-201-30998-X

Savitribai Phule Pune University S.Y.B.Sc. (Computer Science) Computer Science Paper - III Course Code: CS 233 Title : Practical course on CS 231 (Data Structures and Algorithms I) and CS 232 (Software Engineering)		
Teaching Scheme 4 hrs 20 mins / week Batch Size : 12	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Operating Environment: For Data Structures: • Operating system: Linux • Editor: Any linux based editor like vi, gedit etc. • Compiler : cc or gcc Lab Book: The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course. Programming Assignments: Programs should be done individually by the student in their respective login. The codes should be uploaded on either the local server, Moodle, Github or any open source LMS. Print-outs of the programs and output may be taken but not mandatory for assessment. Assessment: Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of student. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include-timely completion, performance, innovation, efficient codes and good programming practices. • Internal Evaluation : ○ 10 marks will be given based on a mini project of Software Engineering. ○ 5 marks will be allocated for Assignment completion and practical attendance. • University Evaluation : ○ The Practical slip will be of 35 Marks which will be based on Data structures.		
Course Contents:		
Suggested Assignments for Data Structures – I Assignment1: Searching Algorithms Implementation of searching algorithms to search an element using: Linear Search, Sentinel Search, Binary Search (with time complexity) Assignment 2: Sorting Algorithms - I Implementation of sorting algorithms: Bubble Sort, Insertion Sort, Selection Sort Assignment 3: Sorting Algorithms - II Implementation of sorting algorithms: Quick Sort, Merge Sort , Counting Sort		

Assignment 4: Singly Linked List

1. Dynamic implementation of Singly Linked List to perform following operations: Create, Insert, Delete, Display, Search, Reverse
2. Create a list in the sorted order.

Assignment 5: Doubly Linked List

1. Dynamic implementation of Doubly circular Linked List to perform following operations: Create, Insert, Delete, Display, Search

Assignment 6: Linked List Applications

1. Merge two sorted lists.
Addition of two polynomials in a single variable.

Assignment 7: Stack

1. Static and Dynamic implementation of Stack to perform following operations: Init, Push, Pop, Peek, Isempty, Isfull

Assignment 8: Applications of Stack

1. Implementation of an algorithm that reverses string of characters using stack and checks whether a string is a palindrome.
2. Infix to Postfix conversion.
3. Evaluation of postfix expression.

Assignment 9: Linear Queue

1. Static and Dynamic implementation of linear Queue to perform following operations: Init, enqueue, dequeue Peek, IsEmpty, IsFull.

Assignment 10: Circular and Priority Queue

1. Implementation of circular queue
2. Implementation of priority queue

Suggested Assignments for Software Engineering mini Project**3**

1. Prepare detailed statement of problem for the selected mini project
2. Identify suitable process model for the same.
3. Develop Software Requirement Specification for the project.
4. Identify scenarios and develop UML Use case
5. Other artifacts: Class Diagram, activity diagram, sequence diagram, component diagram and any other diagrams as applicable to the project.

Sample project titles: (These are just samples, students are suggested to take up different case studies)

1. Online mobile recharge system
2. Credit calculation system
3. Image sharing and editing system
4. Internal examination system
5. e-learning management system

Savitribai Phule Pune University S.Y.B.Sc. (Computer Science) Computer Science Paper - I Course Code: CS 241 Title : DATA STRUCTURES AND ALGORITHMS-II		
Teaching Scheme 3 Lectures / week (50 mins. duration)	No. of Credits 02	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites : • Knowledge of C Programming Language • Basic knowledge of algorithms • Basic knowledge of linear data structures		
Course Objectives • To learn the systematic way of solving problems • To design algorithms • To understand the different methods of organizing large amount of data • To efficiently implement the non-linear data structures		
Course Outcomes: On completion of this course students will be able to • Implementation of different data structures efficiently • Usage of well-organized data structures to handle large amount of data • Usage of appropriate data structures for problem solving		
Course Contents		
Chapter 1	Tree	10 lectures
1.1 Concept and Terminologies 1.2 Types of Binary trees - Binary tree, skewed tree, strictly binary tree, full binary tree, complete binary tree, expression tree, binary search tree, Heap 1.3 Representation – Static and Dynamic 1.4 Implementation and Operations on Binary Search Tree - Create, Insert, Delete, Search, Tree traversals– preorder, inorder, postorder (recursive implementation), Level-order traversal using queue, Counting leaf, non-leaf and total nodes, Copy, Mirror. 1.5 Applications of trees 1.5.1 Heap sort, implementation 1.5.2 Introduction to Greedy strategy, Huffman encoding (implementation using priority queue)		
Chapter 2	Efficient Search Trees	8 lectures
2.1 Terminology: Balanced trees - AVL Trees, Red Black tree, splay tree, Lexical search tree -Trie 2.2 AVL Tree- concept and rotations 2.3 Red Black trees - concept, insertion and deletion. 2.4 Multi-way search tree - B and B+ tree - Insertion, Deletion		
Chapter 3	Graph	12 lectures
3.1 Concept and terminologies 3.2 Graph Representation –Adjacency matrix, Adjacency list, Inverse Adjacency list, Adjacency multilist 3.3 Graph Traversals – Breadth First Search and Depth First Search (with implementation) 3.4 Applications of graph		

- 3.4.1 Topological sorting
- 3.4.2 Use of Greedy Strategy in Minimal Spanning Trees (Prims and Kruskals algorithm)
- 3.4.3 Single source shortest path - Dijkstra's algorithm
- 3.4.4 Dynamic programming strategy, All pairs shortest path - Floyd Warshall algorithm
- 3.4.5 Use of graphs in social networks

Chapter 4**Hash Table****6 lectures**

- 4.1 Concept of hashing
- 4.2 Terminologies – Hash table, Hash function, Bucket, Hash address, collision, synonym, overflow etc.
- 4.3 Properties of good hash function
- 4.4 Hash functions : division function, MID square , folding methods
- 4.5 Collision resolution techniques
 - 4.5.1 Open Addressing - Linear probing, quadratic probing, rehashing
 - 4.5.2 Chaining - Coalesced , separate chaining

Reference Books:

1. Fundamentals of Data Structures in C- Ellis Horowitz, SartajSahni, Susan Anderson-Freed, 2nd Edition, Universities Press.
2. Data Structures using C and C++-YedidyahLangsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Pearson Education
3. Data Structures: A Pseudo code approach with C, Richard Gilberg ,Behrouz A. Forouzan, Cengage Learning.
4. Introduction to Data Structures in C-Ashok Kamthane, Pearson Education
5. Algorithms and Data Structures, Niklaus Wirth, Pearson Education
6. Introduction to Algorithms—Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein--MIT Press
7. Fundamentals of Computer Algorithms-- Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Universities Press
8. The Algorithm Design Manual - Steven S Skiena, Springer

Savitribai Phule Pune University S.Y.B.Sc. (Computer Science) Computer Science Paper - I Semester II Course Code: CS 242 Title : Computer Networks-I		
Teaching Scheme 3 lectures / week (50 mins. duration)	No. of Credits 02	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites Principles of Digital Electronics Communication Principles		
Course Objectives To prepare students with basic networking concepts: data communication, protocols and standards, various topologies and applications of network.		
Course Outcomes 1. Have a good understanding of the OSI and TCP/IP Reference Models and in particular have a good knowledge of Layers. 2. Understand the working of various protocols. 3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies		
Course Contents		
Chapter 1	Introduction to Networks and Network Models	4 lectures
1.1 Data communication, components, data representation 1.2 Networks, network criteria, network types - LAN, WAN, Switching, The Internet, Accessing the Internet 1.3 Network Software- Protocol hierarchies, Design Issues of the layer, Connection Oriented and Connectionless Services, 1.4 Reference models - OSI Reference Models, TCP/IP Reference model, Connection devices in different layers, Comparison of OSI and TCP/IP Reference Models.		
Chapter 2	Lower Layers	10 lectures
2.1 Communication at the physical layer, data rate limits - Noiseless channel (Nyquist bit rate), noisy channel (Shannon capacity), Performance - bandwidth, throughput, latency, bandwidth-delay product, jitter 2.2 Design issues of Data Link Layer, Services - Framing, flow control, error control, congestion control, Link layer addressing 2.3 Framing Methods - Character Count, Flag bytes with Byte Stuffing, Flags bits with Bit Stuffing, Physical Layer Coding Violations 2.4 The Channel allocation problem, Static and dynamic allocation, Media Access Methods - Taxonomy of multiple-access protocols 2.5 Switching and TCP/IP layers, Types - circuit switching, packet switching and message switching 2.6 Wired LANs - Standard Ethernet characteristics, Addressing, Access method, implementation, Fast and Gigabit Ethernet 2.7 Wireless LANs - Architectural comparison, Characteristics, Access control, IEEE 802.11		

architecture, Physical layer, MAC sublayer, Bluetooth architecture, Layers		
Chapter 3	Network Layer	12 lectures
3.1 Network layer services - Packetizing, Routing and forwarding, other services 3.2 Open and closed loop congestion control 3.3 IPv4 addressing- Address space, classful addressing, Subnetting, Supernetting, classless addressing, Network address resolution (NAT) 3.4 Forwarding of IP packets- based on destination address, based on label 3.5 Network Layer Protocols- Internet Protocol (IP), IPv4 datagram format, Fragmentation, options 3.6 Mobile IP-addressing, agents, Three phases 3.7 Next Generation IP- IPv6 address representation, address space, address types, IPv6 protocol, packet format, extension header, Difference between IPv4 and IPv6 3.8 Routing - General idea, Algorithms - Distance vector routing, link state routing, path-vector routing		
Chapter 4	Transport Layer	10 Lectures
4.1 Transport layer Services- Process-to-process communication, Addressing, Encapsulation and decapsulation, Multiplexing and demultiplexing, Flow control, Pushing or pulling, Flow control, Buffers, Sequence numbers, Acknowledgements, sliding window, congestion control 4.2 Connectionless and Connection-oriented service, Port numbers 4.3 Transport layer protocols- User datagram protocol, user datagram, UDP services 4.4 Transmission Control Protocol - TCP Services, TCP Features, TCP Segment format, three-way handshake for connection establishment and termination, State transition diagram, windows in TCP.		
Reference Books:		
1. Computer Networks-Andrew S. Tanenbaum, 5 th Edition, Pearson Education 2. Data Communication and Networking- BehrouzFourouzan, 5 th Edition, McGraw Hill Pvt. Ltd.		

Savitribai Phule Pune University S.Y.B.Sc. (Computer Science) Computer Science Paper - III Course Code: CS 243 Title : Practical course on CS 241(Data Structures and Algorithms II) and CS 242 (Computer Networks I)		
Teaching Scheme 4 hrs 20 mins / week Batch size : 12	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Lab Book: The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course. Programming Assignments: Programs should be done individually by the student in the respective login. The codes should be uploaded on either the local server, Moodle, Github or any open source LMS. Print-outs of the programs and output may be taken but not mandatory for assessment. Assessment: Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of student. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include-timely completion, performance, innovation, efficient codes and good programming practices. • Internal Evaluation : ○ 10 marks will be given based on Networking assignments. ○ 5 marks will be allocated for Assignment completion and practical attendance • University Evaluation : ○ The Practical slip will be of 35 Marks which will be based on Advanced Data structures. Operating Environment: For Data Structures: • Operating system: Linux • Editor: Any linux based editor like vi, gedit etc. • Compiler : cc or gcc		
Course Contents :-		

Assignment 1 Binary Search Tree and Traversals

1. Implement Binary Search Tree (BST) to perform following operations on BST– Create, Recursive Traversals - Inorder, Preorder, Postorder
2. Perform following operations: insert, delete

Assignment 2 Binary Search Tree Operations

1. Implement Binary Search Tree (BST) to perform following operations on BST–copy and mirror image of BST, counting leaf, non-leaf and total nodes.
2. Level-order traversal of binary search tree using queue.

Assignment 3 Applications of Binary Tree

1. Sort set of elements using Heap sort
2. Encode a set of characters using Huffman encoding

Assignment 4 Graph implementation

1. Implement Graph as adjacency matrix and adjacency list
2. Calculate indegree and outdegree of vertices
3. Graph traversals: BFS and DFS.

Assignment 5 Graph Applications - I

1. Implementation of Topological sorting
2. Implementation of Prims/Kruskals Minimum spanning tree algorithm

Assignment 6 Graph Applications - II

1. Implementation of Dijkstra's shortest path algorithm for finding Shortest Path from a given source vertex using adjacency cost matrix.
2. Implementation of Floyd Warshall algorithm for all pairs shortest path.

Assignment 7 Hash Table

1. Implementation of static hash table with Linear Probing.
2. Implementation of static hash table with chaining.

Assignment 8 Hash Table-2

1. Implementation of linked hash table with chaining.

Assignment 9 Networking Assignment**Assignment 10 Networking Assignment**



Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Computer Science
(Faculty of Science & Technology)

T.Y.B.Sc. (Computer Science)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2021 – 2022

Course Structure T.Y.B.Sc. (Computer Science)

Semester V (Total credits=22)

Course type	Paper Code	Paper title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
DSEC - I	CS-351	Operating Systems – I	2		15	35	50
	CS-352	Computer Networks – II	2		15	35	50
	CS-357	Practical course based on CS 351		2	15	35	50
DSEC - II	CS-353	Web Technologies – I	2		15	35	50
	CS-354	Foundations of Data Science	2		15	35	50
	CS-358	Practical course based on CS 353 and CS 354		2	15	35	50
DSEC - III	CS-355	Object Oriented Programming using Java - I	2		15	35	50
	CS-356	Theoretical Computer Science	2		15	35	50
	CS-359	Practical Course based on CS 355		2	15	35	50
SECC - I	CS-3510	Python Programming	2	0	15	35	50
SECC - II	CS-3511	Blockchain Technology	2	0	15	35	50

Semester VI (Total credits=22)

Course type	Paper Code	Paper title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
DSEC - I	CS-361	Operating Systems – II	2		15	35	50
	CS-362	Software Testing	2		15	35	50
	CS-367	Practical course based on CS 361		2	15	35	50
DSEC - II	CS-363	Web Technologies – II	2		15	35	50
	CS-364	Data Analytics	2		15	35	50
	CS-368	Practical course based on CS 363 and CS 364		2	15	35	50
DSEC - III	CS-365	Object Oriented Programming using Java - II	2		15	35	50
	CS-366	Compiler Construction	2		15	35	50
	CS-369	Practical Course based on CS 365		2	15	35	50
SECC - III	CS-3610	Software Testing Tools	2	0	15	35	50
SECC - IV	CS-3611	Project	2	0	15	35	50

SavitribaiPhule Pune University T.Y.B.Sc. (Computer Science) - Sem – V Course Type: DSEC – I Course Code : CS - 351 Course Title : Operating Systems – I		
Teaching Scheme: 03 Lect / week	No. of Credits: 2	Examination Scheme: IE : 15 marks UE: 35 marks
Prerequisites Data structures like stack, queue, linked list, tree, graph, hashing, file structures, any structured programming language		
Course Objectives: 1. To understand the concept of operation system and its principle 2. To study the various functions and services provided by operating system 3. To understand the notion of process and threads		
Course Outcomes: After completion of this course students will be able to understand the concept of 1. Processes and Thread Scheduling by operating system 2. Synchronization in process and threads by operating system 3. Memory management by operating system using with the help of various schemes		
Course Contents		
Chapter 1	Introduction to Operating Systems	6 lectures
- Operating Systems Overview- system Overview and Functions of operating systems - What does an OS do? - Operating system Operations - Operating system structure - Protection and security - Computing Environments- Traditional, mobile , distributed, Client/server, peer to peer computing - Open source operating System - Booting - Operating System services, - System calls Types of System calls and their working.		
Chapter 2	Processes and Threads	6 lectures
- Process Concept – The processes, Process states, Process control block. - Process Scheduling – Scheduling queues, Schedulers, context switch - Operations on Process – Process creation with program using fork(), Process termination - Thread Scheduling- Threads, benefits, Multithreading Models, Thread Libraries		
Chapter 3	Process Scheduling	7 lectures
- Basic Concept – CPU-I/O burst cycle, Scheduling Criteria ,CPU scheduler, Preemptive scheduling, Dispatcher - Scheduling Algorithms – FCFS, SJF, Priority scheduling, Round-robin scheduling, Multiple queue scheduling, Multilevel feedback queue scheduling		
Chapter 4	Synchronization	5 lectures
- Background - Critical Section Problem - Semaphores: Usage, Implementation		

• Classic Problems of Synchronization – The bounded buffer problem, The reader writer problem, The dining philosopher problem		
Chapter 5	Memory Management	12 lectures
• Background – Basic hardware, Address binding, Logical versus physical address space, Dynamic loading, Dynamic linking and shared libraries • Swapping • Contiguous Memory Allocation – Memory mapping and protection, Memory allocation, Fragmentation • Paging – Basic Method, Hardware support, Protection, Shared Pages • Segmentation – Basic concept, Hardware • Virtual Memory Management – Background, Demand paging, Performance of demand paging, Page replacement – FIFO, Optimal, LRU, MFU		
Reference Books:		
1. Operating System Concepts, Avi Silberschatz, Peter Galvin, Greg Gagne, Student Edition, Wiley Asia 2. Operating Systems: Internals and Design Principles, William Stallings, Prentice Hall of India. 3. Advanced Concepts in Operating Systems, M Singhal and NG Shivaratri, Tata McGraw Hill Inc, 2001 4. The ‘C’ Odyssey, UNIX-the open boundless C, Meeta Gandhi, Tilak Shetty, Rajiv Shah, BPB publication		

SavitribaiPhule Pune University T.Y.B.Sc. (Computer Science) Sem - V Course Code: DSEC - I Course Code : CS - 352 Course Title :Computer Networks - II		
Teaching Scheme 03 Lect/ week	No. of Credits 2	Examination Scheme IE :15 marks UE: 35 marks
Prerequisites: Prerequisites: Basic knowledge of Networking and ISO/OSI model		
Course Objectives - To understand different protocols of application layer. - To understand concepts of multimedia. - Explore the different methods used for Network/INTERNET security.		
Course Outcomes On completion of the course, student will be able to– - Student will understand the different protocols of Application layer. - Develop understanding of technical aspect of Multimedia Systems - Develop various Multimedia Systems applicable in real time. - Identify information security goals. - Understand, compare and apply cryptographic techniques for data security.		
Course Contents		
Chapter 1	Application Layer	10 Lect
Domain Name System - Name space-Flat name space, Hierarchical name space - Domain Name Space -Label ,Domain name, FQDN,PQDN - Distribution of Domain Name Space-Hierarchy of name servers, zone, Root server, Primary and secondary servers. - DNS in the Internet: Generic domains, Country domains,inverse domain - Resolution-Resolver,mapping names to address,mapping addresses to names,recursive resolution,iterative resolution,caching Electronic Mail- - Architecture-First scenario, second scenario, Third scenario, Fourth scenario - User agent-services of user agent, types of UA Format of e-mail - MIME-MIME header - Message transfer agent-SMTP - Message Access Agent: POP and IMAP File Transfer FTP-Communication over data control connection,File type,data structure,Transmission mode,anonymous FTP		
Chapter 2	Multimedia	08 Lect
Digitizing audio and video, Audio and Video compression Streaming Stored audio/video - First approach - Second approach - Third approach - Fourth approach Streaming live audio/video		

Real time interactive audio/video- Characteristics, Time relationship, timestamp, Playback buffer, ordering multicasting, translation RTP-Packet format RTCP-Message types Voice over IP-SIP,SIP sessionH.323-Architecture, Protocols		
Chapter 3	Cryptography and Network Security	09 Lect
Terminology: Cryptography, plain text and cipher text, cipher key, categories of cryptography-Symmetric key, asymmetric key Encryption model Symmetric key cryptography • Traditional ciphers – substitution cipher, shift cipher, Transposition cipher • Simple Modern ciphers-XOR, Rotation cipher, s-box,p-box • Modern round ciphers-DES • Mode of operation-ECB,CBC,CFB,OFB Asymmetric key cryptography-RSA Security Services • Message confidentiality-With Symmetric key cryptography, with asymmetric key cryptography • Message integrity-Document and fingerprint, message and message digest • Message authentication-MAC,HMAC • Digital signature • Entity Authentication-Passwords, Fixed passwords challenge-response		
Chapter 4	Security in the Internet	09 Lect
IPSecurity(IPSec) • Two modes • Two security protocols • Services provided by IPSec • Security association • Internet key exchange • Virtual private network SSL/TLS • SSL services • Security parameters • Sessions and connections • Four protocols • Transport layer security PGP • Security parameters • Services • PGP algorithms • Key rings • PGP certificates Firewalls • Packet filter firewall • Proxy firewall		

Reference Books:

1. Data communications and networking by Behrouz Forouzan 4th/5th edition, McGraw Hill Pvt Ltd.
2. Computer Networks by Andrew S Tanenbaum, 4th/5th edition, Pearson Education
3. Cryptography and Network Security: Principles and Practice, William Stallings, 7th edition, Pearson Education
4. Network Security Essentials: Applications and Standards (For VTU), William Stallings, 3rd edition, Pearson Education

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem - V Course Type:DSEC – II Course Code: CS - 353 Course Title : Web Technologies - I		
Teaching Scheme 03 Lect/ week	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites HTML basics for form designing		
Course Objectives - To Design dynamic and interactive Web pages. - To Learn Core-PHP, Server Side Scripting Language - To Learn PHP-Database handling		
Course Outcomes On completion of the course, student will be able to– Understand how to develop dynamic and interactive Web Page		
Course Contents		
Chapter 1	Introduction to HTML, HTTP and PHP	10 Lects
Overview of HTML and Basic Tags , Creating Forms ,Tables, HTML5 Semantics. CSS basic concept ,Three ways to use CSS, Box Model, Navigation Bar . Introduction to Web server and Web browser . HTTP basics . PHP Basics: Use of PHP, Lexical structure, Language basics .		
Chapter 2	Function and String	8 Lects
Defining and calling a function Default parameters Variable parameters, Missing parameters Variable function, Anonymous function Types of strings in PHP Printing functions Encoding and escaping Comparing strings Manipulating and searching strings Regular expressions		
Chapter 3	Arrays	6 Lectures
Indexed Vs Associative arrays Identifying elements of an array Storing data in arrays Multidimensional arrays 3.4Extracting multiple values Converting between arrays and variables Traversing arrays Sorting Action on entire array		
Chapter 4	Files and database handling	10 Lectures
Working with files and directories Opening and Closing, Getting information about file, Read/write to file, Splitting name and path from file, Rename and delete files Reading and writing characters in file Reading entire file		

Random access to file data
Getting information on file
Ownership and permissions
Using PHP to access a database
Relational databases and SQL
PEAR DB basics
Advanced database techniques

Chapter 5 Handling email with php

2 Lectures

Email background
Internet mail protocol
Structure of an email message
Sending email and validation of Email_id with php

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition Author: Thomas A. Powell
First published: 01 Jan 2010.
2. Programming PHP By Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
3. Beginning PHP 5 , Wrox publication
4. PHP web sevicees, Wrox publication
5. Mastering PHP , BPB Publication
6. PHP cookbook, O'Reilly publication
7. PHP for Beginners, SPD publication
8. Programming the World Wide Web , Robert W Sebesta(3rd Edition)
9. HTML 5 Black Book : Covers Css3, Javascript, XML, XHTML, Ajax, PHP And JQuery by
Kogent Learning Solutions Inc, Published November 2011 by Dreamtech Press
10. Spurlock Jake, Bootstrap: Responsive Web development. O'Reilly Media, Inc

Ref. Links

11. www.php.net.in
12. www.W3schools.com
13. www.wrox.com
14. <https://coreui.io/docs/layout/grid/#grid-options>
15. <https://www.tutorialrepublic.com/twitter-bootstrap-tutorial/bootstrap-grid-system.php>

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) – Sem - V Course Type:DSEC – II Course Code: CS - 354 Paper Title : Foundations of Data Science		
Teaching Scheme 03 lectures / week	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites • Problem solving using computers • Basic mathematics and statistics • Knowledge of Databases		
Course Objectives • Provide students with knowledge and skills for data-intensive problem solving and scientific discovery • Be prepared with a varied range of expertise in different aspects of data science such as data collection, visualization, processing and modeling of large data sets. • Acquire good understanding of both the theory and application of applied statistics and computer science based existing data science models to analyze huge data sets originating from diversified application areas. • Be better trained professionals to cater the growing demand for data scientists in industry.		
Course Outcomes On completion of the course, student will be able to– • Perform Exploratory Data Analysis • Obtain, clean/process, and transform data. • Detect and diagnose common data issues, such as missing values, special values, outliers, inconsistencies, and localization. • Demonstrate proficiency with statistical analysis of data. • Present results using data visualization techniques. • Prepare data for use with a variety of statistical methods and models and recognize how the quality of the data and the means of data collection may affect conclusions.		
Course Contents		
Chapter 1	Introduction to Data Science	6 lectures
Introduction to data science, The 3 V's: Volume, Velocity, Variety Why learn Data Science? Applications of Data Science The Data Science Lifecycle Data Scientist's Toolbox Types of Data - Structured, semi-structured, Unstructured Data, Problems with unstructured data - Data sources - Open Data, Social Media Data, Multimodal Data, standard datasets - Data Formats - Integers, Floats, Text Data, Text Files, Dense Numerical Arrays, Compressed or Archived Data, CSV Files, JSON Files, XML Files, HTML Files , Tar Files, GZip Files, Zip Files, Image Files: Rasterized, Vectorized, and/or Compressed		

Chapter 2	Statistical Data Analysis	10 lectures
2.1.Role of statistics in data science 2.2.Descriptive statistics Measuring the Frequency Measuring the Central Tendency: Mean, Median, and Mode Measuring the Dispersion: Range, Standard deviation, Variance, Interquartile Range 2.3.Inferential statistics Hypothesis testing, Multiple hypothesis testing, Parameter Estimation methods, 2.4.Measuring Data Similarity and Dissimilarity Data Matrix versus Dissimilarity Matrix, Proximity Measures for Nominal Attributes, Proximity Measures for Binary Attributes, Dissimilarity of Numeric Data: Euclidean, Manhattan, and Minkowski distances, Proximity Measures for Ordinal Attributes 2.5.Concept of Outlier, types of outliers, outlier detection methods		
Chapter 3	Data Preprocessing	10 lectures
Data Objects and Attribute Types: What Is an Attribute?, Nominal , Binary, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes Data Quality: Why Preprocess the Data? 3.3.Data munging/wrangling operations Cleaning Data - Missing Values, Noisy Data (Duplicate Entries, Multiple Entries for a Single Entity, Missing Entries, NULLs, Huge Outliers, Out-of-Date Data, Artificial Entries, Irregular Spacings, Formatting Issues - Irregular between Different Tables/Columns, Extra Whitespace, Irregular Capitalization, Inconsistent Delimiters, Irregular NULL Format, Invalid Characters, Incompatible Datetimes) Data Transformation – Rescaling, Normalizing, Binarizing, Standardizing,Label and One Hot Encoding Data reduction Data discretization		
Chapter 4	Data Visualization	10 lectures
Introduction to Exploratory Data Analysis Data visualization and visual encoding Data visualization libraries Basic data visualization tools Histograms, Bar charts/graphs, Scatter plots, Line charts, Area plots, Pie charts, Donut charts Specialized data visualization tools Boxplots, Bubble plots, Heat map, Dendrogram, Venn diagram, Treemap, 3D scatter plots Advanced data visualization tools- Wordclouds Visualization of geospatial data Data Visualization types		
Reference Books:		
1) Data Science Fundamentals and Practical Approaches, Gypsy Nandi, Rupam Sharma, BPB Publications, 2020. 2) The Data Science Handbook, Field Cady, John Wiley & Sons, Inc, 2017 3) Data Mining Concepts and Techniques, Third Edition, Jiawei Han, Micheline		

Kamber, Jian Pei, Morgan Kaufmann, 2012.

- 4) A Hands-On Introduction to Data Science, Chirag Shah, University of Washington Cambridge University Press

SavitribaiPhule Pune University T.Y.B.Sc. (Computer Science) Sem – V Course Type:DSEC – III Course Code: CS - 355 Course Title: Object Oriented Programming using Java - I		
Teaching Scheme 03 Lect / week	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites Knowledge of C Programming language		
Course Objectives - To learn Object Oriented Programming language - To study various java programming concept like Interface, File and Exception Handling etc. - To design User Interface using Swing and AWT		
Course Outcomes On completion of the course, student will be able to– - Understand the concept of classes, object, packages and Collections. - To develop GUI based application.		
Course Contents		
Chapter 1	An Introduction to Java	6 Lect
Object Oriented Programming Concepts A short history of Java Features OR Buzzwords of Java Java Environment Simple Java Program Java Tools – jdb, javap, javadoc Types of Comments Data Types Final Variable Declaring 1D, 2D Array Accepting Input (Command Line Arguments, BufferedReader, Scanner)		
Chapter 2	Objects and Classes	7 Lect
Defining your own classes Access Specifiers (public, protected, private, default) Array of Objects Constructors, Overloading Constructors and Use of ‘this’ keyword static block, static fields And methods Predefined Classes - Object Class, Methods (equals(), toString(), hashCode(), getClass()) - String Class And StringBuffer Class, Formatting String data using format() method Creating , Accessing And Using Packages Wrapper Classes		

Chapter 3	Inheritance and Interface	8 Lect
Inheritance Basics (extends Keyword) and Types of Inheritance Superclass, Subclass and use of Super Keyword Method Overriding and runtime polymorphism Use of final keyword related to method and class Use of abstract class and abstract methods Defining and Implementing Interfaces Runtime polymorphism using interface Concept of Marker and Functional Interfaces		
Chapter 4	Exception and File Handling	5 Lect
Dealing with errors , Exception class, Checked And Unchecked Exception Catching Exceptions, Multiple Catch Block, Nested try block Creating User Defined Exception Introduction to Files And Streams Input-OutputStream : FileInputStream/OutputStream, BufferedInput/OutputStream, DataInput/OutputStream Reader-Writer : FileReader/Writer, BufferedReader/Writer, InputStreamReader, OutputStreamWriter		
Chapter 5	User Interface with AWT and Swing	10 Lect
What is AWT? What is Swing? Difference between AWT and Swing The MVC Architecture And Swing Layouts And Layout Managers Containers And Components – JFrame, JButton, JLabel, JText, JTextArea, JCheckBox And JRadioButton, JList, JComboBox, JMenu And related Classes Dialogs (Message, Confirmation, Input), JFileChooser, JColorChooser Event Handling: Event Sources, Listeners Adapters And Anonymous Inner Class		
Reference Books:		
R1. Complete reference Java by Herbert Schildt(5th edition) R2. Java 2 programming black books, Steven Horlznr R3. Programming with Java , A primer ,Forth edition , By E. Balagurusamy R4. Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Pres		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) Sem - V Course Type: DSEC - III Course Code: CS - 356 Paper Title: Theoretical Computer Science		
Teaching Scheme 3 Lect/ week	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites - Mathematical Preliminaries Sets (Subset, Set Operations), Relations (Properties of Relations, Closure of Relations) and Functions - Discrete Mathematics- Graphs, Trees, Logic and Proof Techniques		
Course Objectives - To understand the Finite Automata, Pushdown Automata and Turing Machine. - To understand the Regular Language, Context Free Language, Context Sensitive Language and Unrestricted Language. - To understand the relation between Automaton and Language		
Course Outcomes On completion of the course, student will be able to– - Understand the use of automata during language design. - Relate various automata and Languages.		
Course Contents		
Chapter 1	Finite Automaton	10 Lect
Introduction: Symbol, Alphabet, String, Prefix & Suffix of Strings, Formal Language, Operations on Languages. Deterministic finite Automaton – Definition, DFA as language recognizer, DFA as pattern recognizer. Nondeterministic finite automaton – Definition and Examples. NFA To DFA (Myhill Nerode Method) NFA with ϵ -transitions Definition and Examples. NFA with ϵ -Transitions to DFA & Examples Finite automaton with output – Mealy and Moore machine, Definition and Examples. Minimization of DFA, Algorithm & Problem using Table Method.		
Chapter 2	Regular Expressions and Languages	6 Lect
Regular Expressions (RE): Definition & Example Regular Expressions Identities. Regular language-Definition and Examples. Conversion of RE to FA-Examples. Pumping lemma for regular languages and applications. Closure Properties of regular Languages		

Chapter 3	Context-Free Grammars and Languages	10 Lect
Grammar - Definition and Examples. Derivation-Reduction - Definition and Examples. Chomsky Hierarchy. CFG: Definition & Examples. LMD, RMD, Parse Tree Ambiguous Grammar: Concept & Examples. Simplification of CFG: Removing Useless Symbols, Unit Production, ϵ -production and Nullable Symbol. Normal Forms: Greibach Normal Form (GNF) and Chomsky Normal Form (CNF) Regular Grammar: Definition. Left linear and Right Linear Grammar-Definition and Example. Equivalence of FA & Regular Grammar Construction of regular grammar equivalent to a given DFA. Construction of a FA from the given right linear grammar		
Chapter 4	Push Down Automata	5 Lect
Definition of PDA and examples. Construction of PDA using empty stack and final State method: Examples using stack method. Definition DPDA & NPDA, their correlation and Examples of NPDA CFG (in GNF) to PDA: Method and examples		
Chapter 5	Turing Machine	5 Lect
The Turing Machine Model, Definition and Design of TM Problems on language recognizers. Language accepted by TM. Types of Turing Machines (Multitrack TM, Two-way TM, Multitape TM, Non-deterministic TM) Introduction to LBA (Basic Model) & CSG. (Without Problems)		
Reference Books		
1. Introduction to Automata Theory, Languages and Computation, John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman, Third Edition, Pearson Education Publication, 2008 2. Introduction to Automata theory, Languages and computation By John E. Hopcroft and Jeffrey Ullman – Narosa Publishing House, 1995 3. Theory of Computer Science Automata, Languages and Computation, K.L.P. Mishra, N. Chandrasekaran, Publication- Prentice Hall of India, 2008 4. Introduction to Computer Theory Daniel I. A. Cohen – 2 nd edition – John Wiley & Sons, 1996 5. Introduction to Languages and The Theory of Computation John C. Martin The McGraw-Hill, Fourth Edition, 2011		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem - V Course Type: DSEC - I Course Code: CS - 357 Course Title : Practical Course based on CS - 351		
Teaching Scheme: 5 Lect/ week	No. of Credits: 2	Examination Scheme: IE : 15 marks UE: 35 marks
Course Objectives: 1. To understand the concept of process scheduling with the help of simulation. 2. To study the concept demand paging concepts in operating system. 3. To understand the working of operating system shell.		
Course Outcomes: After completion of this course students will be able to understand the concept of 1. Process synchronization 2. Processes and Thread Scheduling by operating system 3. Memory management by operating system using with the help of various schemes		
Guidelines: 1. Operating system platform – Linux 2. Programming language - C		
List of Assignments: • Operations on processes : (2 slot) (Create a child process using fork() and commands like exec(),execv() and execvp()) • Simulation of Operating System Shell and its working (commands)(2 slots) • Simulation of CPU Scheduling Algorithms – FCFS, SJF, Priority and Round Robin(4 slots) • Simulation of demand paging using memory page replacement algorithms – FIFO, LRU, OPT, MFU(4 slots)		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) Sem – V Course Type: DSEC - II Course Code: CS - 358 Course Title : Practical Course based on CS - 353 and CS - 354		
Teaching Scheme: 5 Lect/ week Batch Size : 12	No. of Credits: 2	Examination Scheme: IE : 15 marks UE: 35 marks
Course Objectives: • To Design dynamic and interactive Web pages. • To Learn Core-PHP, Server Side Scripting Language • To Learn PHP- Database handling • To apply statistical, data preprocessing and visualization techniques on data sets		
Course Outcomes: • Understand how to develop dynamic and interactive Web Page • Prepare data for use with a variety of statistical methods and recognize how the quality of the data may affect conclusions. • Perform exploratory data analysis		
Guidelines: Operating Environment for web technologies: HTML5.0, PHP 5.0 and above , Webserver Operating Environment for Data Science: Linux + python		
List of Assignments on web technologies: 1 : HTML and HTML5.0 2 : CSS, Box Model, Navigation Bar 3 : Bootstrap 4 : Function and String 5 : Arrays 6: Files 7: Databases (PHP-PostgreSQL)		
Suggested Assignments for Foundations of Data Science Assignment 1: The Data Science environment Getting introduced to Python IDLE, command line, online tools like google colaboratory and essential packages like NumPy, SciPy, pandas, scikit-learn, matplotlib, jupyter, beautiful-soup, etc. Assignment 2: Loading the dataset Select a dataset from a list of publicly available datasets at UCI Machine Learning Repository and load it using Pandas. (Import different dataformat files like .CSV,.htm,.json etc. Briefly describe what the dataset is about and size of the dataset (e.g. number of tables, number of instances and attributes, etc.) Assignment 3: Basic statistical operations Apply basic statistical operations on a dataset. For example - compute the mean, median, mode, range, quartiles, and variance for one or more attributes.		

Assignment 4: Data preprocessing

Apply data preprocessing techniques that are likely required for the dataset.

1) Partition them into appropriate number of bins by equal-frequency as well as equal-width partitioning.

2) Use smoothing by bin means to smooth the data based on the above partitioning,

3) Normalize the attribute based on min-max normalization and z-score normalization.

Comment on which method you would prefer to use for partitioning, smoothing, and normalization for the given attribute.

Assignment 5: Data Visualization with matplotlib

View the data using various 2-D, 3-D plots and charts, setting styles, saving the figures, customizing the legends, multiple subplots,

SavitribaiPhule Pune University
T.Y.B.Sc. (Computer Science) - Sem – V
Course Type: DSEC - III **Course Code: CS - 359**
Course Title : Practical Course based on CS - 355

Teaching Scheme 5 Lect / week Batch Size : 12	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
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Course Objectives:

Covers the complete scope of the syllabus.

1. Bringing uniformity in the way course is conducted across different colleges.
2. Continuous assessment of the students.

Course Outcomes:

1. Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
2. Read and make elementary modifications to Java programs that solve real-world problems.
3. Validate input in a Java program.

Guidelines:

Operating Environment :

- **Operating system** : Linux
- **Editor** : Anylinux based editor like vi, gedit and Use of IDE – Eclipse etc.
- **Compiler** : javac

Submission :

Each assignment will be assessed on a scale of 0 to 5 as indicated below.

- | | |
|---------------------|---|
| ▪ Not done | 0 |
| ▪ Incomplete | 1 |
| ▪ Late Complete | 2 |
| ▪ Needs improvement | 3 |
| ▪ Complete | 4 |
| ▪ Well Done | 5 |

Assessment :

Easy : All exercises are compulsory.

Medium : All exercises are compulsory.

List of Assignments :

Assignment 1 : Java Tools and IDE, Simple java programs [Slot – 1]

Introduction to the java environment

Use of java tools like java, javac, jdb and javadoc

Defining simple classes and creating objects.

Assignment 2 : Array of Objects and Packages [Slot – 2]

Defining a class.

Creating an array of objects.

Creating a package.

Assignment 3 : Inheritance and Interfaces [Slot – 2]

To implement inheritance in java.

To define abstract classes.

To define and use interfaces and Functional Interface.

Assignment 4 : Exception And File Handling [Slot – 2]

Demonstrate Exception Handling Mechanism in Java.

Use of try, catch, throw, throws ,finally blocks

Defining User defined Exception classes.

Creation of files and demonstration of I-O operations

Assignment 5 : GUI Designing, Event Handling [Slot – 5]

To demonstrate GUI creation using Swing Package and Layout managers.

To understand Event handling mechanism in Java.

Using Event classes, Event Listeners and Adapters

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem – V Course Type: SECC – I Course Code : CS-3510 Course Title: Python Programming		
Teaching Scheme 03 Lect / week	No. of Credits 2	Examination Scheme: IE : 15 marks UE: 35 marks
Course Objectives 1. To introduce programming concepts using python 2. Student should be able to develop Programming logic using python 3. To develop basic concepts and terminology of python programming 4. To test and execute python programs		
Course Outcomes On completion of the course, student will be able to– • Develop logic for problem solving • Determine the methods to create and develop Python programs by utilizing the data structures like lists, dictionaries, tuples and sets. • To be familiar about the basic constructs of programming such as data, operations, conditions, loops, functions etc. • To write python programs and develop a small application project		
Course Contents		
Chapter 1	An Introduction to Python	3 Lect
Introduction to Python The Python Programming Language, History, features, Applications, Installing Python, Running Simple Python program Basics of Python Standard data types - basic, none, Boolean (true & False), numbers, Variables, Constants, Python identifiers and reserved words, Lines and indentation, multi-line statements and Comments, Input/output with print and input, functions Declaration, Operations on Data such as assignment, arithmetic, relational, logical and bitwise operations, dry run, Simple Input and output etc.		
Chapter 2	Control Statements	4 Lect
Sequence Control – Precedence of operators, Type conversion Conditional Statements: if, if-else, nested if-else, Looping- for, while, nested loops, loop control statements (break, continue, pass) a. Strings: declaration, manipulation, special operations, escape character, string formatting operator, Raw String, Unicode strings, Built-in String methods.		
Chapter 3	Lists, functions, tuples and dictionaries, Sets	7 Lect
Python Lists: Concept, creating and accessing elements, updating & deleting lists, traversing a List, reverse Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods. Functions: Definitions and Uses, Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Flow of Execution, Parameters and Arguments, Variables and Parameters, Stack Diagrams, Void Functions, Anonymous functions Importing with from, Return Values, Boolean Functions, More Recursion, Functional programming tools - filter(), map(), and reduce(), recursion, lambda forms.		

Tuples and Dictionaries: Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, and Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in tuple functions, indexing, slicing and matrices. Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods. Sets- Definition, transaction of set(Adding, Union, intersection), working with sets		
Chapter 4	Modules ,Working with files, Exception handling	4 Lect
Modules: Importing module, Creating & exploring modules, Math module, Random module, Time module Packages: Importing package, creating package,examples Working with files: Creating files and Operations on files (open, close, read, write), File object attributes, file positions, Listing Files in a Directory, Testing File Types, Removing files and directories, copying and renaming files, splitting pathnames, creating and moving directories Regular Expression- Concept of regular expression, various types of regular expressions, using match function. Exception Handling: Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions.		
Demonstration	Programming Assignments:	18 Lect
Out of 36 lectures, 18 are assigned for demonstration. Teacher should give demonstration of various programs mentioned below in the classroom or in the laboratory as per their convenience. Programming assignments should be done individually by the student in their respective login from the list given in Labbook. The codes should be uploaded on either the local server, Moodle, Github or any LMS. Assignment 1 - Python Basics Assignment 2 – Arrays, Strings, and Functions Assignment 3 - List, Tuples, Sets, and Dictionary Assignment 4 - File Handling and Date-Time Assignment 5 - Exception handling and Regular expression		
Reference Books:		
1. An Introduction to Computer Science using Python 3 by Jason Montojo, Jennifer Campbell, Paul Gries, The pragmatic bookshelf-2013 2. James Payne, “Beginning Python: Using Python and Python 3.1,Wrox Publication 3. Introduction to Computer Science Using Python- Charles Dierbach, Wiley Publication Learning with Python “, Green Tea Press, 2002 4. Introduction to Problem Solving with Python by E balguruswamy,TMH publication- 2016 5. Beginning Programming with Python for Dummies Paperback – 2015 by John Paul Mueller 6. Object-oriented Programming in Python, Michael H. Goldwasser, David Letscher, Pearson Prentice Hall-2008		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem – V Course Type: SECC – II Course Code : CS-3511 Course Title: Blockchain Technology		
Teaching Scheme 03 Lect / week	No. of Credits 2	Examination Scheme: IE : 15 marks UE: 35 marks
Prerequisite: Understanding of Object Oriented Programming Concepts Knowledge of Python		
Course Objectives 1. Understand what and why of blockchain technology. 2. Explore major components of blockchain. 3. Learn about Bitcoin, Cryptocurrency and Ethereum. 4. To learn blockchain programming using Python, Flask Web Framework, and HTTP client Postman.		
Course Outcomes On completion of the course, student will be able to– 1. Learn the fundamentals of Blockchain Technology. 2. Learn Blockchain programming 3. Basic knowledge of Smart Contracts and how they function.		
Course Contents		
Chapter 1	Introduction to Blockchain	7 Lect
• Foundational Computing Concepts (Client-Server systems vs Peer to Peer Systems) • Evolution of Blockchain • Blockchain Vs Database • Essentials of Blockchain (Blockchain generations, types of blockchain, benefits and challenges of blockchain usage) • Types of Networks • Layered Architecture of Blockchain Ecosystem • Components of blockchain • Cryptography (private and public keys, Hashing & Digital Signature) • Consensus Mechanisms • Cryptocurrency, Digital Currency Bitcoin and Ethereum • Smart Contracts • Blockchain use cases		
Chapter 2	How Blockchain Works?	5 Lect
• Understanding SHA256 Hash • Immutable Ledger • Distributed P2P Network • How Mining Works? (The NONCE and Cryptographic Puzzle) • Byzantine Fault Tolerance • Consensus Protocols: Proof of Work, Proof of State, Défense Against Attackers, Competing Chains • Blockchain Demo		

Chapter 3	Smart Contracts	6 Lect
• Ethereum Network • What is a Smart Contract? • Ethereum Virtual Machine, Ether, Gas • DApps • Decentralized Autonomous Organizations (DAO) • Hard and Soft Forks • Initial Coin Offerings • Demo of Smart Contracts		
Demonstration	Programming Assignments:	18 Lect
Out of 36 lectures, 18 are assigned for demonstration. Teacher should give demonstration of various programs mentioned below in the classroom or in the laboratory as per their convenience. Assignment 1 –Demonstration of Blockchain https://andersbrownworth.com/blockchain Assignment 2 – Installation of Ganache, Flask and Postman Assignment 3 –Write a Simple Python program to create a Block class that contains index, timestamp, and previous hash. Connect the blocks to create a Blockchain. Assignment 4 –Demo of Remix-Ethereum IDE https://remix.ethereum.org and Test Networks Assignment5–1. Write a Simple Smart Contract for Bank with withdraw and deposit functionality. Assignment 6 – 2. Write a Smart Contract for storing and retrieving information of Degree Certificates.		
Reference Books:		
Textbook: 1. Beginning Blockchain : A Beginner’s Guide to Building Blockchain Solutions By Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda, Apress Media Reference Books: 2. Mastering Blockchain by Imran Bashir, Third Edition, Packt Publication 3. Waterhole, The Science of the Blockchain 4. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System 5. Mastering Ethereum: Building Smart Contracts and DAPPS, by Andreas Antonopoulos, Dr. Gavid Wood, Oreilly Publication Reference Web Links 1. https://www.investopedia.com/terms/b/blockchain.asp		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem – VI Course Type: DSEC - IV Course Code: CS - 361 Course Title : Operating Systems-II		
Teaching Scheme: 03 Lect / week	No. of Credits: 2	Examination Scheme: IE : 15 marks UE: 35 marks
Prerequisites Concepts of Operating System, Processes and Threads Scheduling, Synchronization		
Course Objectives: 1. To understand the issue of Deadlocks in Process management. 2. To understand the concept of File system management & disk scheduling 3. To study the concept of distributed and mobile operating systems		
Course Outcomes: After completion of this course students will be able to understand the concept of 1. Management of deadlocks and File System by operating system 2. Scheduling storage or disk for processes 3. Distributed Operating System and its architecture and the extended features in mobile OS.		
Course Contents		
Chapter 1	Process Deadlocks	7 lectures
• System model • Deadlock Characterization – Necessary conditions, Resource allocation graph • Deadlock Methods- Prevention and Deadlock Avoidance - Safe state, Resource allocation graph algorithm, Banker's Algorithm • Deadlock Detection • Recovery from Deadlock – Process termination, Resource preemption		
Chapter 2	File system Management	6 lectures
• File concept , File attributes, File operations • Access Methods – Sequential, Direct, Other access methods • Directory overview, Single level directory, Two level directory, Tree structure directory, Acyclic graph directory, General graph directory • Allocation Methods – Contiguous allocation, Linked allocation, Indexed allocation • Free Space Management – Bit vector, Linked list, Grouping, Counting, Space maps		
Chapter 3	Disk scheduling	4 lectures
• Overview, Disk Structure • Disk Scheduling, FCFS Scheduling, SSTF Scheduling, Scan Scheduling-Scan Scheduling, Look Scheduling , Disk Management		
Chapter 4	Introduction to Distributed operating systems & Architecture	11 lectures
• What is a distributed system, Design goals • Types of distributed systems • Architectural styles : Layered architectures , Object-based architectures, Resource-centered architectures • System architecture – Centralized organization, Decentralized organizations, peer-to-peer systems, Hybrid architectures.		

• Example architectures : Network file system(NFS), Web-based distributed systems		
Chapter 5	Mobile Operating Systems	7 lectures
• Introduction • Features • Special Constraints and Requirements of Mobile Operating System • Special Service Requirements • ARM & Intel architectures – Power management • Mobile OS architectures – Underlying OS, kernel structure & native level programming, Runtime issues, Approaches to power management • Commercial Mobile Operating Systems - Windows Mobile, iPhone OS (iOS), Android • A Comparative Study of Mobile Operating Systems (Palm OS, Android, Symbian OS, Blackberry OS, Apple iOS)		
Reference Books:		
1) Advanced Concepts in Operating Systems, M Singhal and NG Shivaratri, Tata McGraw Hill Inc, 2001 (Text Book) 2) Operating System Concepts, Avi Silberschatz, Peter Galvin, Greg Gagne, Student Edition, Wiley Asia 3) Operating Systems: Internals and Design Principles, William Stallings, Prentice Hall of India. 4) Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI 5) Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt.Ltd, New Delhi – 2012. 6)A. Tannenbum, Herbert Bos, “Modern Operating systems”, Pearson Publication, 4th Edition 7) A. Tannenbum, Maarten van Steen, “Distributed systems”, 3rd Edition 8) Source wikipedia, Mobile operating systems, General books, LLC,2010		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem – VI Course Type: DSEC - IV Course Code: CS - 362 Course Title : Software Testing		
Teaching Scheme: 3 Lect / week	No. of Credits: 2	Examination Scheme: IE : 15 marks UE: 35 marks
Prerequisites: • Basic knowledge of algorithms, problem solving, expected inputs/outputs • Knowledge of C and java Programming Language, compilation, debugging.		
Course Objectives: • To provide the knowledge of software testing techniques • To understand how testing methods can be used as an effective tools in quality assurance of software. • To provide skills to design test case plan for testing software. • To provide knowledge of latest testing methods		
Course Outcomes: • To understand various software testing methods and strategies. • To understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software. • To design test cases and test plans, review reports of testing for qualitative software. • 4. To understand latest testing methods used in the software industries.		
Course Contents		
Chapter 1	Introduction to Software Testing	5 lectures
Basics of Software Testing – faults, errors and failures Testing objectives Principles of testing Testing and debugging Testing metrics and measurements Verification and Validation Testing Life Cycle		
Chapter 2	Software Testing Strategies & Techniques	10 lectures
Testability - Characteristics lead to testable software. Test characteristics Test Case Design for Desktop, Mobile, Web application using Excel White Box Testing - Basis path testing, Control Structure Testing. Black Box Testing- Boundary Value Analysis, Equivalence partitioning. Differences between BBT & WBT		
Chapter 3	Levels of Testing	10 lectures
A Strategic Approach to Software Testing Test strategies for conventional Software Unit testing Integration testing – Top-Down, Bottom-up integration System Testing – Acceptance, performance, regression, Load/Stress testing, Security testing, Internationalization testing. Alpha, Beta Testing		

Usability and accessibility testing Configuration, compatibility testing		
Chapter 4	Testing Web Applications	6 lectures
Dimension of Quality, Error within a WebApp Environment Testing Strategy for WebApp Test Planning The Testing Process –an overview		
Chapter 5	Agile Testing	5 lectures
Agile Testing, Difference between Traditional and Agile testing, Agile principles and values, Agile Testing Quadrants, Automated Tests.		
Reference Books:		
1. Software Engineering – A Practitioners Approach, Roger S. Pressman, 7th Edition, Tata McGraw Hill, 20 2. Effective Methods of Software Testing, William E Perry, 3rd Edition, Wiley Publishing Inc 3. Managing the Testing Process: Practical Tools and Techniques for Managing Hardware and Software Testing, Rex Black, Microsoft Press, 1999 4. Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin and Janet Gregory, 1st Edition, Addison-Wesley Professional, 2008 5. Software Testing Principles and Practices By Srinivasan Desikan, Gopalaswamy Ramesh, Pearson		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science)- Sem - VI Course Type:DSEC – V Course Code: CS - 363 Course Title : Web Technologies - II		
Teaching Scheme 3 Lect / week	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites • HTML5,CSS • Core PHP • Bootstrap framework utility		
Course Objectives • To Learn different technologies used at client Side Scripting Language • To Learn XML and XML parsers. • To One PHP framework for effective design of web application. • To Learn Java Script to program the behavior of web pages. • To Learn AJAX to make our application more dynamic. • Framework has		
Course Outcomes On completion of the course, student will be able to– • Build dynamic website. • Using MVC based framework easy to design and handling the errors in dynamic website.		
Course Contents		
Chapter 1	Introduction to Web Techniques	6 Lect
Variables Server information Processing forms Setting response headers Maintaining state PHP error handling		
Chapter 2	XML	6 Lect
What is XML? XML document Structure PHP and XML XML parser The document object model The simple XML extension Changing a value with simple XML		
Chapter 3	Java Script and Jquery	10 Lect
Overview of JavaScript Object Orientation and JavaScript Basic Syntax(JS datatypes, JS variables) Primitives, Operations and Expressions Screen Output and keyboard input(Verification and Validation) JS Control statements and JS Functions JavaScript HTML DOM Events(onmouseup, onmousedown, onclick, onload, onmouseover, onmouseout).		

JS Strings and JS String methods JS popup boxes(alert, confirm, prompt). JQuery library , Including jquery library in page JQuery selector , DOM manipulation using jquery		
Chapter 4	AJAX	6 Lect
Introduction of AJAX AJAX web application model AJAX –PHP framework Performing AJAX validation Handling XML data using php and AJAX Connecting database using php and AJAX		
Chapter 5	PHP framework CodeIgniter	8 Lect
CodeIgniter - Overview, Installing CodeIgnite Application Architecture MVC Framework , Basic concept of CodeIgniter, Libraries Working with databases Load external JS and CSS page & redirecting from controller , Adding JS and CSS , Page redirection. Loading dynamic data on page & session management, cookies management		
Reference Books:		
1. Programming PHP By Rasmus Lerdorf and Kevin Tatroe O'Reilly publication 2. Beginning PHP 5, Wrox publication 3. AJAX Black Book Kogent solution 4. Mastering PHP BPB Publication 5. Professional Codeigniter By Thomas Myer ,Wrox Publication, 6. Codeihniter 2 CookBook By Rob Foster ,PACKT Publication , 7. JQuery CookBook, O'reilly Publication. Ref. Links: 1. www.php.net.in 2. www.W3schools.com 3. https://www.tutorialspoint.com/codeigniter/index.htm 4. https://api.jquery.com/ 5. http://codeigniter.com/docs		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) – Sem VI Course Type:DSEC – V Course Code: CS - 364 Course Title : Data Analytics		
Teaching Scheme 03 lectures / week	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites • Basic of mathematics and statistics • Basic programming Knowledge of python • Knowledge of databases		
Course Objectives • Deploy the Data Analytics Lifecycle to address data analytics projects. • Develop in depth understanding of the key technologies in data analytics. • Apply appropriate analytic techniques and tools to analyze data, create models, and identify insights that can lead to actionable results.		
Course Outcomes On completion of the course, student will be able to– • Use appropriate models of analysis, assess the quality of input, and derive insight from results. • Analyze data, choose relevant models and algorithms for respective applications • Understand different data mining techniques like classification, prediction, clustering and association rule mining • Apply modeling and data analysis techniques to the solution of real world business problems		
Course Contents		
Chapter 1	Introduction to Data Analytics	6 lectures
Concept of data analytics Data analysis vs Data analytics Types of analytics Diagnostic Analytics, Predictive Analytics , Prescriptive Analytics, Exploratory Analysis, Mechanistic Analysis Mathematical models - Concept Model evaluation: metrics for evaluating classifiers - Class imbalance - AUC, ROC (Receiver-Operator Characteristic) curves, Evaluating value prediction models		
Chapter 2	Machine Learning Overview	6 Lectures
Introduction to Machine Learning, deep learning, Artificial intelligence Applications for machine learning in data science The modeling process Engineering features and selecting a model, Training the model, Validating the model, Predicting new observations Types of machine learning Supervised learning, Unsupervised learning, Semi-supervised learning, ensemble techniques Regression models Linear Regression		

Polynomial Regression Logistic Regression 2.6. Concept of classification, clustering and reinforcement learning.		
Chapter 3	Mining Frequent Patterns, Associations, and Correlations	12 lectures
What kind of patterns can be mined Class/Concept Description: Characterization and Discrimination, Mining Frequent Patterns, Associations, and Correlations, Classification and Regression for Predictive Analysis, Cluster Analysis, Outlier Analysis Mining frequent patterns - Market Basket Analysis. Frequent Itemsets, Closed Itemsets, and Association Rules Frequent Itemset Mining Methods Apriori Algorithm Generating Association Rules from Frequent Itemsets Improving efficiency of apriori algorithm Frequent pattern growth (FP-growth) algorithm		
Chapter 4	Social Media and Text Analytics	12 lectures
Overview of social media analytics Social Media Analytics Process, Seven layers of social media analytics, accessing social media data Key social media analytics methods Social network analysis Link prediction, Community detection, Influence maximization, Expert finding, Prediction of trust and distrust among individuals Introduction to Natural Language Processing Text Analytics : Tokenization, Bag of words, Word weighting : TF-IDF, n-Grams, stop words, Stemming and lemmatization, synonyms and parts of speech tagging Sentiment Analysis Document or text summarization Trend analytics Challenges to social media analytics		
Reference Books:		
1) Data Science Fundamentals and Practical Approaches, Gypsy Nandi, Rupam Sharma, BPB Publications, 2020. 2) The Data Science Handbook, Field Cady, John Wiley & Sons, Inc, 2017 3) Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann, Third Edition, 2012. 4) A Hands-On Introduction to Data Science, Chirag Shah, University of Washington Cambridge University Press 5) The Data Science Design Manual, Steven S. Skiena, Springer, 2017 6) Introducing data science: big data, machine learning, and more, using Python tools, Cielen D., Meysman A. D., & Ali M., Manning Publications Co., 2016		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem – VI Course Type: DSEC – VI Course Code : CS - 365 Course Title : Object Oriented Programming using Java – II		
Teaching Scheme 03 Lect / week	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
Prerequisites Knowledge of Core Java (CS – 355)		
Course Objectives - To learn database programming using Java - To study web development concept using Servlet and JSP - To develop a game application using multithreading - To learn socket programming concept		
Course Outcomes On completion of the course, student will be able to– - To access open database through Java programs using Java Data Base Connectivity (JDBC) and develop the application. - Understand and Create dynamic web pages, using Servlets and JSP. - Work with basics of framework to develop secure web applications.		
Course Contents		
Chapter 1	Collections	6 Lect
Introduction to the Collection framework List - ArrayList, LinkedList Set - HashSet, TreeSet, Map - HashMap and TreeMap Interfaces such as Comparator, Iterator, ListIterator, Enumeration		
Chapter 2	Multithreading	6 Lect
What are threads? Life cycle of thread Creating threads - Thread class , Runnable interface Thread priorities Running multiple threads Synchronization and interthread communication		
Chapter 3	Database Programming	6 Lect
The design of jdbc Types of drivers Executing sql statements, query execution Scrollable and updatable Resultset		
Chapter 4	Servlets and JSP	12 Lect
Introduction to Servlet and Hierarchy of Servlet Life cycle of servlet Handling get and post request (HTTP) Handling data from HTML to servlet Retrieving data from database to servlet		

Session tracking – User Authorization, URL rewriting, Hidden form fields, Cookies and HttpSession

Introduction to JSP, Life cycle of JSP

Implicit Objects

Scripting elements - Declarations, Expressions, Scriptlets, Comments

JSP Directives - Page Directive, include directive

Mixing Scriptlets and HTML

JSP Actions - jsp:forward , jsp:include, jsp:useBean, jsp:setProperty and jsp:getProperty

Chapter 5	Spring Framework	6 Lect
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Introduction of Spring framework

Spring Modules / Architecture

Spring Applications

Spring MVC

Spring MVC Forms, Validation

Reference Books:

R1. Complete reference Java by Herbert Schildt(5th edition)

R2. Java 2 programming black books, Steven Horlznern

R3. Programming with Java , A primer ,Forth edition , By E. Balagurusamy

R4. Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

R5. Core Java Volume-II-Advanced Features, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

R6. Getting started with Spring Framework: covers Spring 5 by J Sharma and Ashish Sarin

R7. Spring 4 for Developing Enterprise Applications: An End-to-End Approach by Henry H. Liu

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem - VI Course Type: DSEC - VI Course Code: CS - 366 Course Title: Compiler Construction		
Teaching Scheme 3 Lect / week	No. of Credits 2	Examination Scheme IE: 15 marks UE: 35 marks
Prerequisites Knowledge of Automata Theory and Languages.		
Course Objectives - To understand design issues of a lexical analyzer and use of LEX tool. - To understand design issues of a parser and use of YACC tool. - To understand and design code generation and optimization techniques.		
Course Outcomes On completion of the course, student will be able to– - Understand the process of scanning and parsing of source code. - Learn the conversion code written in source language to machine language. - Understand tools like LEX and YACC.		
Course Contents		
Chapter 1	Introduction	4 Lect
Definition of Compiler, Aspects of compilation. The structure of Compiler. Phases of Compiler – Lexical Analysis, Syntax Analysis, Semantic Analysis, Intermediate Code generation, code optimization, code generation. Error Handling. Introduction to one pass & Multipass compilers, cross compiler, Bootstrapping.		
Chapter 2	Lexical Analysis (Scanner)	4 Lect
Review of Finite automata as a lexical analyzer, Applications of Regular Expressions and Finite Automata (lexical analyzer, searching using RE), Input buffering, Recognition of tokens. LEX: A Lexical analyzer generator (Simple Lex Program)		
Chapter 3	Syntax Analysis (Parser)	14 Lect
Definition, Types of Parsers Top-Down Parser – Top-Down Parsing with Backtracking: Method & Problems Drawbacks of Top-Down parsing with backtracking, 3.2.3 Elimination of Left Recursion (direct & indirect) 3.2.4 Need for Left Factoring & examples Recursive Descent Parsing: Definition Implementation of Recursive Descent Parser Using Recursive Procedures 3.4 Predictive [LL (1)] Parser (Definition, Model) 3.4.1 Implementation of Predictive Parser [LL (1)] 3.4.2 FIRST & FOLLOW		

Construction of LL (1) Parsing Table Parsing of a String using LL (1) Table. Bottom-Up Parsers Operator Precedence Parser -Basic Concepts Operator Precedence Relations form Associativity & Precedence Operator Precedence Grammar Algorithm for LEADING & TRAILING (with ex.) Algorithm for Operator Precedence Parsing (with ex.) Precedence Functions Shift Reduce Parser Reduction, Handle, Handle Pruning Stack Implementation of Shift Reduce Parser (with examples) LR Parser: Model, Types [SLR (1), Canonical LR, LALR]-Method & examples. YACC (from Book 3) –program sections, simple YACC program for expression evaluation		
Chapter 4	Syntax Directed Definition	7 Lect
Syntax Directed Definitions (SDD) Inherited & Synthesized Attributes Evaluating an SDD at the nodes of a Parse Tree, Example Evaluation Orders for SDD's Dependency Graph Ordering the Evaluation of Attributes S-Attributed Definition L-Attributed Definition Application of SDT Construction of syntax trees, The Structure of a Type 4. 4 Translation Schemes 4.4.1 Definition, Postfix Translation Scheme		
Chapter 5	Code Generation and Optimization	7 Lect
Compilation of expression – Concepts of operand descriptors and register descriptors with example. Intermediate code for expressions – postfix notations, Triples, Quadruples and Expression trees. Code Optimization – Optimizing transformations – compile time evaluation, elimination of common sub expressions, dead code elimination, frequency reduction, strength reduction. Three address code DAG for Three address code The Value-number method for constructing DAG's. Definition of basic block, Basic blocks, and flow graphs Directed acyclic graph (DAG) representation of basic block. Issues in design of code generator.		

Reference Books
1. Compilers: Principles, Techniques, and Tools, Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, 2004 2. Principles of Compiler Design By: Alfred V. Aho, Jeffrey D. Ullman, Narosa Publication House, 2002 3. LEX & YACC, 2nd edition, O'reilly Publication, 2012

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem – VI Course Type: DSEC- IV Course Code: CS - 367 Course Title : Practical Course based on CS - 361		
Teaching Scheme: 5 Lect/ week	No. of Credits: 2	Examination Scheme: IE : 15 marks UE: 35 marks
Course Objectives: 1. To implement Banker’s algorithm for Deadlocks in Process management. 2. To simulate File system management 3. To study and implement various algorithms of disk scheduling		
Course Outcomes: After completion of this course students will be able to understand the concept of 1. Management of deadlocks by operating system 2. File System management 3. Disk space management and scheduling for processes		
Guidelines: 1. Operating system platform – Linux 2. Programming language - C		
List of Assignments: • Simulation of Banker’s algorithm of deadlock avoidance in processes of operating system (3 slots) • Simulation of File Allocation methods and free space management in storage - Contiguous allocation, Linked allocation, Indexed allocation (4 slots) • Simulation of Disk Scheduling algorithms – FCFS, SSTF, Scan, Look (2 slots) • Assignment based on distributed and mobile OS (3 slots)		

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem – VI Course Type: DSEC - V Course Code: CS - 368 Course Title : Practical Course based on CS - 363 and CS - 364		
Teaching Scheme 5 Lect/ week Batch Size : 12	No. of Credits: 2	Examination Scheme: IE : 15 marks UE: 35 marks
Course Objectives: - To Learn different technologies used at client Side Scripting Language - To Learn XML and XML parsers. - To One PHP framework for effective design of web application. - To Learn Java Script to program the behavior of web pages. - To Learn AJAX to make our application more dynamic. Framework has some utility features that make easy to write API in more efficient way than Core PHP		
Course Outcomes: - Build dynamic website. - Using MVC based framework easy to design and handling the errors in dynamic website.		
Guidelines: Operating Environment :Linux, HTML, PHP5.0 and above, Codeigniter, Python		
List of Assignments based on Web Technology CS-363: 1 : Self Processing Forms, Sticky Forms, File Upload. 2 : COOKIES and SESSIONS. 3 : XML documents and DOM 4 : JavaScript 5 : Ajax 6 : PHP framework CodeIgniter List of Assignments for Data Analytics Assignment 1: Frequent itemset and association rule mining Load Transactional data set. Do the needful data preprocessing. Display the set of frequent 2-itemsets and 3-itemsets. Repeat the process for different min_sup value. Assignment 2: Linear and Logistic regression For Given dataset predict the value of specific attribute. Assignment 3: Text Analytics Take text file as input. Create bag of words. Find frequent item sets. Display word cloud Assignment 4: Sentiment analysis		

SavitribaiPhule Pune University
T.Y.B.Sc. (Computer Science) - Sem – VI
Course Type: DSEC - VI Course Code: CS - 369
Course Title : Practical Course based on CS - 365

Teaching Scheme 5 Lect/ week Batch Size : 12	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
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Course Objectives:

1. Covers the complete scope of the syllabus.
2. Bringing uniformity in the way course is conducted across different colleges.
3. Continuous assessment of the students.
4. Advanced Java is designed to develop web based, network centric, Enterprise level applications

Course Outcomes:

1. To Learn database Programming using Java
2. Understand and Create dynamic web pages using Servlets and JSP.
3. Work with basics of framework to develop secure web applications

Guidelines:

Operating Environment :

- **Operating system:** Linux
- **Editor:** Anylinux based editor like vi, gedit and Use of IDE – Eclipse etc.
- **Compiler :** javac
- **Database :** postgresql

Submission :

Each assignment will be assessed on a scale of 0 to 5 as indicated below.

- | | |
|---------------------|---|
| ▪ Not done | 0 |
| ▪ Incomplete | 1 |
| ▪ Late Complete | 2 |
| ▪ Needs improvement | 3 |
| ▪ Complete | 4 |
| ▪ Well Done | 5 |

Assessment :

Easy : All exercises are compulsory.

Medium : All exercises are compulsory.

List of Assignments:

Assignment 1 : Database Programming [Slot-2]

Study the Collection framework in java.

To Implement various Interfaces and classes through algorithms.

To Demonstrate Cursor Objects (Enumeration, Iterator, ListIterator, Comparator)

Assignment 2 : Multithreading [Slot-2]

To create and use threads in java.
To demonstrate multithreading using Thread Synchronization, Inter-thread .
Communication, Thread Priorities.

Assignment 3 : Database Programming [Slot-2]

To communicate with a database using java.
To execute queries on tables.
To obtain information about the database and tables.

Assignment 4 : Servlets [Slot-2]

To understand server-side programming.
Simple steps to create and execute servlets.
How to pass parameters using doGet and doPost methods.
Handling data from HTML to servlet .
How to connect servlet to a database .
Use of various session tracking methods like Cookies.

Assignment 5 : Java Server Pages [Slot-2]

JSP life-cycle.
Use of JSP implicit objects.
JSP Directives.
Use of Scripting Elements.
To understand actiontags in JSP.
Understanding flow of JSP custom tags.

Assignment 6 : Spring Framework [Slot-2]

To create and understand the steps to develop Spring application.

Savitribai Phule Pune University T.Y.B.Sc. (Computer Science) - Sem – VI Course Type: SECC - III Course Code: CS - 3610 Course Title: Software Testing Tools		
Teaching Scheme: 03 Lect / week	No. of Credits: 2	Examination Scheme: IE:15 marks UE: 35 marks
Prerequisites • Basic knowledge of algorithms, problem solving, expected inputs/outputs • Knowledge of C and Java Programming Language, compilation, debugging		
Course Objectives: • To provide the knowledge of software testing methods and strategies. • To understand how testing methods can be used as an effective tool in quality assurance of software. • To provide skills to design test case plan for testing software. • 4.To provide knowledge of latest testing tools		
Course Outcomes: • To understand various software testing methods and strategies. • To understand a variety of software metrics and identify defects and managing those defects for improvement in quality for given software. • To design test cases and test plans, review reports of testing for qualitative software. • 4. To understand latest testing tools used in the software industries.		
Course Contents		
Chapter 1	Introduction to Test case design	4 lectures
How to identify errors, bugs in the given application. Design entry and exit criteria for test case, design test cases in excel. Describe feature of a testing method used.		
Chapter 2	Test cases for simple programs	4 lectures
Write simple programs make use of loops and control structures. Write Test Cases for above programs.		
Chapter 3	Test cases and Test plan	4 lectures
Write Test Plan for given application with resources required. Write Test case for given application. Prepare Test report for test cases executed.		
Chapter 4	Defect Report	3 lectures
Defect Life Cycle Classification of Defect Write Defect Report		
Chapter 5	Testing Tools	3 lectures
How to make use of Automation Tools Types of Testing Tools		
Demonstration	Programming Assignments	18 Lect
Out of 36 lectures, 18 are assigned for demonstration. Teacher should give demonstration of various assignments based on above theory topics in the classroom or in the laboratory as per their convenience. Demonstration of any open source testing tool should be given.		

Programming assignments should be done individually by the student in their respective login from the list given in Labbook. The code/ documentation should be uploaded on either the local server, Moodle, Github or any LMS.

Reference Books:

1. Software Engineering – A Practitioners Approach, Roger S. Pressman, 7th Edition, Tata McGraw Hill, 20
2. Effective Methods of Software Testing, William E Perry, 3rd Edition, Wiley Publishing Inc
3. Managing the Testing Process: Practical Tools and Techniques for Managing Hardware and Software Testing, Rex Black, Microsoft Press, 1999
4. Software Testing Principles and Practices by Srinivasan Desikan, Gopalaswamy Ramesh, Pearson.

Savitribai Phule Pune University
T.Y.B.Sc. (Computer Science) - Sem - VI
Course Type: SECC - IV Course Code: CS - 3611
Course Title : Project

Teaching Scheme 03 Lect/ week/Batch Batch Size : 20	No. of Credits 2	Examination Scheme IE : 15 marks UE: 35 marks
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Project Guidelines:

- Students should work in a team of minimum 3 and maximum 4 students.
- Students can choose a project topic and implement the same using any language/technology covered in the curriculum so far. The operating environment must be linux.
- The student group will work independently throughout the project work including: problem identification, information searching, literature study, design and analysis, implementation, testing, and the final reporting.
- Project guide must conduct project presentations (minimum 2) to monitor the progress of the project groups.
- At the end of the project, the group should prepare a report which should conform to international academic standards. The report should follow the style in academic journals and books, with clear elements such as: abstract, background, aim, design and implementation, testing, conclusion and full references, Tables and figures should be numbered and referenced to in the report.
- The final project presentation with demonstration (UE) will be evaluated by the project guide (appointed by the college) and one external examiner (appointed by the University).

Recommended Documentation contents:

Abstract

Introduction

- motivation
- problem statement
- purpose/objective and goals
- literature survey
- project scope and limitations

System analysis

- Existing systems
- scope and limitations of existing systems
- project perspective, features
- stakeholders
- Requirement analysis - Functional requirements, performance requirements, security requirements etc.

System Design

- Design constraints
- System Model: Using OOSE
- Data Model
- User interfaces

Implementation details

- Software/hardware specifications

Outputs and Reports Testing

- Test Plan, Black Box Testing or Data Validation Test Cases, White Box Testing or Functional Validation Test cases and results

Conclusion and Recommendations

Future Scope

Bibliography and References

Project Related Assignments

Guidelines:

- The project assignments are a compulsory part of the project course and should be carried out by each project group.
- Project assignments are to be given by the guide for continuous internal evaluation.
- The project assignments are to be allotted to each group separately by the project guide on the basis of the implementation technology. A suggested list of assignments is given below.
 1. Project Time management: plan (schedule table), Gantt chart, Roles and responsibilities, data collection, Implementation
 2. Simple assignments to evaluate choice of technology
 3. Assignments on UI elements in chosen technology
 4. Assignments on User interfaces in the project
 5. Assignments on event handling in chosen technology
 6. Assignments on Data handling in chosen technology
 7. Online and offline connectivity
 8. Report generation
 9. Deployment considerations
 10. Test cases
- Each student within the group must work actively and contribute to the assignments, project work and report writing.

Evaluation guidelines:

IA (15 marks)			UE (35 marks)		
First presentation	Second presentation	Assignments	Project Logic/ Presentation	Assignments and Project Documentation	Viva
05	05	05	20	10	05

Savitribai Phule Pune University [SPPU]

B.Sc. (Chemistry)
(Three Years Integrated Degree Program)

Choice Based Credit System [CBCS]
2019 Pattern

Third Year Bachelors of Science
(T. Y. B. Sc. CHEMISTRY)

From
Academic Year 2021-22

Board of Studies in Chemistry
Savitribai Phule Pune University [SPPU]
Pune-411007

Structure of T. Y. B. Sc. Chemistry

(According to CBCS – 2019 Pattern of SPPU)

Semester	DSEC/SEC	Nature	Paper Code	Code and Title	Credits/Lectures
V	DSEC-I	Theory	CH-501	Physical Chemistry-I	Credit-2, 36 L
		Theory	CH-502	Analytical Chemistry-I	Credit-2, 36 L
		Practical	CH-503	Physical Chemistry Practical-I	Credit-2, 73 L
	DSEC-II	Theory	CH-504	Inorganic Chemistry-I	Credit-2, 36 L
		Theory	CH-505	Industrial Chemistry	Credit-2, 36 L
		Practical	CH-506	Inorganic Chemistry Practical-I	Credit-2, 73 L
	DSEC-III	Theory	CH-507	Organic Chemistry-I	Credit-2, 36 L
		Theory	CH-508	Chemistry of Biomolecules	Credit-2, 36 L
		Practical	CH-509	Organic Chemistry Practical-I	Credit-2, 73 L
	SEC- I	Theory	CH-510	(A) Introduction of Medicinal Chemistry OR (B) Polymer Chemistry	Credit-2, 36 L
	SEC- II	Theory	CH-511	(A) Environmental Chemistry OR (B) Chemo informatics	Credit-2, 36 L
VI	DSEC-IV	Theory	CH-601	Physical Chemistry-II	Credit-2, 36 L
		Theory	CH-602	Physical Chemistry -III	Credit-2, 36 L
		Practical	CH-603	Physical Chemistry Practical-II	Credit-2, 73 L
	DSEC-V	Theory	CH-604	Inorganic Chemistry-II	Credit-2, 36 L
		Theory	CH-605	Inorganic Chemistry-III	Credit-2, 36 L
		Practical	CH-606	Inorganic Chemistry Practical-II	Credit-2, 73 L
	DSEC-VI	Theory	CH-607	Organic Chemistry-II	Credit-2, 36 L
		Theory	CH-608	Organic Chemistry-III	Credit-2, 36 L
		Practical	CH-609	Organic Chemistry Practical-II	Credit-2, 73 L
	SEC III	Theory	CH-610	(A) Chemistry of Soil and Agrochemicals OR (B) Introduction of Forensic Chemistry	Credit-2, 36 L
	SEC IV	Theory	CH-611	(A) Analytical Chemistry-II OR (B) Chemistry of Cosmetics and Perfumes	Credit-2, 36 L

Important points:

- i. Each credit is equivalent to 18 lectures of 50 minutes for theory courses and 36 lecture of 50 minutes for practical courses.
- ii. There will be 12 practical sessions per semester of 4 hours 20 minutes each.
- iii. Total weeks for teaching and internal evaluation are 15. Out of the 15 weeks, 12 weeks for teaching and 03 weeks for internal evaluation. (Theory as well as Practical).
- iv. For more details refer to UG rules and regulations (CBCS for Science program under Science & Technology) on SPPU website.

Evaluation Pattern (As per CBCS rules, SPPU, 2019 Pattern)

1. Each theory and practical course carry 50 marks equivalent to 2 credits.
2. Each course will be evaluated with Continuous Internal Assessment (CIA) and University Assessment (UEX) mechanism.
3. Continuous internal assessment shall be of 15 marks (30%) while university Evaluation shall be of 35 marks (70%).
4. To pass each course, a student has to secure 40% mark in continuous assessment as well as university assessment i.e. minimum 6 marks in continuous assessment and 14 in university assessment in the respective course.
5. For Continuous internal assessment minimum two tests per paper must be organized, of which one must be written test of 10 marks.
6. Method of assessment for internal exams: written test, MCQ type test, Viva-Voce, Project, survey, field visits, tutorials, assignments, group discussion, etc. (on approval of the head of centre).
7. Theory - University Assessment Question Paper Pattern (According to CBCS - 2019 Pattern of SPPU) Note that in theory question paper weightage will be given to each topics equivalent to number of lectures assigned in the syllabus.

Preamble:

The syllabus of Chemistry for third year has been redesigned for **Choice Based Credit System (CBCS: 2019 pattern)** and to be implemented from academic year 2021-22. In CBCS pattern semester system has been adopted for B. Sc. degree programme. Different types of courses are introduced at degree level viz. **Discipline Specific Core Course (DSCC)**, **Ability Enhancement Compulsory Course (AECC)**, **Discipline Specific Elective Course (DSEC)** and **Skill Enhancement Course (SEC)**. DSCC courses has been introduced at FY/SY level and AECC courses at SY level. At TY level DSEC and SEC courses are to be introduced. Third year syllabus comprises of six theory and three practical courses of DSEC type and two theory SEC per semester.

Equivalence with Previous Syllabus (2013 Pattern)

2013 Pattern	2019 Pattern
Sem-III (T.Y.B.Sc.)	Sem-V (T.Y.B.Sc.)
Core courses	Discipline Specific Elective Courses (DSEC)
CH-331: Physical Chemistry	CH: 501: Physical Chemistry-I
CH-332: Inorganic Chemistry	CH: 504: Inorganic Chemistry-I
CH-333: Organic Chemistry	CH: 507: Organic Chemistry-I
CH-334: Analytical Chemistry	CH: 502: Analytical Chemistry-I
CH-335: Industrial Chemistry	CH: 505: Industrial Chemistry
CH-336: Optional course (Any one) A- Nuclear Chemistry, B- Polymer Chemistry C- Intro. To Biochemistry, D- Env. And Green Chemistry, E- Agriculture Chemistry	CH:508: Chemistry of Biomolecules
----	Skill Enhancement Courses (SEC) CH:510 (A): Introduction of Medicinal Chemistry OR CH:510 (B): Polymer Chemistry
----	CH:511(A): Environmental Chemistry OR CH:511(B): Cheminformatics
Sem-IV (T.Y.B.Sc.)	Sem-VI (T.Y.B.Sc.)
Core courses	Discipline Specific Elective Courses (DSEC)
CH-341: Physical Chemistry	CH: 601: Physical Chemistry-II
CH-342: Inorganic Chemistry	CH: 604: Inorganic Chemistry-II
CH-343: Organic Chemistry	CH: 607: Organic Chemistry-II
CH-344: Analytical Chemistry	CH-602: Physical Chemistry -III
CH-345: Industrial Chemistry	CH: 605: Inorganic Chemistry-III
CH-346: Optional course (Any one) A- Nuclear Chemistry, B- Polymer Chemistry C- Intro. To Biochemistry, D- Env. And Green Chemistry, E- Dairy Chemistry	CH: 608: Organic Chemistry-III
	Skill Enhancement Courses (SEC) CH-610 (A): Chemistry of Soils and Agrochemicals OR CH-610 (B): Introduction of Forensic Chemistry
	CH-611 (A): Analytical Chemistry-II OR CH-611 (B): Chemistry of Cosmetics and Perfumes
CH-347: Physical Chemistry Practical	CH 503 and 603: Physical Chemistry Practical-I and II
CH-348: Inorganic Chemistry Practical	CH 506 and 606: Inorganic Chemistry Practical I and II
CH-349: Organic Chemistry Practical	CH 509 and 609: Organic Chemistry Practical-I and II

The Detailed Semester and Course Wise Syllabus as follows:**SEMESTER-V****DSEC-I: CH-501: Physical Chemistry- I****[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Quantum Chemistry	10
2	Investigation of Molecular structure	16
3	Photochemistry	10
Total		36

1. Quantum Chemistry**[10 L]**

Introduction, de Broglie hypothesis, The Heisenberg's uncertainty principle, quantisation of energy, Operators, Schrodinger wave equation, well behaved function, Particle in a one-, two and three-dimensional box (no derivation), Physical interpretation of the ψ and ψ^2 , sketching of wave function and probability densities for 1D box, degeneracy, applications to conjugated systems, zero-point energy and quantum tunnelling, Numerical

Expected learning Outcome:

After successfully completion, students will be able to:

1. Know historical of development of quantum mechanics in chemistry.
2. Understand and explain the differences between classical and quantum mechanics.
3. Understand the idea of wave function
4. Understanding of De Broglie hypothesis and the uncertainty principle
5. Understanding the operators: Position, momentum and energy
6. Solving Schrodinger equation for 1D, 2D and 3D model
7. Physical interpretation of the ψ and ψ^2 and sketching the wave function
8. Applications to conjugated systems, zero-point energy and quantum tunnelling, Numerical Problems

Reference books:

- 1) Principles of Physical Chemistry by Puri, Sharma, Pathania,; (Page No: 21-110)
- 2) Essential of Physical Chemistry, Bahl and Tuli (S. Chand).; (Page No: 50-58)

2. Investigation of Molecular structure**[16 L]**

Introduction: Molar refraction and molecular structure, Dipole moment and molecular structure, electromagnetic spectrum, energy of molecules, Types of molecular spectra.

Microwave Spectroscopy: Introduction, Classification of molecules on the basis of moment of Inertia, Rotational spectra of rigid diatomic molecules, relative intensities of spectral lines, effect of isotopic substitution on the rotational spectra, Determination of bond length and moment of inertia from rotational spectra, Problems

Infrared Spectroscopy: Introduction, Simple Harmonic oscillator, Modes of vibration, force constant, Vibrational spectrum of a diatomic molecule: Vibrational Energy expression, Allowed vibrational energies, zero-point energy, Selection rule, Vibrational energy level diagram with transitions, spectrum depiction, Vibration-rotation Spectra: Born-Oppenheimer approximation, Energy expression for vibrational rotor, Selection rules, Vibrational-rotational energy level diagram with transitions, Nature of vibrational spectra, P, Q and R branches of lines of the IR spectra, Problems

Raman Spectroscopy: Introduction, Classical and Quantum theory of Raman effect, Rayleigh, Stokes and anti-stokes lines, Pure rotational Raman spectra of linear diatomic molecules

Expected learning Outcome: After studying this chapter, the student will be able to:

1. Understand the term additive and constitutive properties.
2. Understand the term specific volume, molar volume and molar refraction.
3. Understand the meaning of electrical polarization of molecule, induced and orientation polarization.
4. Dipole moment and its experimental determination by temperature variation method.
5. Electromagnetic spectrum, Nature of wave and its characteristics such as wavelength, wave number, frequency and velocity, Energy level diagram,
6. Classification of molecules on the basis of moment of Inertia,
7. Rotational spectra of rigid diatomic molecules, selection rules, nature of spectral lines.
8. Simple Harmonic oscillator model, Born-Oppenheimer approximation. Vibrational spectra of diatomic molecules selection rules, nature of spectral lines.
9. Explain the difference between Rayleigh, Stokes and anti-Stokes lines in a Raman spectrum.
10. Justify the difference in intensity between Stokes and anti-Stokes lines.
11. Draw the Stokes and anti-Stokes lines in a Raman spectrum
12. Raman spectra: Concept of polarizability,
13. Pure rotational Raman spectra of diatomic molecules, Energy Expression, Selection rule, Rotational energy level diagram, Rotational Raman spectrum and Problems

Reference books:

1. Fundamentals of molecular spectroscopy by C.N. Banwell and E. M. McCash.

(Page No: 33-59, 60-75, 111-119)

2. Physical Chemistry, Singh, N.B., et al. Volume 2, New Age International Ltd, 2000.

(Page No: 413-455)

3. Photochemistry

[10 L]

Introduction, Difference between thermal and photochemical processes, Laws of photochemistry: i) Grothus - Draper law ii) Stark-Einstein law, Quantum yield, Reasons for high and low quantum yield., Factors affecting Quantum yield, Experimental method for the determination of quantum yield, types of photochemical reactions - photosynthesis, photolysis, photocatalysis, photosensitization, Jablonski diagram depicting various processes occurring in the excited state: Qualitative description of fluorescence and phosphorescence, Chemiluminescence, Problems

Expected learning Outcome:

After studying this chapter, the student will be able to know and understand:

1. Difference between thermal and photochemical processes.
2. photochemical laws: Grothus - Draper law, Stark-Einstein law,
3. Quantum yield and reasons for high and low quantum yield,
4. factors affecting the quantum yield,
5. Experimental method for the determination of quantum yield
6. Photochemical reactions: photosynthesis, photolysis, photocatalysis, photosensitization
7. Various photochemical phenomena like fluorescence and phosphorescence, Chemiluminescence,
8. Problems

Reference books:

1. Essential of Physical Chemistry, Bahl and Tuli (S. Chand).; (Page No: 1154-1178)
2. Principles of Physical Chemistry by Puri, Sharma, Pathania,; (Page No: 1112-1135)
3. Physical Chemistry, Singh, N.B., et al. Volume 2, New Age International Ltd, 2000.
(Page No: 262-2810)

Additional Reference Books:

1. Physical Chemistry by G. M. Barrow, International student Edition, Mc Graw Hill.
2. University General Chemistry by C.N.R. Rao, Macmillan.
3. Physical Chemistry by, R. A. Alberty, Wiley Eastern Ltd.
4. The Elements of Physical Chemistry by P. W. Atkins, Oxford.
5. Principles of Physical Chemistry by S. H. Maron, C. H. Prutton, 4th Edition.
6. Quantum Chemistry by Donald A McQuarrie, Viva Student Edition

7. Quantum Chemistry by I. Levine.
8. Quantum Chemistry by R.K. Prasad

DSEC-I: CH-502: Analytical Chemistry- I**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Gravimetry	09
2	Inorganic Qualitative Analysis	07
3	Thermal methods of analysis	06
4	Parameters of instrumental analysis	04
5	UV-Visible spectroscopy	10
Total		36

1. Gravimetry**(9 L)**

Introduction to gravimetric analysis; Precipitation methods; The colloidal state; Supersaturation and precipitate formation; The purity of the precipitate: Co-precipitation; ; Conditions of precipitation; Precipitation from homogeneous solution; Washing the precipitate; Ignition of the precipitate: quantitative separations based upon precipitation methods: Fractional precipitation; Organic precipitants (8-hydroxyquinoline, DMG, Cupferron, Nitron, and Benzoin-alfa oxime, Anthranilic acid), Gravimetric Calculations—How Much Analyte is there (Ref-3)

Applications of Gravimetry: Determination of Al(III) by 8-hydroxyquinoline, Determination of calcium as oxalate; Determination of potassium as potassium tetraphenylborate, Determination of phosphate as ammonium molybdophosphate, Numericals,

Key Reference-1: 417-428, 433-444, 446, 451, 464, 485; [Supplementary Ref-2: Pp-342 to 362]

2. Inorganic Qualitative Analysis**(7 L)**

Basic principle, common ion effect, solubility, solubility product, preparation of original solution, classification of basic radicals in groups, separation of basic radicals, removal of interfering anions (phosphate and borate), detection of acid radicals. Ref-6

3. Thermal methods of analysis**(6 L)**

General discussion, Thermogravimetry, Experimental factors affecting TG analysis, Instruments for thermogravimetry, Applications: Thermogravimetric analysis of $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, Differential Thermal Analysis: Introduction, instrumentation for DTA and DSC, experimental and instrumental factors, applications: DTA of copper sulphate pentahydrate, Purity of

pharmaceutical by DSC, Key Reference-2: 503-522, [Supplementary reference, Ref-4: 884-890, Ref-1: 428-433]

3. Parameters of instrumental analysis

(4 L)

Techniques, Methods, Procedures, and Protocols, Selecting an Analytical Method, Accuracy, Precision, Sensitivity, Selectivity, Robustness and Ruggedness, Scale of Operation, equipment, Time, and Cost, Making the Final Choice, Developing the Procedure, Calibration and Standardization, Sampling, Validation, Protocols, Key Reference -5: 35-48

4. UV-Visible spectroscopy

(10 L)

Introduction, Theory of spectrophotometry and colorimetry-Beer's law, Application of Beer's Law, Spectrophotometry: Wavelength selection by prism and diffraction grating, Radiation source, cells, data presentation, single-beam spectrophotometer, Double-beam spectrophotometers, Choice solvent, general procedure for colorimetric estimation, simultaneous analysis, Applications: Estimation of metal ions from aqueous solution: Boron in steel, Chromium in steel with diphenyl carbazide reagent, ammonia in water, Chloride, Primary amine, Determination of phenol, spectrophotometric titration (example Cu(II) with EDTA), Determination of pKa value of indicator, Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method., Numericals Key Reference-2: 658-717 and Ref-1: 645-725

References:

- Ref-1: Vogel's textbook of Inorganic Quantitative Analysis, Jeffery, Basset, Mendham Deney, 5th Ed, Longman Scientific Technical, USA (copublished with John Wiley Sons)
Ref-2: Vogel's textbook of Inorganic Quantitative Analysis, Mendham, Deney Barnes, 6th Ed, Pearson education
Ref-3: Analytical Chemistry by G. D. Christian, et al , Wiley, 6th Ed.
Ref-4: Principles of Instrumental Analysis: Holler, Skoog, Crouch 6th Ed. Thomson Publication
Ref-5: Modern Analytical Chemistry, David Harvey, Mc-Graw Hill Higher education
Ref-6: Vogel's Qualitative Inorganic Analysis, G. Svehla, Pearson, 7th Ed.

Course outcome: After completion of the course student should be able to

1. Define basic terms in gravimetry, spectrophotometry, qualitative analysis and parameters in instrumental analysis. Such as: Gravimetry, precipitation, solubility product, ionic product, common ion effect, precipitating agent, washing of ppt., drying and ignition of ppt., linearity range, detection limit, precision, accuracy, Sensitivity, Selectivity, Robustness and Ruggedness, electromagnetic radiations, spectrophotometry, Beers law, absorbance, transmittance, molar absorptivity, monochromator, wavelength of maximum absorbance,

metal ligand ration, qualitative analysis, group reagent, dry tests, wet test, confirmatory test, precipitation, thermogravimetry, thermogram, percent wt. loss, differential thermal analysis, etc.

2. Identify important parameters in analytical processes or estimations. Example: minimum analyte concentration in particular method, reagent concentration in particular analysis (gravimetry, spectrophotometry, thermogravimetry), reagent for particular analysis, reaction condition to convert analyte into measurable form, drying and ignition temperature for ppt in gravimetry, heating rate thermogravimetry, wavelength in spectrophotometry, group reagent, removal borate and phosphate in qualitative analysis, etc.
3. Explain different principles involved in the gravimetry, spectrophotometry, parameters in instrumental analysis, qualitative analysis.
4. Perform quantitative calculations depending upon equations student has studied in the theory. Furthermore, student should able to solve problems on the basis of theory.
5. Discuss / Describe procedure for different types analyses included in the syllabus.
6. Select particular method of analysis if analyte sample is given to him.
7. Differentiate / distinguish / Compare among the different analytical terms, process and analytical methods.
8. Demonstrate theoretical principles with help of practical.
9. Design analytical procedure for given sample.
10. Apply whatever theoretical principles he has studied in theory during practical session in laboratory.

DSEC-I: CH-503: Physical Chemistry Practical - I**[Credit -2, 73 L]**

Total 12 experiments to be completed.

1. Refractometry: (any two)

- 1) To determine the specific refractivity's of the given liquids A and B and their mixture and hence determine the percentage composition their mixture C.
- 2) To determine the molecular refractivity of the given liquids A, B, C and D.
- 3) To determine the molar refraction of homologues methyl, ethyl and propyl alcohol and show the constancy contribution to the molar refraction by -CH₂ group.
- 4) Determine the refractive index of a series of salt solutions and determine the concentration of a salt of unknown solution

2. Spectrophotometry and Colorimetry (any three)

- 1) To titrate Cu²⁺ ions with EDTA photometrically.
- 2) To determine the indicator constant of methyl red indicator

- 3) To estimate of Fe^{3+} ions by thiocyanate method.
- 4) Cobalt by using R-nitroso salt method.
- 5) To determine the order of reaction for the oxidation of alcohol by potassium dichromate and potassium permanganate in acidic medium calorimetrically.
- 6) Simultaneous determination of Cu^{2+} and Ni^{2+} ions by colorimetry/spectrophotometry method

3. Conductometry (any four)

- 1) Titration of a mixture of weak acid and strong acid with strong alkali.
- 2) To determine the velocity constant of hydrolysis of ethyl acetate by NaOH solution by conduct metric method.
- 3) To determine the normality of citric acid in given fruit by titrating it against standard NaOH solution by conductometric method.
- 4) To determine λ_{∞} of strong electrolyte (NaCl or KCl) and to verify Onsager equation.
- 5) To estimate the amount of lead present in given solution of lead nitrate by conductometric titration with sodium sulphate.
- 6) To determine the relative strength of monochloro acetic acid and acetic acid conductometrically

4. Viscosity: (any one)

1. To determine the molecular weight of a high polymer by using solutions of different concentrations.
2. Determine the radius of glycerol molecule from viscosity measurement.

5. Photoflurometry

1. Analysis of Riboflavin from vitamin supplementary capsules / syrup / tablet sample by Photoflurometry

6. Table work

1. Analysis of the given vibration-rotation spectrum of HCl(g)

DSEC-II: CH-504: Inorganic Chemistry - I**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Molecular Orbital Theory of Coordination Compounds	08
2	Inorganic Reaction Mechanism	06
3	Chemistry of transition elements	06
4	Chemistry of f-block elements	08
5	Metals, Semiconductors and Superconductors	08
Total		36

1. Molecular Orbital Theory of Coordination Compounds**(8L)**

Electro-neutrality principle, multiple bonding ($d\pi-p\pi$ and $d\pi-d\pi$), Nephelauxetic effect and Nephelauxetic series (Recapulation from VBT and CFT), Need and introduction of MOT, Assumptions, MO treatment to octahedral complexes with sigma bonding, Formation of MO's from metal orbitals and Composite Ligand Orbitals (CLO), MO correlation diagram for octahedral complexes with sigma bonding, effect of π bonding on MO correlation diagram, Charge transfer spectra, Advantages of MOT over VBT and CFT.

Aims and objective/Learning Outcomes: A student should know:

- Explain electroneutrality principle and different types of pi bonding.
- Able to explain Nephelauxetic effect towards covalent bonding.
- Explain MOT of Octahedral complexes with sigma bonding.
- Able to explain Charge Transfer Spectra.
- Able to compare the different approaches to bonding in Coordination compounds.

References:

- Concise Inorganic Chemistry by J.D. Lee - 4th Edition pp226-231
- Physical Inorganic Chemistry A Coordination Chemistry Approach S. F. A. Kettle Springer-Verlag Berlin Heidelberg GmbH, 1996 pp 95-120
- Theoretical Inorganic Chemistry by Day and Selvin (Relevant Pages)

2. Inorganic Reaction Mechanism**(6L)**

Basic concepts of stability and lability, stability constants, Factors affecting lability, chelate effect. Classification of inorganic reactions, ligand substitution reactions: Intimate and stoichiometric mechanism of ligand substitution. Substitution Reactions in Four Coordinated

square planar complexes: Trans effect and Trans effect series, applications of trans effect, stereochemistry of substitution.

[**Further reading:** Student should also read about the relation between kinetics and mechanism. Reaction mechanisms in complexes with C.N.4, 5 and 6]

Aims and objective: A student should know:

- i. To understand about inert and labile complexes and stability of complexes in aqueous solutions
- ii. Classification of reactions of coordination compounds
- iii. The basic mechanisms of ligand substitution reactions.
- iv. Substitution reactions of square planar complexes.
- v. Tran's effect and applications of Trans effect
- vi. Stereochemistry of mechanism
- vii. Gain the knowledge of inorganic reaction mechanisms available in the literature to solve chemical problems.

References:

1. Inorganic Chemistry – Principles of Structure and Reactivity, J. E. Huheey, E. A. Keiter & R. L. Keiter, 4th Edn. Harper Collins College Publ. New York, Chapt.13, p.537-576, (1993).
2. Martin L. Tobe and John Burgess, Inorganic Reaction Mechanisms, Addison Wesley Longman Inc., 1999.
3. Inorganic Chemistry – D.F. Shriver, P.W. Atkins, C.H. Lamford – Oxford, 5th Edn., 1994, pp507-517.
4. Inorganic Chemistry - Messler and Tarr - Pearson Publishers pages 412-420, 434-440

3. Chemistry of Transition elements

[6L]

Position in periodic table, electronic configuration, trends in properties w.r.t.(a) size of atoms and ions (b) reactivity (c) catalytic activity (d) oxidation state (e) complex formation ability (f) colour (g) magnetic properties (h) non-stoichiometry (i) density, melting & boiling points. [Ref.-1]

Aims and objective: A student should know:

1. To know position of d-block elements in periodic table.
2. To know the general electronic configuration & electronic configuration of elements.
3. To know trends in periodic properties of these elements w.r.t. size of atom and ions, reactivity, catalytic activity, oxidation state, complex formation ability, color, magnetic properties, non-stoichiometry, density, melting point, boiling point.

References:

1. Concise Inorganic Chemistry by J.D. Lee - 5th edition. Pages 859-863, 865-866,

4. Chemistry of f-block elements**[8L]**

Introduction of f-block elements- on the basis of electronic configurations, occurrence and reactivity, F-block elements as Lanthanide and Actinide series

I. Lanthanides:

Position in periodic table, Name and electronic configuration of lanthanides, Oxidation States, atomic and ionic radii, Lanthanide contraction, its causes and consequences on chemistry of Lanthanides and post lanthanide elements, Occurrence and separation: Bulk separation, Individual separation by modern methods viz., Ion exchange and solvent extraction method, applications of lanthanides. [Reference-1]

II. Actinides:

Position in periodic table, names and their electronic configurations. IUPAC nomenclature system for super heavy elements, Oxidation States, Occurrence and general methods of preparation of transuranic elements viz., Neutron Bombardment, Accelerated projectile bombardment and Heavy ion bombardment. Nuclear Fuels-Nuclear fission and fusion fuels, comparison between Lanthanides and Actinides. [Reference-1]

Aims and objective: A student should know:

1. The meaning of term f-block elements, Inner transition elements, lanthanides, actinides.
2. Electronic configuration of lanthanides and actinides.
3. Oxidation states of lanthanides and actinides and common oxidation states.
4. Separation lanthanides by modern methods.
5. Lanthanide contraction and effects of lanthanide contraction on post-lanthanides.
6. Use of lanthanide elements in different industries.
7. Transuranic elements.
8. Preparation methods of transuranic elements.
9. Nuclear fuels and their applications.
10. Why transuranic elements are called as the synthetic elements?
11. IUPAC nomenclature for super heavy elements with atomic no. 100 onwards.

References:

1. Concise Inorganic Chemistry by J.D. Lee - 5th Edn. 874 – 875, 879-886, 891-893, 898-900.

5. Metals, Semiconductors and Superconductors**[8L]**

Introduction, Metallic bonding, Band theory in metals with respect to Na along with n (E) and N(E) diagrams, Electrical conductivity of metals (Na, Mg, Al), Valence electrons and conductivity of metals, Effect of temperature and impurity on electrical conductivity of metals,

Semiconductors, types of Semiconductors: I. Intrinsic II. Extrinsic, effect of temperature and impurity on semiconductivity, n & p type semiconductors ZnO and NiO, Superconductivity: Discovery, property, models, structure and superconductivity, low and high temperature superconductors, applications of superconductors.

Aims and Objectives: A student should be able –

1. The meaning of metal & semiconductor.
2. The difference between metal, semiconductor and insulator.
3. Metallic bond on the basis of band theory.
4. The energy band and energy curve.
5. Draw $n(E)$ & $N(E)$ curves.
6. Explain the electrical conductivity of metals with respect to valence electrons.
7. Explain the effect of temperature and impurity on conductivity of metals and semiconductors.
8. Intrinsic and extrinsic semiconductor.
9. The term valance band and conduction band.
10. n and p type of semiconductors.
11. Non-stoichiometry and semi conductivity.
12. Insulators on the basis of band theory.
13. The difference between Na, Mg, and Al in terms of valence electrons and conductivity.
14. Meaning of super conductors and their structure. o. Discovery and applications of superconductors.

References:

1. Solid State Chemistry: An Introduction, Lesley E. Smart, Elaine A. Moore, 3rd Edn. Relevant pages from Chapter 10, pp394-411
2. Solid State Chemistry and its Applications, Anthony R. West, Second Edition, Wiley 2014, PP 359-391
3. Chemistry by Raymond Chang - 5th edition (Related Pages)
4. New Guide to Modern Valence Theory by G.I. Brown - 3rd edition Pages 209-221

DSEC-II: CH-505: Industrial Chemistry - I**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Modern Approach to Chemical Industry	06
2	Manufacture of Basic Chemicals	07
3	Sugar and Fermentation Industry	07
4	Soap and Detergents Industry	08
5	Dyes and Pigments	08
Total		36

1. Modern Approach to Chemical Industry**(6 L)**

Introduction, basic requirements of chemical industries, chemical production, unit process and unit operations, Quality control and quality assurance, process control, research and development, human resource, safety measures, classification of chemical reactions, batch and continuous process, Conversion, selectivity and yield, copy-right act, patent act, trademarks.

Ref. No.-7, Relent pages, Ref. - 10: [www.wikipedia.org/wiki/copyright_act_of1976/patent act/trademark](http://www.wikipedia.org/wiki/copyright_act_of1976/patent_act/trademark)

Aims and Learning objectives: The students are expected to learn;

- Importance of chemical industry,
- Meaning of the terms involved,
- Comparison between batch and continuous process,
- Knowledge of various industrial aspects

2 Manufacture of Basic Chemicals**(7 L)**

- Ammonia: Manufacture of ammonia by modified Haber-Bosch process, Physico-chemical principles involved and uses of ammonia.
- Nitric acid: Manufacture of nitric acid by Ostwald's process, Physico-chemical principles involved and uses of nitric acid.
- Sulphuric acid: Manufacture of sulphuric acid by contact process, Physico-chemical principles involved and uses of sulphuric acid.

Reference No.-1: Page No. 731 to 761, 809 to 844, Reference-3: 1128-1175, 1253-1263

Aims and Learning objectives: The students are expected to learn

- Concept of basic chemicals,
- Their uses and manufacturing process.
- They should also know the physico-chemical principals involved in manufacturing process

3. Sugar and Fermentation Industry**(7 L)**

- a. Sugar:** Introduction, manufacture of cane sugar, extraction of juice, purification of juice, sulfitation and carbonation, evaporation, crystallization, separations of crystals, drying refining, grades, recovery of sugar from molasses, by-product of sugar industry,

Reference No.-1: Page No.1208- 1218

- b. Fermentation Industry:** Introduction, importance, conditions favorable for fermentation, Characteristics of enzymes, short account of some fermentation processes, Alcohol beverages, Manufacture of beer, manufacture of spirit, manufacture of wines, manufacture of vinegar, manufacture of power alcohol, ethyl alcohol from molasses.

Reference No.-1: Page No. 1176-1184

Aims and Learning objectives: The students are expected to learn

Sugar Industry: The students are expected to learn

- i. Importance of sugar industry,
- ii. Manufacture of direct iii. Consumption (plantation white) sugar with flow diagram.
- iii. Cane juice extraction by various methods,
- iv. Clarification by processes like carbonation, vi. Sulphitation, vii. Phosphatation, etc.
- v. Concentration of juice by using multiple effect evaporator system,
- vi. Crystallization of sucrose by using vacuum pan.

Fermentation Industry- The students are expected to learn

- i. Importance,
- ii. Basic requirement of fermentation process,
- iii. Manufacturing of ethyl alcohol by using molasses and fruit juice.

4. Soap and detergents**(8 L)**

(a) Soap: Soap and Fatty Acids: Introduction, Chemistry, Manufacturing Technology, Raw Materials, Functional Properties of Soap, Manufacturing Processes, Saponification Reactor, Cooling, Soap Separator, Soap Extraction, Centrifugation, Neutralization, Direct Neutralization, Carbonate Neutralization, Partial Neutralizing with Soda Ash, Carbon Dioxide Separation, Raw Material Dosing, Caustic Soda, Completion of Neutralizing with Caustic Soda, Neutralization Soap Viscosity,

Reference-5: 980-997, Reference-1: 1243 -1250

- (b) Detergents: Synthetic Detergents: Introduction, Characteristic Features of Surfactants, Raw Materials for Surfactant Production, intermediates for Surfactant Production, Anionic Surfactants, Non-ionic Surfactants, Amphoteric Surfactants, Cationic Surfactants, Detergent Additives, Production of Synthetic Detergents, and Washing action of soap and detergents.

Reference-5: 1006-1029, Reference-1: 252 – 1279

Aims and Learning objectives: The students are expected to learn

- i. Different types of soap products,
- ii. Chemistry of soap.
- iii. Raw materials required for soap manufacture
- iv. Meaning of the term's Surfactants, Types of surfactants
- v. Raw materials for detergents
- vi. Detergent builders, additives
- vi. Washing action of soap and detergents

5. Dyes and Pigments

(8 L)

(a) Dyes: Introduction, qualities of good dye, Colour constituents (Chromophore, auxochrome), classification of dyes according to their application, Synthesis and uses of following dyes: Nitroso dye-martius yellow, Azo dyes-Methyl orange and aniline yellow, Triphenylmethane dye-Crystal violet, Phthalein dye - Phenolphthalein, Xanthane-Fluorescein, Antha-quinnoe-Alizarin and Indigo dyes - Indigo.

Reference -1: pp 1545-1595

(b) Pigments: Introduction, classification and general properties of pigments.

Inorganic pigments:

- i) Zinc oxide pigments (Fundamentals and properties, Raw materials, Direct process (American process), Precipitation process)
- ii) Iron oxide pigments (Fundamentals and properties, Production of iron oxide pigment by precipitation process),

Reference-9: 80-87, 97 to 109.

Aims and Learning objectives: The students are expected to learn

Dyes - Students should know about

- i. Dyes: introduction,
- ii. Dye intermediates,
- iii. Structural features of a dye;
- iv. Classification of dyes,
- v. Synthesis, Structures, properties and applications of dyes

Pigments: Students should know about

- i. Introduction,
- ii. Classification and general properties of pigment
- iii. Production processes of zinc oxide and iron oxide

References:

1. Industrial Chemistry, B. K. Sharma, Goel publishing House, 18th Ed. (2014)
 2. Riegeal's Hand book of industrial chemistry, James A. kent. 9th Ed. CBS publishers
 3. Advanced Inorganic Chemistry, Satyaprakash, Tuli, Basu pages 458-463.
 4. Advanced Inorganic Chemistry, Satyaprakash, Tuli, Basu pages 830-849
 5. Handbook of Industrial Chemistry and Biotechnology, James A. Kent, Tilak V. Bommaraju, Scott D. Barnicki, Thirteenth Edition, Springer.
 6. Inorganic Pigments by Gerhard Pfaff, Publisher-De Gruyter, 1st Ed.
 7. Shreeve's chemical process industries 5th Edition, G.T. Austin, TATA McGraw-Hill Edition, chemical engineering series
 8. Industrial Chemistry, Part-II, R. K. Das, Kalyani Publisher, Second Ed.
 9. Inorganic Pigments by Gerhard Pfaff, Publisher-De Gruyter, 1st Ed.
- www.wikipedia.org/wiki/copyright_act_of1976 , www.wikipedia.org/wiki/patentact and www.wikipedia.org/wiki/trademark

Industrial visit:

Visit to any one of the Chemical / Pharmaceutical / Polymer / Research Institutes / Sugar Factories / waste water treatment plant, etc. is essential and a systematic report is to be submitted by the student to the Department of Chemistry.

DSEC-II: CH-506: Inorganic Chemistry Practical - I [Credit -2, 73 L]**Total 12 experiments to be completed.****A. Gravimetric estimations (Any 3)**

1. Gravimetric estimation of Fe as Fe₂O₃. Ref-1: 457
2. Gravimetric estimation of Ba as BaSO₄ using homogeneous precipitation method. Ref-1: 448
3. Gravimetric estimation of Nickel as Ni – DMG. Ref-1: 462
4. Analysis of sodium bicarbonate from mixture by thermal decomposition method. Ref.-6
5. Determination of water of crystallization by thermal decomposition. Reference-5
6. Analysis of Food/Pharmaceutical sample for ash and sulphated ash example-Aspirin, Ref. -2.

B. Inorganic preparations (Any 3) (Ref-7, 8, 9)

Preparation of inorganic complexes and spot tests for metal ions and ligands:

1. Preparation of hexamminenickel(II) chloride, [Ni (NH₃)₆]Cl₂.
2. Preparation of Potassium trioxalatoferrate(III), K₃[Fe(C₂O₄)₃].
3. Preparation of Manganese (III) acetylacetonate, [Mn(acac)₃].
4. Preparation of tris(glycinato)nickelate(II), [Ni(gly)₃]⁻
5. Preparation of Potassium dioxalatocuprate(II), [Cu(C₂O₄)₂]²⁻.

C. Inorganic Qualitative Analysis (6 Expts.)

1. Inorganic Qualitative analysis (5 mixtures) [1 simple water soluble mixture, 2 mixtures containing borates and 2 mixtures containing phosphates]

(DST manual green chemistry monograph procedure must be followed strictly) Ref.-4

2. Limit test for iron, chloride and sulphate from pharmaceutical raw materials. Ref.-2; pp - 220

OR

2. Qualitative and confirmatory tests of inorganic toxicants of any four ions (Borate, copper, hypochlorite or nitrate or nitrite, Sb or Bi, Iodate, H_2O_2). Reference-3

References:

1: Vogel's textbook of Inorganic Quantitative Analysis, Jeffery, Basset, Mendham Deney, 5th Ed, Longman Scientific Technical, USA (copublished with John Wiley Sons)

2: Indian Pharmacopoeia, Vol-2; 2007

3: Basics of Analytical toxicology, World Health Organization

4: [Green Chem - \[PDF Document\] – FDOCUMENTS; \(https://fdocuments.in/document/green-chem.html\)](https://fdocuments.in/document/green-chem.html)

5: <https://www.studocu.com/ec/document/universidad-de-investigacion-de-tecnologia-experimental-yachay/fisica-matematica/otros/the-gravimetric-analysis-of-barium-chloride-hydrate/8364963/view>

6: https://effectiveness.lahc.edu/academic_affairs/sfcs/chemistry/Shared%20Documents/Decomposing%20Baking%20Soda.pdf

7: Experimental Inorganic Chemistry, Mounir A. Malati, Horwood Series in Chemical Science (Horwood Publishing, Chichester) 1999.

8: Experiments in Chemistry, D. V. Jahagirdar, Himalaya Publishing House

9: Journal of chemical education: Synthesis of cis- $Cu(gly)_2$ Trans- $Cu(gly)_2$ and cis-ni(gly) $_2H_2O$ and their characterization using thermal and spectroscopic technique – a Capstone laboratory experiment.

Structure of Practical Examination [35 Marks; Time: 3 hours]

Q1. Gravimetric estimation/Inorganic preparation/Inorganic Qualitative analysis....	30 M
Q2. Viva-Voce	05 M

DSEC-III: CH-507: Organic Chemistry - I**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Polynuclear and Heteronuclear Aromatic Compounds	08
2	Active Methylene Compounds	05
3	Rearrangement Reactions	12
4	Elimination reactions	11
Total		36

1. Polynuclear and Heteronuclear Aromatic Compounds**[08 L]**

Introduction, Classification of aromatic compounds, Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine. Ref.1: Pages 759 – 779. Ref.3: Pages 952 – 962. 2.

2. Active Methylene Compounds**[05 L]**

Definition, Preparation of Ethylacetoacetate and Synthetic uses of ethylacetoacetate Preparation of Diethyl malonate and Synthetic uses of diethyl malonate, (preparation of non-heteromolecules having upto 6 carbon). Ref.1: Pages 864 – 875. Ref.3: Pages 859 – 874. Ref.6: Pp 206 – 213.

3. Rearrangement Reactions**[12 L]**

Introduction, Types of rearrangement, Types of reactive intermediate involved in different rearrangements, Rearrangement – Beckmann, Baeyer-Villiger, Favorskii, Curtius, Lossen, Schmidt and Pinacol-Pinacolone with mechanism. Electrocyclic Rearrangements- Claisen, Cope and Mc-Lafferty rearrangements with mechanism. Ref.4: Pages 618-656. Ref.7: Pages 89-94, 105-107, 112-114, 122-125, 158-161. Ref.10: Pages 130-132.

4. Elimination reactions**[11 L]**

Introduction; Types of eliminations-1,1; 1,2 elimination, Mechanism with evidences of E1 and E2, E1cB reactions, stereochemistry of E1 and E2 elimination, Orientations and reactivity in E1 and E2 elimination- Hoffmann and Saytzeff's orientation, Factors affecting the reactivity- effect of structure, attacking base and leaving groups. Ref.1: Pages 305-326. Ref. 3: Pages 260-265. Ref.4: Pages 472-496. Ref.6: Pages 188-194.

References

- 1) R.T. Morrison & R.N. Boyd: Organic Chemistry, 7th edition, Prentice Hall.
- 2) Organic Chemistry: Clayden, Greeves, Wothers, Warren, Oxford Press.
- 3) Organic Chemistry: Graham Solomans
- 4) E. S. Gould: Mechanism and Structure in Organic Chemistry

- 5) Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman
- 6) I.L. Finar: Organic Chemistry (Vol. I & II), E.L.B.S.
- 7) S. N. Sanyal: Reactions, Rearrangements and Reagents
- 8) Eliel: Stereochemistry of Organic Compounds, Tata Mc Graw Hill, 1989
- 9) D. Nasipuri: Stereochemistry of Organic Compounds- Principles and Applications, New Age International Publishers, 3rd edition.
- 10) Jagdamba Singh, Jaya Singh: Photochemistry and Pericyclic reactions. 3rd edition

Learning Outcomes

Chapter 1 Polynuclear and Heteronuclear Aromatic Compounds: After studying the polynuclear and heteronuclear aromatic compounds, students will be able to

1. Define and classify polynuclear and heteronuclear aromatic hydrocarbons.
2. Write the structure, synthesis of polynuclear and heteronuclear aromatic hydrocarbons.
3. Understand the reactions and mechanisms
4. Explain the reactivity of polynuclear and heteronuclear aromatic hydrocarbons.
5. Describe the synthesis of chemical reactions of polynuclear and heteronuclear aromatic Hydrocarbons.

Chapter 2 Active Methylene Compounds : Students should be able to understand

1. Meaning of active methylene group
2. Reactivity of methylene group,
3. Synthetic applications ethyl acetoacetate and malonic ester
4. To predict product with panning or supply the reagent/s for these reactions

Chapter 3 Molecular Rearrangements Students will study

1. What is rearrangement reaction?
2. Different types of intermediate in rearrangement reactions?
3. To write the mechanism of some named rearrangement reactions and their applications
4. Electrocyclic rearrangement with their mechanisms

Chapter 4 Elimination Reactions: Students should be familiar with

1. 1,1 and 1,2 elimination
2. E1, E2 and E1cB mechanism with evidences of these reactions
3. Understand stereochemistry by using models and learn reactivity of geometrical isomers
4. Orientation and reactivity in E1 and E2 elimination
5. Hoffmann and Saytzeff's Orientation
6. Effect of factors on the rate elimination reactions

DSEC-III: CH-508: Chemistry of Biomolecules**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Introduction to molecular logic of life	03
2	Carbohydrates	07
3	Lipids	06
4	Amino acids and Proteins	08
5	Enzymes	06
6	Hormones	06
Total		36

1. Introduction to molecular logic of life.**(3L)**

Unicellular and multicellular organisms, prokaryotes and eukaryotes. List of cell organelles and its functions. Molecules that constitute the organisation of cell and its organelles. types of bonds in biomolecules

2. Carbohydrates**(7L)**

Introduction, classification of carbohydrates, their structures and biological significance. Concept of anomers, epimers, reducing and non-reducing sugars, mutarotation, inversion. Reactions of glucose with acid, base, phenyl hydrazine, oxidizing agents, reducing agents and its significance, Glycosidic bonds.

3. Lipids**(6L)**

Introduction, classification of lipids, their structures and biological significance. Reactions of Lipids-Saponification Hydrolysis, emulsification, oxidation. Concept of saponification number, acid number, iodine number and their significance. Rancidity. Types of Lipoproteins and their significance. Blood group substances.

4. Amino acids and Proteins**(8L)**

Amino acids: classification of amino acids. Concept of ampholytes, isoelectric pH, zwitter ions, titration curve of glycine. Reactions of amino acid with Ninhydrin, Sanger's, Dansyl chloride, Dabsyl chloride and Edmann's reagents and their significance. Peptide bond and its features. **Proteins:** Classification based on function, nutrition and composition. Structural organization of proteins- primary, secondary, tertiary and quaternary structures.

5. Enzymes**(6L)**

Classification of enzymes. Features of active site. ES complex formation, Enzyme specificity, Factors affecting enzyme activity. Basics of Enzyme kinetics. MM and LB equation and

Significance of K_m . Types of Enzyme inhibitions. Concept of Conjugated enzymes- Holoenzyme, Apoenzyme, prosthetic groups. Coenzymes of vitamins. Industrial applications of enzymes.

6. Hormones

(6L)

Introduction to endocrine glands and their hormones. Biochemical nature of hormones, Mechanism of action of lipophilic and hydrophilic hormones.

References

1. Lehninger's Principles of Biochemistry, by Nelson and Cox Macmillan Publisher 4th Edn.
2. Biochemistry by U. Satyanarayana
3. Harper's Illustrated Biochemistry, 26th Edition
4. Biophysical techniques by Upadhyay and Nath, 3rd revised edition.
5. Organic Chemistry, Morrison, R. T. & Boyd, R. N.
6. Organic Chemistry (Volume 1) Finar, I. L.
7. Organic Chemistry (Volume 2) Finar, I. L.

Learning Outcome:

1. **Introduction to molecular logic of life.** The student will understanding of Cell types, Difference between a bacterial cell, Plant cell and animal cell. Biological composition and organization of cell membrane, structure and function of various cell organelles of plant and animal cell. Concepts of biomolecules, Bonds that link monomeric units to form macromolecules
2. **Carbohydrates:** The student will understand the types of carbohydrates and their biochemical significance in living organisms, structure of carbohydrates and reactions of carbohydrates with Glucose as example. Properties of carbohydrates.
3. **Lipids:** The student needs to know the types of lipids with examples, structure of lipids, properties of lipids
4. **Amino acids and proteins:** The student will understand the structure and types of amino acids. Reactions of amino acids. Properties of amino acids. Peptide bond formation. Types of proteins. Structural features in proteins. Effect of pH on structure of amino acid, Determination of N and C terminus of peptide chain.
5. **Enzymes:** The student know the classes of enzymes with subclasses and examples. Enzyme specificity, Equations of enzyme kinetics K_m and its significance, features of various types of enzyme inhibitions, industrial applications of enzymes.

6. **Hormones:** Basic concepts of Endocrinology. Types of Endocrine glands and their hormones. Biochemical nature of hormones. Mechanism of action of lipophilic and hydrophilic hormones.

DSEC-III: CH-509: Organic Chemistry Practical-I [Credit -2, 73 L]

Total 12 Experiments to be performed**A) Separation of Binary Mixtures and Qualitative Analysis (Any Six)**

a) Solid-Solid (3 Mixtures) b) Solid-Liquid (2 Mixtures) c) Liquid-Liquid (1 Mixture) At least one mixture from each of the following should be given-Acid-Base, Acid- Phenol, AcidNeutral, Phenol-Base, Phenol-Neutral, Base-Neutral and Neutral- Neutral. (Solid-solid mixtures must be insoluble in water)

B) Preparations**a) Green Chemistry Preparations (Any Two)**

1. Preparation of dibenzalpropanone from benzaldehyde and acetone using $\text{LiOH} \cdot \text{H}_2\text{O}/\text{NaOH}$
2. Nitration of phenol or substituted phenols using CaNO_3 .
3. Bromination of acetamide using ferric ammonium nitrate and KBr in aqueous medium.

b) Organic Preparations (Any Two)

1. Preparation of 1, 4- dihydropyrimidinone from ethyl acetoacetate, benzaldehyde and urea using oxalic acid as catalyst.
2. Preparation p-Iodonitrobenzene from p-Nitroaniline by Sandmeyer Reaction
3. Preparation P-chloro benzoic acid and p-chloro benzyl alcohol from p-chloro benzaldehyde.

C) Preparations of Organic Derivative (Any Two)

1. Amide derivative of Carboxylic acid
2. Glucosazone derivative of Glucose
3. Paracetamol from p-Aminophenol

Imp. Note: At the time of practical examination candidate should perform complete analysis of one binary mixture OR One preparation and one preparation of organic derivative.

- To develop skills required in chemistry such as the appropriate handling of apparatus and chemicals.
- The student will learn the laboratory skills needed to design, safely conduct and interpret chemical research.
- To expose the students to an extent of experimental techniques using modern instrumentation.
- The student will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Learning Outcomes:**A) Separation of Binary Mixtures and Qualitative Analysis The students will be able to**

1. Perform the quantitative chemical analysis of binary mixture, explain principles behind it.
2. Separate, purify and analyse binary water insoluble mixture.
3. Separate, purify and analyse binary water-soluble mixture.
4. Understand the techniques involving drying and recrystallization by various method.
5. Familiarize the test involving identification of special elements.
6. Learn the confirmatory test for various functional groups.

B) Preparations The students will be able to

1. Systematic working skill in laboratory will be imparted in student.
2. Learn the basic principles of green and sustainable chemistry.
3. Synthesis of various organic compounds through greener approach.
4. Do and understand stoichiometric calculations and relate them to green process metrics.
5. Learn alternative solvent media and energy sources for chemical processes.
6. Learn the preparations of derivative various functional groups aspects of electrical experiments.
7. Understand the techniques involving drying and recrystallization by various method
8. Expertise the various techniques of preparation and analysis of organic substances
9. Understand principle of Thin Layer Chromatographic techniques.
10. Understand the purification technique used in organic chemistry.

SEC-I: CH-510: Skills Enhancing Course-I**[Credit -2, 36 L]****Choose one out of the two options, A and B.****CH-510 (A) : Introduction to Medicinal Chemistry**

Chapter No.	Title	Number of Lectures
1	An Introduction to Drugs, their Action and Immunobiologicals	08
2	Bio-physicochemical Properties in Drug Action and Design	08
3	Drugs for Infectious Diseases	12
4	Drugs for Non -infectious Diseases	08
Total		36

1. An Introduction to Drugs, their Action and Immunobiologicals (8L)

A. Introduction, Need of new drugs, Historical background of drug discovery and design, Sources of drugs, Classification of drugs, Introduction to drug action

(Ref.1 Pages 37-53, Ref.2 Pages 4-11, Ref.4 Pages 4-9)

B. Immunobiologicals: Vaccines: Introduction, Methods of vaccine production: Inactivated pathogens, Live/Attenuated Pathogens and Cellular Antigen from a pathogen, SARS-CoV-19

(Ref.3 Pages 165-168, Ref.9, Ref.10)

2. Bio-physicochemical Properties in Drug Action and Design (8L)

Introduction, Acidity/Basicity, Solubility, Ionization, Hydrophobic and hydrophilic properties, Lipinski Rule, **Terminology in Medicinal Chemistry:** Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics, metabolites, antimetabolites and therapeutic index. Importance of stereochemistry in drug action (Example: Ibuprofen), Concept of rational drug design: Structure activity relationship, Drug-receptor understanding

(Ref.1 Pages 57-75, 95-96 Ref.2 Pages 189-274, 384-392, Ref.4 Pages 29-61)

3. Drugs for Infectious Diseases (12L)

Introduction, Structures, Mode of Action and Applications:

A. Antimicrobial Agents: Classification on i) Type of action: Bacteriostatic and Bactericidal ii) Source (Natural, Synthetic and Semisynthetic) iii) Spectrum of activity: Narrow and Broad Spectrum iv) Chemical structure: β -lactams (Penicillin), Macrolides (Azithromycin), Sulphonamides (Sulfadiazine), and Tetracyclins (Chlortetracycline)

B. Anti-fungal and anti-viral agents: Example: Amphotericin-B, Acyclovir

(Ref.1 Pages 131-157, Ref.2 Pages 413-472, Ref.3 Pages 258-308, Ref.4 Pages 191-228)

4. Drugs for Non-infectious diseases (8L)

Introduction, Structures, Mode of Action, and Applications:

A. i) Anti-inflammatory and Analgesic Agents: Example: Aspirin, Paracetamol, and Ibuprofen, **ii) Psychoactive Agents:** Sedatives and Hypnotics: Example: Benzodiazepines,

B. Metallodrugs as Chemotherapeutic Agents: Examples: Aluminium based antacids, Salvarsan, Cis Platin, and Transition Metal Complexes

(Ref.3 Pp 443-457, 509-515, 637-647, 776-792, Ref. 5, Ref.6, Ref.7, Ref. 8 Pp.69-70, 481-491)

References:

1. Fundamentals of Medicinal Chemistry by Gareth Thomas, University of Portsmouth, UK.
2. An Introduction to Medicinal Chemistry, Patrick, G. Oxford. University Press (Vth Edition).
3. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical, Charles Owens Wilson, John H. Block, Ole Gisvold, John Marlowe Beale.
4. Foye's Principles of Medicinal Chemistry by David A. Williams, Thomas L. Lemke, William O. Foye (VIIth Edition), Kluwer publication.

5. Medicinal chemistry, fourth edition, Ashutosh Kar (2007).
6. Metallodrugs in Medicinal Inorganic Chemistry Katja Dralle Mjos and Chris Orvig, Chem. Rev. 2014, 114, 4540-4563, <http://dx.doi.org/10.1021/cr400460s>
7. Metallodrugs are unique: opportunities and challenges of discovery and development, E. J. Anthony et.al. Chem. Sci., 2020, 11, 12888, <http://dx.doi.org/10.1039/d0sc04082g>.
8. Metallo-therapeutic Drugs And Metal-Based Diagnostic Agents by Marcel Gielen and Edward R.T. Tiekink
9. Research and Development on Therapeutic Agents and Vaccines for COVID-19 and Related Human Coronavirus Diseases, Cynthia Liu et al., ACS Cent. Sci. 2020, 6, 315–331, <http://dx.doi.org/10.1021/acscentsci.0c00272>
10. A comprehensive overview of vaccines developed for pandemic viral pathogens over the past two decades including those in clinical trials for the current novel SARS-CoV-2, Kannan Damodharan et al., RSC Adv., 2021, 11, 20006–20035, <http://dx.doi.org/10.1039/d0ra09668g>

Learning Outcomes:

Upon completion of the course the student shall be able to understand,

1. The basics of medicinal chemistry, biophysical properties, overview of basic concepts of traditional systems of medicine.
2. Over view of the overall process of drug discovery, and the role played by medicinal chemistry in this process.
3. Biological activity parameters and importance of stereochemistry of drugs and receptors.
4. Knowledge of mechanism of action of drugs belonging to the classes of infectious and non-infectious diseases.
5. Enhancement of practical skills in synthesis, purification and analysis.

Additional Study Material: NPTEL Video lecture on Medicinal Chemistry:

1. <https://youtu.be/UHEXXGiegd0> ;
2. https://youtu.be/rVN_HybZ-Vk
3. <https://youtu.be/-fCXLW-jF2o>
4. <https://youtu.be/n5C-peu54Wk>
5. <https://youtu.be/0wx4hep1low>
6. <https://youtu.be/9lWrNuUzP4A>
7. <https://youtu.be/84-q3SAVEQk>

CH-510 (B) : Polymer Chemistry

Chapter No	Topic	Number of lectures
1	Introduction and history of polymeric materials	6
2	Polymerization Chemistry	12
3	Molecular weight of Polymers	6
4	Important Polymers	12
Total		36

1. Introduction and history of polymeric materials: (6 L)

Brief history, Basic terms- monomer, polymer, polymerisation, degree of polymerisation, functionality. Different schemes of classification of polymers, polymer nomenclature, molecular forces and chemical bonding in polymers, glass transition temperature of polymer.

Ref. 1: Pages 1-20, 150

Ref. 2: Pages 1-16

Ref. 5, 7 & 8 Relevant Pages

2. Polymerization Chemistry (12 L)

Classification of polymerization processes, mechanism of- step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations. Polymerization techniques-bulk, solution, suspension, emulsion and interfacial condensation.

Ref. 1: Pages 20-58, 71-79

Ref. 2: Pages 25-32, 49-56, 82-86, 88-94, 126-132

Ref. 3 & 4 Relevant Pages

3. Molecular weight of Polymers (6 L)

Average molecular weight of polymer, Number average molecular weight (M_n), Weight average molecular weight (M_w), Number average molecular weight by end group analysis, Viscosity average molecular weight by viscometric method, Molecular weight distribution and its significance, polydispersity index.

Ref. 1: Pages 86-98, 402-409

Ref. 2 & 4: Relevant Pages

4. Important Polymers: (12 L)

Brief introduction to preparation, structure, properties and application of the following polymers: polyethylene, polystyrene, polyvinyl chloride, polyvinyl alcohol, polymethyl methacrylate, polytetrafluoroethylene, polyamides, polyesters, phenol formaldehyde resins (Bakelite, Novolac), silicone polymers, polyisoprene, conducting Polymers.

Ref. 1: Pages 215-255

Ref. 3, 4 & 6 Relevant Pages

Course Outcome: The students are expected to learn the following aspects of Polymer Chemistry:

- 1) History of polymers.
- 2) Difference between simple compounds and polymer.
- 3) Names of polymers.
- 4) Various ways of nomenclature.
- 5) Difference between natural, synthetic, organic and inorganic polymers.
- 6) Terms-Monomer, Polymer, Polymerization, Degree of polymerization, Functionality, Number average, Weight average molecular weight.
- 7) Mechanisms of polymerization.
- 8) Polymerization techniques.
- 9) Uses & properties of polymers.
- 10) Role of polymer industry in the economy.
- 11) Advantages of polymers.

Reference Books:

1. Polymer Science by V.R. Gowarikar, N.V. Vishvanathan, Jaydev Shreedhar New Age International Ltd. Publisher 1996. (Reprint 2012)
2. Textbook of Polymer Science by Fred Billmeyer, 3rd Edn. A Wiley-Interscience Publication John Wiley & Sons New York 1984. (Reprint 2008)
3. Introductory Polymer Chemistry by G.S. Misra New Age International (P) Ltd. Publisher 1996.
4. Polymer Chemistry by Charles E. Carraher (Jr.), 6th Edn, (First Indian Print 2005), New York- Basel.
5. Principle of Polymer Science by P. Bahadur, N.V. Sastry, 2nd Edn, Narosa Publishing House.
6. Polymer Chemistry by Ayodhya Singh, 2008, Published by Campus Book International, New Delhi.
7. Organic Polymer Chemistry by Jagdamba Singh, R.C. Dubey, 4th Edn, 2012.
8. Principles of Polymerisation by George Odian 3rd Edn. John Wiley & Sons New York.

SEC-II: CH-511: Skills Enhancing Course-II**[Credit -2, 36 L]****Choose one out of the two options, A and B.****CH-511 (A) : Environmental Chemistry**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Concepts and Scope of Environmental Chemistry	06
2	Hydrosphere and Water Pollution	10
3	Analytical Techniques in water Analysis	10
4	Water pollution and treatment methods	10
Total		36

1: Concepts and Scope of Environmental Chemistry (06L)

Introduction, Environmental Pollution and Classification, Units of concentration, Segments of Environment, Biogeochemical cycles of C, N, P, S and O system

Reference: 1, 2, 3

Aims and objectives: -Students should know:

- Importance and conservation of environment.
- Importance of biogeochemical cycles

2: Hydrosphere and Water Pollution (10L)

Water resources, Hydrological Cycle: stages of hydrological cycle and chemical composition of water bodies, Microbially mediated aquatic reactions, Classification of water pollutants

Organic and Inorganic pollutants, Sewage and Domestic waste, Sediments, Detergents, Pesticides, Eutrophication, Sampling and monitoring water quality parameters: pH, D.O. (Winkler Method), COD, TOC, Total hardness, free chlorine.

Reference: 1 Page no -47-62,

Aims and Objectives:- Students should know:

- Water resources
- Hydrological Cycle
- Organic and inorganic pollutants
- Water quality parameters

3. Analytical Techniques in water Analysis (10 L)

Water quality parameters and standards, domestic water quality parameters, surface water, sampling, preservation, Monitoring techniques and methodology (pH, conductance, DO, ammonia, nitrate and nitrite, Cl, F, CN, Sulfide, sulphate, phosphate, total hardness, boron, metals and metalloids- As, Cd,

Cr, Cu, Fe, Pb, Mn, Hg (Exclude polarographic and AAS methods), COD, BOD, TOC, phenols, pesticides, surfactants, tannis and lignins, E. Coli, Case studies of water pollution.

Ref-1: 225-278

4. Water pollution and treatment methods (10 L)

Water pollutants, Eutrophication, Waste water treatment (domestic waste water, aerobic treatment, anaerobic treatment, upflow aerobic sludge bed, industrial waste water treatment, drinking water supplies, Trace elements in water, chemical speciation (Cu, Pb, Hg, As, Se, Cr)

Ref-1: 167-225

Reference-1: Environmental Chemistry – A. K. De, Third Edition (Wiley)

Additional References:

1. Environmental Chemistry – A. K. De, 5th Edition (New age international publishers)
2. Environmental Chemistry – A. K. Bhagi and C. R. Chatwal (Himalaya Publishing House)
3. Environmental Chemistry – H. Kaur 2nd Edition 2007, Pragati Prakashan, Meerut, India
4. Environmental Chemistry – J. W. Moore and E. A. Moore (Academic Press, New York)
5. Basic Concepts of Analytical Chemistry: S. M. Khopkar, Wiley Eastern (1995)

CH-511 (B) : Cheminformatics

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Introduction to Cheminformatics	02
2	Representation of Molecules and Chemical Reactions	10
3	Searching Chemical Structures	06
4	Applications of Cheminformatics	18
Total		36

1. Introduction to Cheminformatics [02L]

- 1.1. History and progression of cheminformatics
- 1.2. Significance of cheminformatics
- 1.3. Prospects of cheminformatics and Molecular Modelling

Learning Outcomes:

1. Students should understand the significance of cheminformatics in the modern practices of chemical science
2. Students should learn the necessity of cheminformatics in chemical science

Ref. 2. (Page no. 4-11 and relevant pages)

2. Representation of Molecules and Chemical Reactions: [10L]

- 2.1. Nomenclature

- 2.2. Different types of notations
- 2.3. Canonical representation of chemical structure, SMILES notation
- 2.4. 2D representation of chemical structure; Graph Theory, Connection tables and linear notations, Matrix representations
- 2.5. 3D chemical structure representation and molecular structure file formats; Molfiles, Sdfiles and Pdbfiles
- 2.6. 3D molecular structure visualization
- 2.7. Chemical Libraries (Pubchem, ChEMBL, DrugBank and Zinc) and online Available cheminformatics toolkits
- 2.8. Molecular properties calculations; electronic effects, Reaction classification

Learning Outcomes:

- 1. Students should learn the basic concepts about these representation methods.
- 2. Students should understand the significance of different representation methods for their specific applications.
- 3. Students should be able to identify these representation methods with understanding.
- 4. Students should be able to read these representation methods for basic examples.

Ref. 1. (Page no. 1-74, 183-201 and relevant pages)

Ref. 2. (Page no. 15-51, 92-96, 169-197 and relevant pages)

3. Searching Chemical Structures:**[06L]**

- 3.1. Basic ideas about the Full structure search, Sub-structure search
- 3.2. Basics of similarity and diversity search; Tanimoto, Dice, Cosine coefficient and Euclidean distance
- 3.3. Basics of three dimensional search methods
- 3.4. Basics of computation of physical and chemical data and structure descriptors.

Learning Outcomes:

- 1. Students should learn the basic concepts of referencing
- 2. Students should understand the significance of structural data in the process of referencing
- 3. Students should be able to correlate the necessity of input methods and the expected outcomes for the set of chemicals
- 4. Students should be able to understand data interpretation using these methods for basic or representative molecules.

Ref. 1. (Page no. 141-158 and relevant pages)

Ref. 2. (Page no. 291-313, 320-431 and relevant pages)

Ref. 3. (Page no. 39-50, 317-371 and relevant pages)

4: Applications of Cheminformatics:

[18 L]

- 4.1. Prediction of Properties of Compounds: Linear Free Energy Relations; Quantitative Structure-Property Relations; Descriptor Analysis; Model Building; Modeling Toxicity
- 4.2. Predictive Methods for Organic Spectral Data Simulation: Spectra prediction methods and tools, open source and propriety tools, spectra viewer programs, Structure-Spectra correlations
- 4.3. Introduction to computer aided drug design: Computer Assisted Synthesis Design; Target Identification and Validation; Lead Finding and Optimization; Combinatorial library design, Virtual screening, Molecular docking and Molecular Dynamics simulation. Pharmacophore modeling; Ligand-Based and Structure Based virtual screening, Drug likeness properties, Protein Ligand Interaction Profile (PLIP) analysis and its application in drug discovery process
- 4.4. Machine Learning Methods in Cheminformatics
- 4.5. Introduction to Cheminformatics Softwares: Basic operational principle and applications of MarvinSketch, Discovery Studio, Gaussian, GOLD, Schrodinger, Expert protein Analysis System (Expasy) online server

Learning Outcomes:

1. Students should learn the basic idea about how to apply cheminformatics tool for variety of applications.
2. Students should understand the significance of database for the specific purpose of application.
3. Students should able to correlate the content of data with the possible applications for the set of chemicals.
4. Students should get aware with the principle and the basic operational methods of well-practiced software used in the data interpretation in cheminformatics.
5. Students should learn the basic concepts of Machine Learning and Artificial intelligence

Ref. 1. (Page no. 75-97 and relevant pages)

Ref. 2. (Page no. 487-542, 567-616 and relevant pages)

Ref. 3. (Page no. 10-15, 93-129, 133-192, 375-406 and relevant pages)

Reference Books:

1. Andrew R. Leach and Valerie, J. Gillette (2007) An introduction to Chemoinformatics. Springer: The Netherlands.
2. Gasteiger, J. and Engel, T. (2003) Chemoinformatics: A text-book. Wiley-VCH.
3. Muthukumarasamy Karthikeyan and Renu Vyas (2014) Practical Chemoinformatics, Springer

Semester-VI

DSEC-IV: CH-601 : Physical Chemistry-II**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Electrochemical Cells	16
2	Crystal structure	10
3	Nuclear Chemistry	10
Total		36

1. Electrochemical Cells**[16 L]**

Electrochemical cells, reversible and irreversible cells with examples, The e.m.f. of electrochemical cell and its measurement, The Weston standard cell, Reference electrodes: The primary reference electrode and Secondary reference electrodes, The Nernst equation for E.M.F. of a cell. Types of reversible electrodes, the sign convention for electrode potentials, Thermodynamics of reversible cells and reversible electrodes, E.M.F. and equilibrium constant of cell reaction, Electrochemical series, Types of concentration cells, liquid junction potential, salt bridge, Applications of emf measurements: 1. Determination of pH of a solution by using hydrogen electrode, quinhydrone electrode and glass electrodes 2. Potentiometric titrations: i) Acid-base titrations, (ii) Redox titrations. (iii) Precipitation titration, Batteries: Primary and Secondary batteries, applications for Secondary Batteries, Fuel Cells: Types of fuel cells, advantages, disadvantages of fuels cells, comparison of battery Vs fuel cell

Expected learning Outcomes:

After studying this chapter, the student will be able to know and understand:

1. Electrochemical cells: Explanation of Daniell cell, Conventions to represent electrochemical cells
2. Thermodynamic conditions of reversible cell, Explanations of reversible and irreversible electrochemical cell with suitable example,
3. EMF of electrochemical cell and its measurement.
4. The Weston standard cell
5. The primary reference electrode: The standard hydrogen electrode (SHE) with reference to diagram, Construction, representation, working and limitation,
6. Secondary reference electrodes: (a) The calomel electrode, (b) The glass electrode (c) The silver-silver chloride electrode. Understanding of these electrodes with reference to diagram, representation, Construction, working

7. Nernst Equation for theoretical determination of EMF
8. Types of Reversible electrodes: Metal-metal ion electrodes, Amalgam electrodes, Gas electrodes, Metal-metal insoluble salt electrodes, Oxidation-reduction electrodes with respect to examples, diagram, representation, construction, working (electrode reactions) and electrode potential.
9. Sign convention for electrode potentials and Electrochemical series
10. Standard electrode potentials,
11. Types of concentration cells: Concentration cells without and with transference
Concentration cells with liquid junction potential
12. Liquid junction potential and salt bridge
13. Applications of emf measurements: 1. Determination of pH of a solution by using hydrogen electrode, quinhydrone electrode and glass electrodes 2. Potentiometric titrations: i) Acid-base titrations, (ii) Redox titrations and (iii) Precipitation
14. Primary Batteries: Dry Cells, alkaline batteries with respect to construction, diagram and working
15. Secondary Batteries: Nickel-cadmium, Lithium-ion batteries, the lead acid battery with respect to construction, diagram and working
16. Applications for Secondary Batteries
17. Fuel Cells: Types of fuel cells, advantages, disadvantages of these fuels cells, comparison of battery Vs fuel cell
18. Problems

Reference books:

1. Essential of Physical Chemistry, Bahl and Tuli (S. Chand), (Page No: 1154-1178)
2. Principles of Physical Chemistry by Puri, Sharma, Pathania, (Page No: 835-880)
3. Physical Chemistry, Singh, N.B., et al. Volume 2, New Age International Ltd, 2000, (Page No: 320-412)
- 4) Modern Electrochemistry Second Edition by John O'M Bockris, Molecular Green Technology College Station, Texas and Amulya K. N. Reddy, President International Energy Initiative Bangalore, India, (Page No: 1789-1888)

2. Crystal structure**[10 L]**

Types of Solids: Isotropy and Anisotropy, Laws of crystallography: Law of constancy of interfacial angles, Law of rational indices, Law of crystal symmetry, Weiss indices and Miller indices, Crystal Structure: Parameters of the Unit Cells, Cubic Unit Cells: Three Types of Cubic Unit Cells, Calculation of Mass of the Unit Cell, Methods of Crystal structure analysis: The

Laue method and Braggs method: Derivation of Bragg's equation, Determination of crystal structure of NaCl by Bragg's method, X ray analysis of NaCl crystal system, Calculation of d and λ for a crystal system, Numerical.

Expected learning Outcomes:

After studying this topic students are expected to know and understand:

1. Distinguish between crystalline and amorphous solids / anisotropic and isotropic solids.
2. Explain the term crystallography and laws of crystallography.
3. Weiss and Millers Indices, determination of Miller Indices
4. Bravais lattices, space groups, seven crystal systems and fourteen Bravais lattices;
5. Cubic lattice and types of cubic lattice
6. Distance between the planes for 100, 110 and 111 for cubic lattice
7. Methods of Crystal structure analysis: The Laue method and Braggs method: Derivation of Bragg's equation,
8. Determination of crystal structure of NaCl by Bragg's method,
9. X ray analysis of NaCl crystal system and Calculation of d and λ for a crystal system,
10. Problems

Reference books:

1. Essential of Physical Chemistry, Bahl and Tuli (S. Chand), (Pp: 491-507, 518-528)
2. Principles of Physical Chemistry by Puri, Sharma, Pathania, (Page No: 1165-1180)

3. Nuclear Chemistry**[10L]**

Radioactivity, Types of Radiations, Properties of Radiations, Detection and Measurement of Radioactivity: Cloud chamber, Ionization Chamber, Geiger-Muller Counter, Scintillation Counter and Film Badges, Nuclear structure, Classification of nuclides, Types of Radioactive Decay, The Group Displacement Law, Kinetics of Radioactive Decay, Half-life, average life, Energy released in nuclear reaction, Mass Defect, Nuclear Binding Energy, Some applications of radio-isotopes as tracers: Chemical investigation – Esterification, Friedel -Craft reaction, Structural determination – Phosphorus pentachloride, Age determination – use of tritium and C^{14} dating, Problems

Expected learning Outcomes:

After studying this topic students are expected to know

1. Radioactivity
2. Types and properties of radiations: alpha, beta and gamma
3. Detection and Measurement of Radioactivity: Cloud chamber, Ionization Chamber, Geiger-Muller Counter, Scintillation Counter, Film Badges

- Types of radioactive decay: α -Decay, β -Decay and γ -Decay
- The Group Displacement Law, Radioactive Disintegration Series
- Kinetics of Radioactive Decay, Half-life, average life and units of radioactivity
- Energy released in nuclear reaction: Einstein's equation, Mass Defect, Nuclear Binding Energy,
- Application of radioisotopes as a tracer: Chemical investigation- Esterification, Friedel - Craft reaction and structure determination w.r.t PCl_5 , Age determination use of tritium and C^{14} dating.
- Solve the problems based on this topic

Reference books:

- Elements of Nuclear Chemistry by H.J. Arnikar
- Essential of Physical Chemistry, Bahl and Tuli (S. Chand), (Page No: 117-145)

Additional Reference Books:

- Physical Chemistry by G. M. Barrow, International student Edition, Mc Graw Hill.
- University General Chemistry by C.N.R. Rao, Macmillan.
- Physical Chemistry by, R. A. Alberty, Wiley Eastern Ltd.
- The Elements of Physical Chemistry by P. W. Atkins, Oxford.
- Principles of Physical Chemistry by S. H. Maron, C. H. Prutton, 4th Edition.
- Principles of Physical Chemistry by Puri, Sharma, Pathania,
- Chemical applications of radioisotopes by H.J.M. Brown
- Source book of Atomic energy by S. Glasstone and D. Van .
- Modern Electrochemistry Second Edition by John O'M Bockris

Molecular Green Technology College Station, Texas and Amulya K. N. Reddy President International Energy Initiative Bangalore, India, Kluwer Academic Publishers New York, Boston, Dordrecht, London, Moscow

DSEC-IV: CH-602 : Physical Chemistry-III**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Colligative properties of dilute solutions	09
2	Kinetics of Reactions in the Solid State	09
3	Electronic structure and macroscopic properties	08
4	Polymers	10
Total		36

1) Colligative properties of dilute solutions**(09L)**

Introduction, Solution, electrolytes and nonelectrolytes, Meaning of term colligative property, relative lowering of vapour pressure of solvent in solution, elevation of B.P. of solvent in solution, Landsberger's method, freezing point depression, Beckmann's method, Osmosis and Osmotic pressure, Berkeley and Hartley method, application of colligative properties to determine molecular weight of nonelectrolyte, abnormal molecular weight, Relation between Vant Hoff's factor and degree of dissociation of electrolyte by colligative property, Numerical.

Expected learning Outcomes:

After studying this topic students are expected to know

1. Meaning of the terms-Solution, electrolytes, nonelectrolytes and colligative properties,
2. Lowering of vapour pressure of solvent in solution,
3. Elevation of B.P. of solvent in solution, Landsberger's method,
4. freezing point depression, Beckmann's method Osmosis and Osmotic pressure, Berkeley and Hartley method,
5. Application of colligative properties to determine molecular weight of nonelectrolyte, abnormal molecular weight,
6. Relation between Vant Hoff's factor and degree of dissociation of electrolyte by colligative property,
7. Problems.

Reference books:

- 3) Principles of Physical Chemistry by Puri, Sharma, Pathania, (Page No: 778 - 800)
- 4) Essential of Physical Chemistry, Bahl and Tuli (S. Chand). (Page No: 614 - 684)

2) Kinetics of Reactions in the Solid State:**(09L)**

Some General Considerations, Factors affecting reactions in Solids, Rate Laws for Reactions in Solids, The Parabolic Rate Law, The First-Order Rate Law, The Contracting Sphere Rate Law, The Contracting Area Rate Law, The Prout-Tompkins Equation, Rate Laws Based on Nucleation, Applying Rate Laws, Results of Some Kinetic Studies, The Deaquation-Anation of $[\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}]\text{Cl}_3$, Two Reacting Solids

Expected learning Outcomes:

1. Factors affecting on solid state reactions,
2. Rate laws for reactions in solid state
3. Applying rate laws for solid state reactions
4. Results of kinetics studies

Reference books:

- 1) Principles of James E House, Second Edn, (Page nos: 229 to 262)
- 2) Principles of Physical Chemistry by Puri, Sharma, Pathania,
- 3) Essential of Physical Chemistry, Bahl and Tuli (S. Chand).

3) Electronic structure and macroscopic properties**(08L)**

Cohesive energy in ionic crystals, electronic structure of solids, conductors and insulators, Ionic crystals, semiconductors, cohesive energy in metals.

Reference books:

1. Castellan, G.W. Physical Chemistry Third edition (1993) , Addison –Wesley Publishing Co. (Page Numbers 709-719)

Expected learning Outcomes:

1. Cohesive Energy of ionic crystals based on coulomb's law and Born Haber Cycle
2. Correspondence between energy levels in the atom and energy bands in solid
3. Band structure in solids – Na , Ca and diamond
4. Conductors and insulators – Its correlation with Extent of energy in energy bands
5. phenomena of photoconductivity
6. Semiconductors – Role of impurity in transformation of insulator into semiconductor
7. Temperature dependant conductivity semiconductors
8. Cohesive Energy in metals
9. Numericals based on cohesive energy

4) Polymers**(10L)**

Introduction to Polymer Chemistry, Brief History, Polymer definition, Preparation, Classification, Structures, Chemical bonding & Molecular forces in Polymers. Ref. 1: Pages 1-14, Ref. 2: Pp. 1-16

Molecular weights of polymers: Average Molecular weight, Number Average & Weight Average Molecular weight, Molecular weight & degree of polymerisation, Practical significance of polymer molecular weights, b) Molecular weight determination by End Group Analysis & Viscosity method and c) Problems based on Number Average & Weight Average Molecular weight Ref. 1: Pages 86-89, 92, 96-98, 402-409

References

Polymer Science by V.R. Gowariker, N.V. Vishvanathan, Jaydev Shreedhar New Age International Ltd. Publisher 1996.(Reprint 2012)

Textbook of Polymer Science by Fred Billmeyer, 3rd Edn. A Wiley-Interscience Publication John Wiley & Sons New York 1984. (Reprint 2008)

Expected learning Outcomes:

After studying this topic students are expected to know

- 1) History of polymers.
- 2) Classification of polymers
- 3) Chemical bonding & Molecular forces in Polymer
- 4) Molecular weight of polymers
- 5) Practical significance of polymer molecular weights
- 6) Molecular weight determination

Reference books:

- 1) Essential of Physical Chemistry, Bahl and Tuli (S. Chand). (Page No: 1 - 35)
- 2) Principles of Physical Chemistry by Puri, Sharma, Pathania, (Page No: 9-23)

Other Reference Books:

1. Atkins' Physical Chemistry by Peter Atkins Professor of Chemistry, University of Oxford, and Fellow of Lincoln College, Oxford Julio de Paula Professor and Dean of the College of Arts and Sciences Lewis and Clark College, Portland, Oregon
2. Barrow, G.M. Physical Chemistry Tata McGraw-Hill (2007).
3. Kotz, J.C., Treichel, P.M. & Townsend, J.R. General Chemistry Cengage Learning India Pvt. Ltd., New Delhi (2009).
4. Mahan, B.H. University Chemistry 3rd Ed. Narosa (1998).

DSEC-IV: CH-603 : Physical Chemistry Practical-II [Credit -2, 73 L]**Total 12 Experiments to be performed.****1. Potentiometry (any five)**

- 1) To determine the PKa value of given monobasic weak acid by potentiometric titration.
- 2) To determine the formal redox potential of $\text{Fe}_2^+/\text{Fe}_3^+$ system potentiometrically.
- 3) To determine the amount of NaCl in the given solution by potentiometric titration against silver nitrate.
- 4) To determine the solubility product and solubility of AgCl potentiometrically using chemical cell.
- 5) Estimate the amount of Cl^- , Br^- and I^- in given unknown halide mixture by titrating it against standard AgNO_3 solution (mixture of any two ions).
- 6) To prepare standard 0.2 M Na_2HPO_4 and 0.1 M Citric acid solution, hence prepare four different buffer solutions using them. Determine the pH value of these and unknown solution.

- 7) To determine the composition of Zinc ferrocyanide complex potentiometrically
- 8) To determine the standard electrode potentials of Cu and Ag electrodes and to determine the EMF of a concentration cell.

2. pH metry (any three)

- 1) To determine the degree of hydrolysis of aniline hydrochloride.
- 2) To determine the dissociation constant of oxalic acid by pH-metric titration with strong base.
- 3) Determination of Pka of given weak acid by pH metry titration with strong base
- 4) To determine the acid and base dissociation constant of an amino acid and hence the isoelectric point of an acid.
- 5) pH metric titration of strong acid against strong base by pH measurement and hence determine the concentration and strength of strong acid.

3. Radioactivity (any one)

- 1) To determine plateau voltage of the given G M counter.
- 2) To determine the resolving time of GM counter.
- 3) To determine Emax of beta particle

4. Colligative properties (any one)

1. To determine the molecular weight of solute by depression in freezing point method
2. To study the association of Benzoic acid in benzene by Beckmann Method
3. Determine the molecular weight of given electrolyte and non-electrolyte by Landsberger's method and to study the abnormal molecular weight of electrolyte

5. Turbidometry: (any one)

1. Determination of SO_4^{2-} and Cl^- by turbidimetric method (turbidimetric titration or calibration curve method)
2. To determine the molecular weight of a given polymer by turbidometry

6. Table work

1. Analysis of crystal structure from X-ray diffraction spectra of any two compounds (Calculation d, lattice constant, crystal volume and density, and assigning planes to peaks using JCPDS data)

Reference Books:

1. Practical physical chemistry, A. Findlay, T.A. Kitchner (Longmans, Green and Co.)
2. Experiments in Physical Chemistry, J.M. Wilson, K.J. Newcombe, A.r. Denko. R.M.W. Richett (Pergamon Press)
3. Senior Practical Physical Chemistry, B.D. Khosla and V.S. Garg (R. Chand and Co.,

Delhi.).

4. Experimental Physical Chemistry by D. P. Shoemaker, Mc. Growhill, 7th Edition, 2003.
5. Physical chemistry by Wien (2001)
6. Advance Physical Chemistry Experiment, Gurtu and Gurtu, Pragati Publication (Meerut),
7. Experiments in Chemistry, D. V. Jahagirdar, Himalaya Publishing House
8. Practical physical Chemistry, B. Vishwanathan and P. S. Raghwan, Viva Books
9. Vogel-qualitative-inorganic-analysis-5th-edition-1979
10. Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS.
11. Halpern, A. M. & McBane, G. C. *Experimental Physical Chemistry 3rd Ed.*; W.H. Freeman & Co.: New York (2003).

DSEC-V: CH-604 : Inorganic Chemistry -II**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Organometallic Chemistry	08
2	Homogeneous and Heterogeneous catalysis	10
3	Bioinorganic Chemistry	08
4	Inorganic Polymers	05
5	Inorganic solids/ionic liquids of technological importance	05
Total		36

1. Organometallic Chemistry**[8L]**

Definition of Organometallic compounds and Organometallic chemistry, CO as a π -acid donor ligand, binary metal carbonyls, classification of metal carbonyls, synthesis of metal carbonyls; (a) Direct reaction (b) Reductive carbonylation (c) Photolysis and thermolysis. Hepticity, Molecular and electronic structures of binary metal carbonyls, Electron count in complexes (18 electron rule). Applications of organometallic compounds in industrial catalysis (list of examples). Chemistry of ferrocene; Introduction, synthesis and physical properties of ferrocene. Reactions of ferrocene such as Friedel-Craft Acylation, Friedel-Craft Alkylation, Mannich reaction, Nitration and Halogenation.

[Further Reading: Student should also read about the interaction of different organic ligands with metals and their possible bonding.]

Aim and Objectives: Students should be able:

- To understand M-C bond and to define organometallic compounds
- To define organometallic chemistry
- To understand the multiple bonding due to CO ligand.
- To know methods of synthesis of binary metal carbonyls.
- To understand the structure and bonding using valence electron count (18 ele. rule)
- To understand the catalytic properties of binary metal carbonyls.
- To understand the uses of organometallic compounds in the homogenous catalysis.
- Chemistry of ferrocene

References:

- Inorganic Chemistry – D.F. Shriver, P.W. Atkins, C.H. Lamford – Oxford, 5th Edn., 1994, pp 534-542,553-564.
- Concise Inorganic Chemistry by J. D. Lee (Relevant pages)
- General Chemistry by Raymond Chang(Relevant pages)

4. Basic Organometallic Chemistry: Concepts, Syntheses and Applications of Transition Metals (CRC), B. D. Gupta and Anil J. Elias, Universities Press; 2nd Edition, 2013.

2. Homogeneous and Heterogeneous catalysis

[10L]

Introduction to Catalysis, basic principles, activity and selectivity in catalysis, Types of catalysis, homogeneous vs. heterogeneous catalysis, importance of catalysis in the synthesis of high value chemicals.

Homogeneous catalysis: catalytic cycles for following reactions: a) Hydrogenation of olefins using Wilkinson complex, b) Hydroformylation of olefins using Cobalt and Rhodium complexes, c) Carbonylation reaction: methanol to acetic acid process i.e. Monsanto processes and d) C-C coupling reactions: Heck reaction. [References 1 to 3]

Heterogeneous catalysis: History of the development of industrial heterogeneous catalysis, Classification of heterogeneous catalysts, supported metal catalyst, Role of support, Promoters and Poisons. Catalytic processes viz., a) Hydrogenation of olefins using Raney Nickel catalyst, b) Zeolites in catalysis: Catalytic cracking, c) Biodiesel synthesis using Heteropolyacids (HPAs) d) Automotive Exhaust catalysts: The catalytic converters. [Reference 5 to 6]

[Further reading: Student should also read about advanced development in the field of homogeneous and heterogeneous Catalysis.]

Aims and objectives: A student should be able to:

- i. Understand the phenomenon of catalysis, its basic principles and terminologies.
- ii. Define and differentiate homogeneous and heterogeneous catalysis.
- iii. Give examples and brief account of homogeneous catalysts.
- iv. Understand the essential properties of homogeneous catalysts-Give the catalytic reactions for Wilkinson's Catalysis, hydroformylation reaction, Monsanto acetic acid synthesis, Heck reaction
- v. Understand the principle of heterogeneous catalyst and development in it.
- vi. Give examples of heterogeneous catalysts.
- vii. Understand the classification and essential properties of heterogeneous catalysts.
- viii. Give the brief account of Hydrogenation of olefins , Zeolites in catalysis, biodiesel synthesis, Automotive Exhaust catalysts
- ix. Understand the catalytic reactions used in industries around.

References:

1. Homogeneous Catalysis: The Applications and Chemistry of Catalysis by Soluble Transition Metal Complexes, G.W. Parshall and S.D. Ittel, Wiley, New York 1992.

2. Inorganic Chemistry D.F. Shriver and P.W. Atkins, 5th Edn, Oxford University Press, 2010, Chapter 26 pp690-721.
3. Homogeneous Catalysis: Mechanisms and Industrial Applications, S. Bhaduri and D. Mukesh, Wiley, New York, 2000.pp 13-23, 55-61,85-102, 161-163
4. Catalysis: Concepts and Green Applications: Gadi Rothenberg, Wiley-VCH; First edition, 2015 Relevant pages.
5. Heterogeneous catalysis in industrial practice, Chaerls N. Shatterfield, second edition, Krieger Publishing Company, Florida USA pp 1-16, 87-112, 203-205, 222-224.
6. Heterogeneous catalysis by B. Vishwanathan and D. K. Chakrabarty, New Age International Private Limited, 2007 (Relevant pages)

3. Bioinorganic Chemistry

[8 L]

I. Introduction, Role of metals in bioinorganic chemistry, Classification as enzymatic and non-enzymatic metals, enzymatic redox metals such as Cu (SOD) and enzymatic non-redox metals such as Zn (Hydrolase). Role of metal ions in non-enzymatic processes-Na, K, Ca, Mg (one example of each and brief discussion). Role of metals in enzymatic processes-Transition metals-Catalase, peroxidase and nitrogenase (Redox active). II. Metalloproteins-Iron proteins-Introduction of Fe-S proteins, Electron transfer proteins (Fe-S, Fe₂S₂, Fe₃S₄, Fe₄S₄). Transport protein (transferrin) and Storage protein (ferritin) III. Bioinorganic Chemistry of Fe: Hemoglobin and myoglobin, its structure and functions and IV. Bioinorganic Chemistry of Co: Vitamin-B₁₂, its structure and function.

[Further Reading: Student should also read about the role of other metals and advanced development in the field of Bioinorganic Chemistry.]

Aims and objective- A student should:

- i. Identify the biological role of inorganic ions & compounds.
- ii. Know the abundance of elements in living system and earth crust.
- iii. Give the classification of metals as enzymatic and non-enzymatic.
- iv. Understand the role of metals in non-enzymatic processes.
- v. Know the metalloproteins of iron.
- vi. Explain the functions of hemoglobin and myoglobin in O₂ transport and storage.
- vii. Understand the toxicity of CN⁻ and CO binding to Hb.
- viii. Draw the structure of Vit.B₁₂ and give its metabolism.

References:

1. Concise Inorganic Chemistry by J.D. Lee - 5th edition, Pages 353, 775, 779, 796-797.
2. Inorganic Chemistry,-D.F. Shiver & P.W. Atkins- C.H. Longford ELBS- 2nd Ed,782-806.

3. Principles of Bioinorganic Chemistry by S. J. Lippard and J. M. Berg, Panima Publishing Corporation, 1st Edn., Pages 1-13, 24, 285-290.

4. Inorganic Polymers

[5L]

Introduction, Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicates, silicones, siloxanes, borazines, and phosphazenes.

Aims and objective: A student should be able to:

- know thy types of Inorganic polymers
- comparison with organic polymers
- synthesis, structural aspects of Inorganic polymers
- understand the polymers of Si, B, Si and P
- Inorganic polymers and their use.

References:

- Inorganic polymer chemistry, Pimpalpore, Jain, Soni, Sahai, Pragati edition 2012, pages 1-7, 110-129, 179-186, 207-217
- N. H. Ray, Inorganic Polymers, Academic Press (1978).
- Inorganic Polymers, Second Edition James E. Mark Harry R. Allcock Robert West Oxford University Press, 2nd Edition, 2005.

5. Inorganic solids/ionic liquids of technological importance

[5L]

Inorganic solids, Preparation of inorganic solids: Conventional heat and beat methods, Co-precipitation method, Sol-gel method and Hydro-thermal method. Introduction to Solid electrolytes, inorganic liquid crystals and their examples. Ionic liquids, synthesis and application of imidazolium and phosphonium based ionic liquids.

Further reading: student should also read about the advanced smart materials and green aspects of ionic liquids.

Aims and objective: A student should know:

- Understand Preparation of inorganic solids by various methods,
- Inorganic liquid crystals
- Ionic liquids, their preparations, and their significance w.r.t green chemistry.
- Technological importance of ionic liquids,

Reference

- Rodger, G.E. *Inorganic and Solid State Chemistry*, Cengage Learning, 2002.
- Ionic Liquids: Industrial Applications for Green Chemistry, Robin D. Rogers, Kenneth R. Seddon, American Chemical Society, Washington, DC, USA. pp1-13, 30-41

DSEC-V: CH-605: Inorganic Chemistry -III**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Acid–Base and Donor–Acceptor Chemistry	08
2	Ionic Solids	10
3	Chemistry of Zeolites	08
4	Introduction to Nanochemistry	05
5	Chemical Toxicology	05
Total		36

1. Acid–Base and Donor–Acceptor Chemistry**[8 L]**

Acid–Base Models as Organizing Concepts, Arrhenius Concept, Brønsted–Lowry Concept, solvent system concept, Lux Flood concept, Lewis Concept, Frontier Orbitals and Acid–Base Reactions, Hard and soft acids and bases, theory of hard and soft acids bases, Acid and base strength (proton affinity, acidity and basicity of binary hydrogen compounds, inductive effects, steric effect, strength of oxy acids, acidity of cations in aqueous solutions, non-aqueous solvents and acid and base strengths, super acids).

Aims and objectives: A student should:

1. Student will learn the concept of acid base and their theories.
2. They will also come to know different properties of acids and bases.
3. Strength of various types acids.
4. How acid and base strengths get affected in non-aqueous solvents.

Reference: Inorganic chemistry, Gary L Messler and Donald A Tar, Third Ed, Pearson publisher, pages: 67-178, 183 – 208.

2. Ionic Solids**[10L]**

Crystalline and amorphous solids, crystal structures simple cubic, body centered cubic and face centered cubic, Properties of ionic solids, packing arrangements of anions in an ionic solids, Voids in crystal structure- tetrahedral and octahedral, Ionic radius, Palings univalent and crystal radii, Conversion of univalent radii to crystal radii, problems based on conversion of radii, Radius ratio effect, Lattice energy, Born-Lande equation, Born Haber cycle and its applications, Schottky and Frenkel defect.

A student should:

1. Know the nature of solids.
2. Know the crystal structures of solids.

3. Draw the simple cubic, BCC and FCC structures.
4. Identify the C.N. of an ion in ionic solid.
5. Identify the type of void.
6. Know the effect of radius ratio in determining the crystal structure.
7. Be able to define Pauling's univalent radius and crystal radius.
8. Be able to solve simple problems based on Pauling's univalent radii and crystal radii.
9. Know how to draw Born-Haber cycle.
10. Be able to solve simple problems based on Born- Haber cycle.
11. Know the defects in Ionic solids.
12. Be able to differentiate between the defects.

Reference Books:

Ref. 1- Concise Inorganic Chemistry by J.D. Lee - 5th edition. Pages 32-61

Ref .2- Concept and Model of Inorganic Chemistry by Douglas-Mc Daniels - 3rd edition Pp 102-127.

Ref. 3 -New Guide to Modern Valence Theory by G.I. Brown - 3rd edition Pages 55-62

3. Chemistry of Zeolites**[8L]**

1. Historical Background, Natural and artificial Zeolites,
2. Zeolite Framework Types: Classification, Nomenclature, Database of Zeolite Structures, Channels, Building Units, Natural Tiles, Framework Density, Coordination Sequences
3. Zeolite Structures: Framework Composition, Extra-framework Species, Stacking Faults and Disorder
4. Synthesis of Zeolites: Introduction, Basic Zeolite Synthesis, Mineralizing Agents, Effects of water concentration, Gel preparation and crystallization, Structure Directing Agents (SDA)
5. Applications 1. Zeolites as Heterogeneous Catalysts: Critical Properties for Catalysis, Catalytic Applications, Zeolites for Fine Chemistry: Acylation and Alkylation Aromatic Hydrocarbons, 2. Zeolites for Adsorption and Separations

A student should:

1. Different Zeolite Framework Types and their classification
2. Zeolite synthesis and their structure
3. Application of zeolites

Reference:

1. Zeolites in Catalysis Properties and Applications Edited by Jiri Cejka, Russell E. Morris, Petr Nachtigall, The Royal Society of Chemistry 2017 pp 1-5, 19-25, 37-50, 73-79, 87, 412-414, 418

2. Chemistry of Zeolites and Related Porous Materials: Synthesis and Structure, Ruren Xu, Wenqin Pang, Jihong Yu, Qisheng Huo, Jiesheng Chen, John Wiley & Sons (Asia) Pvt. Ltd, 2007

4. Introduction to Nanochemistry

[5L]

Synthesis and Stabilization of Nanoparticles by Chemical Reduction, Reactions in Micelles, Emulsions, and Dendrimers. Photochemical and Radiation Chemical Reduction, Cryochemical Synthesis, Physical Methods. Particles of Various Shapes and Films, Properties and Application of Nanoparticles in Science and Technology (in brief), Applications of CNTs

Reference:

1. Nanochemistry, G.B.Sergeev, Elsevier, 2006, pp 7-36, 175-83,199-201
2. The Chemistry of Nanomaterials C. N. R. Rao, A. Muller, A. K. Cheetham (Eds.) WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 2004. (Relevant pages)

A student should:

1. Various methods of nanoparticle synthesis
2. Stabilization of Nanoparticles in solution
3. Properties and Application of Nanoparticles
4. Know about carbon nanotube and its application

5. Chemical Toxicology

[5L]

Toxic chemicals in the environment, Impact of toxic chemistry on enzymes. Biochemical effect of Arsenic, Cadmium, Lead and Mercury. Biological methylation.

A student should be able -

- i) To know toxic chemical in the environment.
- ii) To know the impact of toxic chemicals on enzyme.
- iii) To know the biochemical effect of Arsenic, Cd, Pb, Hg.
- iv) To explain biological methylation.

Reference:

- i) Fundamental Chemistry by A. K. De (3rd Ed.)
- ii) Environmental chemistry by A.K.De Publisher- Wiley Eastern Limited New Age International Limited Page No. 75-100.

DSEC-V: CH-606: Inorganic Chemistry Practical-II

[Credit -2, 73 L]

Total 12 Experiments to be performed.

A. Volumetric Estimations (Any 3)

1. Analysis of Phosphate (PO_4^{3-}) from Fertilizer. (Ref-1)
2. Analysis of Iodine from Iodized salt.(Ref-2)

3. Strength of medicinal H_2O_2 . (Ref-1)
4. Analysis of Calcium from milk powder. (Ref-1)
5. Analysis of Cu from Cu-Fungicide. (Ref-1)

B. Flame Photometry (Any 3) (Ref-1)

1. Estimation of Na by flame photometry by calibration curve method.
2. Estimation of Na by flame photometry by regression method.
3. Estimation of K by flame photometry by calibration curve method.
4. Estimation of K by flame photometry by regression method.

C. Column Chromatography (any 1) (Ref-1)

1. Purification of water using cation/anion exchange resin and analysis by qualitative analysis /conductometry.

D. Nanomaterial synthesis (Any 1) (Ref-3, 4)

1. Synthesis of Silver nanoparticles.
2. Synthesis of ZnO nanoparticles.

E. Verification of periodic trends using solubility of alkaline earth metal hydroxides $\text{Ca}(\text{OH})_2$, $\text{Mg}(\text{OH})_2$, $\text{Cr}(\text{OH})_2$, $\text{Ba}(\text{OH})_2$. (Ref-1)**F. Synthesis of amine complexes of Ni(II) and its ligand exchange reaction (bidentate ligands like acac, DMG, Glycine) by substitution method.**

OR

Determination of the Metal to ligand ratio (M : L) in complexes. (Ref-5)

G. Solvent free microwave assisted one pot synthesis of phthalocynin copper (II) complex.

OR

Fenton reaction: Degradation of H_2O_2 using Fe catalyst. (Ref-6)

H. Table work: Band gap calculation for the nanomaterial TiO_2 / SnO_2 / ZnO from its electronic spectra (UV-Visible). (Ref-3, 4)**References:**

- 1: Vogel's textbook of Inorganic Quantitative Analysis, Jeffery, Basset, Mendham Deney, 5th Ed, Longman Scientific Technical, USA (copublished with John Wiley Sons)
- 2: General Chemistry Experiment – Anil J Elias (University press).
- 3: Nanotechnology: Principles and Practices by Dr.Sulbha Kulkarni. Third Edition, Springer
- 4: A laboratory course in nanoscience and nanotechnology, Dr. Gerrad Eddy Jai Poinem, CRC press
- 5: Experimental Inorganic Chemistry, Mounir A. Malati, Horwood Series in Chemical Science (Horword Publishing, Chichester) 1999.

6: Environmental Chemistry Microscale Laboratory Experiments, Jorge G.Ibanez Margarita
Hernandez-Esparza Carmen Doria-Serrano Arturo Fregoso-Infante, Springer

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Structure of Practical Examination [35 Marks; Time: 3 hours]

Q1. Expt. A/ B/ C/ D/ E/ F/ G/ H**30 M**

Q2. Viva-Voce**05 M**
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DSEC-VI: CH-607: Organic Chemistry-II**[Credit -2, 36 L]**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Introduction to Spectroscopy	03
2	Ultra Violet and Visible Spectroscopy	06
3	Infra-Red Spectroscopy	08
4	Nuclear Magnetic Resonance Spectroscopy (PMR)	10
5	Combined problems based on U.V., I.R. and PMR spectroscopy	05
6	Stereochemistry of Disubstituted Cyclohexane and Decalin	04
Total		36

1: Introduction to Spectroscopy**[03 L]**

Introduction, meaning of spectroscopy, Types of spectroscopy, nature of electromagnetic radiation and regions of electromagnetic spectrum, Terms used in spectroscopy; wavelength, amplitude, frequency, wavenumber, energy and their relations and conversions Ref 2: Page Nos. 43-55 Chapter

2: Ultra Violet and Visible Spectroscopy**[06 L]**

Introduction, Electromagnetic radiations, electronic transitions, λ_{max} & ϵ_{max} , chromophore, auxochrome, bathochromic and hypsochromic shifts, Application of visible, ultraviolet spectroscopy in organic molecules. Application of electronic spectroscopy and Woodward rules for calculating λ_{max} of conjugated dienes and α , β – unsaturated compounds. Ref 1: Page Nos. 367-398

3: Infra-Red Spectroscopy**[08 L]**

Introduction, Infrared radiation and types of molecular vibrations, functional group and fingerprint region. Infra-red spectroscopy in organic molecules, IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on $>\text{C}=\text{O}$ stretching absorptions). Ref 1: Page Nos 26-93

4: Nuclear Magnetic Resonance Spectroscopy (PMR)**[10 L]**

Introduction, Principles, Magnetic and nonmagnetic nuclei, nuclear resonance, chemical shift, shielding, & deshielding effect. Measurement of chemical shift, TMS as reference and its advantages, peak area, integration, spin-spin coupling, coupling constants, J-value, problems

based on NMR. Ref 1: Page Nos.108-175 and 225-366 Chapter 5: Combined Problems Based on U.V., I.R. and PMR Spectroscopy. [05 L] Ref 1: Page Nos. 501 to 567

5: Combined problems based on U.V., I.R. and PMR spectroscopy. [05 L]

Ref 1: Page Nos. 501 to 567

6: Stereochemistry of Disubstituted Cyclohexane and Decalin [04 L]

Recapitulation, Geometrical and optical isomerism of 1,3- dimethyl and 1,4-dimethyl cyclohexane with their stability and energy calculations. Conformations of decalin and their stability.

Ref.19: Pages 94, 213 - 216, 250. Ref.20: Pages 243 – 250, 289-292.

References:

1. Pavia D.L.; Lampman G.M. Kriz G. S.; Vyvyan J.R. Spectroscopy, First Indian Reprint 2008 : Brooks/Cole CENGAGE Learning.
2. Silverstein and Basallar: Spectroscopic Identification of Organic Compounds.
3. M. Parikh :Absorption Spectroscopy Organic Compounds (John Wiley)
4. P. S. Kalsi : Spectroscopy of organic compounds (New Age)
5. J. R. Dyer: Application of absorption spectroscopy of organic compounds.
6. V. M. Parikh:Application spectroscopy of Organic molecules. (Mehata)
7. D.W. Williams and Flemming: Spectroscopic methods of Organic compound.
8. Jackman and Stermineil: Application of NMR spectroscopy
9. J. D. Roberts:Nuclear magnetic resonance (J. Wiley)
10. Jaffe and Orchin: Theory and application of U. V.
11. K. Benjamin: Mass spectroscopy
12. Budsikiewicz et al.: Mass spectroscopy.
13. Beynon J H et al: The mass spectra of organic molecules.
14. W. Kemp: Organic spectroscopy ELBS
15. Atherben; Electron spin resonance
16. Das and Jame: Mass Spectroscopy.
17. Eliel: Stereochemistry of Organic Compounds, Tata Mc Graw Hill, 1989
18. D. Nasipuri: Stereochemistry of Organic Compounds- Principles and Applications, New Age International Publishers, 3rd edition.

Learning Outcomes

Chapter 1 to 5: Organic Spectroscopic Methods in Structure Determination. (Chapter 1-5)

Students will learn the interaction of radiations with matter. They will understand different regions of electromagnetic radiations. They will know different wave parameters.

1. Students will learn the principle of mass spectroscopy, its instrumentation and nature of mass spectrum.
2. Students will understand the principle of UV spectroscopy and the nature of UV spectrum. They will learn types of electronic excitations.
3. Students will be able to calculate maximum wavelength for any conjugated system. And from the value of λ -max they will be able to find out the extent of conjugation in the compound.
4. Students will understand the principle of IR spectroscopy, types of vibrations and the nature of IR spectrum.
5. From the IR spectrum, they will be able to find out IR frequencies of different functional groups. And thus, they will be able to find functional groups present in the compound.
6. Students will understand the principle of NMR spectroscopy and will understand various terms used in NMR spectroscopy. They will learn measurement of chemical shift and coupling constants.
7. Students will be able to interpret the NMR data and they will be able to use it for determination of structure of organic compounds.
8. Students will be able to determine the structure of simple organic compounds on the basis of spectral data such as λ max values, IR frequencies, chemical shift (δ values).

Chapter 6: Students should be able to learn

1. The use of models to draw different types of disubstituted cyclohexanes in chair form
2. The geometrical isomerism in disubstituted cyclohexanes
3. The stability, energy calculations and optical activity of these conformers
4. The use models and to draw different types of conformational isomers of decalin in chair form
5. To know the stability of geometrical isomers of decalin

DSEC-VI: CH-608: Organic Chemistry-III

[Credit -2, 36 L]

Synthetic Organic Chemistry

Chapter No	Chapter	No of Lectures
1	Retrosynthetic Analysis and Applications	06
2	Organic Reaction Mechanism and Synthetic Applications	12
3	Reagents in Organic Synthesis	10
4	Natural Products	08

1. Retrosynthetic Analysis and Applications

[06 L]

Introduction, Different terms used – Disconnection, Synthons, Synthetic equivalence, FGI, TM. One group disconnection, Retrosynthesis and Synthesis of target molecules: Acetophenone, Crotonaldehyde, Cyclohexene, Benzylbenzoate, and Benzyl diethyl malonate.

Ref 1: Page Nos. 1-34 **Ref. 2:** Page Nos. 694-722

2. Organic Reaction Mechanism and Synthetic Applications [12 L]

1. Chemistry of reactive intermediates (carbocations, carbanions, free radicals, carbenes, nitrenes, benzyne etc...);
2. Wolff rearrangement (Step up),
3. Hofmann rearrangement (Step down),
4. Simmons-Smith reaction,
5. Michael reaction,
6. Wittig reaction and McMurry reaction,
7. Diels-Alder reaction,
8. Functional group interconversions and structural problems using chemical reactions.

Ref 2 Page Nos. 1021-1022, 1009-1018, 500, 237-238, 982-983, 877-893

3. Reagents in Organic Synthesis [10 L]

Reagents- Preparation and Applications of following reagents.

Reducing Reagents: **Ref 2** Pages Nos. 226, 828, 131-132, 26, 39, 537

Lithium aluminium hydride LiAlH_4 , NaBH_4 , DIBAL-H, $\text{Li}(\text{tBuO})_3\text{AlH}$ & Raney Nickel.

Oxidizing Reagents: **Ref. 2** Page Nos. 545, 1123-1126, 919, 764

1. DMSO either with DCC or Ac_2O , Dess Martin reagent, Osmium tetroxide, Selenium dioxide (SeO_2), DDQ.

4. Natural Products [08 L]

Ref 2: Page Nos. 1413-1447

Terpenoids: Introduction, Isolation, Classification. Citral- structure determination using chemical and spectral methods, Synthesis of Citral by Barbier and Bouveault Synthesis.

Alkaloids: Introduction, extraction, Purification, Some examples of alkaloids and their natural resources. Ephedrine- structure determination using chemical methods. Synthesis of Ephedrine by Nagai.

Reference:

1. Designing Organic Synthesis by Stuart Warren 1983.
 2. Organic Chemistry by Clayden, Greeves, Warren and Wothers. Second edition.
 3. Organic Chemistry by I. L. Finar Vol. II Edn. V.
 4. Organic Chemistry by Morrison and Boyd. VI Edn.
- A Guidebook to Reaction Mechanism by Peter Sykes VI Edn.

DSEC-VI: CH-609: Organic Chemistry Practical-II**[Credit -2, 73 L]****Total 12 Experiments to be performed****A) Interpretation of IR and NMR spectra (2 Experiments of each type)**

1. Determination of functional group of organic compound from given IR spectra.

2. Determination of structure of organic compound from given NMR spectra.

(Ethyl alcohol, Cis-2-butene, Trans-2-butene, Benzoic acid, Propanaldehyde, Ethyl methyl ether, 1 Butyne, Ethyl acetate, Propyl Cyanide, Salicylic Acid, Nitro phenols, Isopropyl benzene, Propanamine, Benzamide, n-Pentane, 2-chloro butane, Acetophenone)

B) Organic Estimations (Any Three)

1. Estimation of glucose

2. Estimation of glycine

3. Saponification value of oil

4. Estimation of Alkali content in Antacid using HCl.

C) Organic Extractions (Any Three)

1. Caffeine from tea leaves

2. Eugenol from cloves

3. Lycopene from tomato peels

4. Cinnamic acid from cinnamon

5. Trimyristin from nutmeg

D) Column chromatography

1. Separation of mixture of aldehyde and carboxylic acid by column chromatography

2. Separation of mixture of O-nitrophenol and P-nitrophenol by column chromatography

Learning Outcomes:**A) Interpretations of IR and PMR Spectra The students will be able to**

1. Explain “fingerprint region” of an infrared spectrum can used in the identification of an unknown compound.

2. Identify the functional group or groups present in a compound.

3. Identify the broad regions of the infrared spectrum in which occur absorptions caused by N–H, C–H, and O–H, C≡C and C≡N, C=O, C=N, and C=C.

4. Understand use NMR spectra to determine the structures of compounds.

5. Interpret integration of NMR spectra

6. Calculate coupling constants from ¹H NMR spectra.

7. Interpret elemental analysis technique

B) Organic Estimations The students will be able to

1. Practical knowledge of handling chemicals.
2. Achieve the practical skills required to estimations of glucose and glycine.
3. Achieve the practical skills required to Saponification value of oil.
4. Determine the molecular weight of given tribasic acids.

C) Organic Extractions The students will be able to

1. Apply the principles of extraction
2. Understand the equipment for extraction.
3. Gain practical hands-on experience of modern Extraction.
4. Develop basic design of extractor
5. Describe the extraction separation process.

D) Column chromatography The students will be able to

1. Defines the basic parameters in chromatography
2. Explain the processes of a chromatography analysis
3. Describes the types and materials of column.
4. Explains the types of mobile phase and elution.
5. Realize the selection of appropriate mobile phase, column and detector

SEC-III: CH-610: Skill Enhancing Course-III

[Credit -2, 36 L]

Choose one out of the two options, A and B.

CH-610 (A) : Chemistry of Soil and Agrochemicals

Chapter No	Name of the Topic	Number of lectures
1	Soil Chemistry	6
2	Problematic Soil and Soil testing	6
3	Laboratory Methods of Soil Analysis	12
4	Fertilizers and Manures	6
5	Protection of Plants	6
Total Lectures		36

1. Soil Chemistry

(6 L)

- 1.1 Role of agricultural chemistry
- 1.2 Introduction to soil chemistry, definitions of soil, Soil components- Mineral component, organic matter or humus, soil atmosphere, soil water, soil microorganism.
- 1.3 Physical properties of soil- Soil texture, soil structure, soil colour, soil temperature, soil density, porosity of soil.

1.4 Surface soil and sub-soil, Functions of soil.

1.5 Chemical properties of soil - Soil reactions, importance of soil reaction, factors controlling soil reactions,

1.6 Buffer action, buffering capacity, importance of buffer reaction in agriculture, ion exchange and importance of ion exchange.

Ref 1- Pages 8-12, 92-94, 98-113, 116-146

Ref 3 - Pages 28-50

Ref 12 - Pages 211-224, 228-234

Ref 17 - Pages 49-56, 295-308, 357-370

2. Problematic Soil and Soil testing (06 L)

2.1 Introduction to problematic soils.

2.2 Acid soils- formation of acid soil, effect of soil acidity on plant, reclamation of acidic soil, application of lime in improving the acidity of soil, lime requirements.

2.3 Alkali Soil- formation of alkali soil, reclamation of alkali soil.

2.4 Classification of alkali soil- saline soil, alkali soil, saline alkali soil, non-saline alkali soil.

2.5 Soil testing - Introduction, different methods of soil fertility evaluation.

2.6 Objectives of soil testing.

Ref 1- Pages 345-370

Ref 3 - 301-312

Ref 4 – Pages 135-147, 150-159

Ref 12 - Pages 237-246, 337-353

3. Laboratory Methods of Soil Analysis (12 L)

3.1 Collection of soil Samples from field.

3.2 Soil sample preparation for analysis of various parameters.

3.3 Digestion and Extraction Procedures for soil.

3.4 Project/ Hands on training of Analysis of various parameters of soil and writing project on it.

(Note: Students can perform minimum six experiments out of eight in the laboratory with the help of teacher and write report on it and submit to subject teacher. It is considered for internal marks of this course).

1. Determination of pH of soil
2. Determination of EC and TDS of soil
3. Determination of soil organic matter of soil.
4. Determination of available nitrogen in soil.
5. Determination of available phosphorus from soil.

6. Determination of calcium and magnesium from soil by EDTA method.
7. Determination of sodium and potassium by flame photometry method.
8. Determination of carbonate and bicarbonates from soil.
9. Calculate the RSC, SAR, SSP, Salinity of soil. Interpretation of soil data and recommendations for soil use.

Ref 23 pages 11-160

Ref 25 pages 17-104

4. Fertilizers and Manures

(06 L)

Fertilizers

- 4.1 Introduction, Classification of nitrogenous fertilizers, reaction of ammonium sulphate, urea as a fertilizer in soil.
- 4.2 Nano fertilizers- Nano-Fertilizers for Sustainable Crop Production, Nano urea- preparation, forms and application of nano urea.
- 4.3 Phosphatic fertilizers- Classification of phosphatic fertilizers, reactions of superphosphate as a fertilizer in soil.
- 4.4 Potassic fertilizers - Classification of potassic fertilizers, reactions of potash fertilizer in soil.
- 4.5 Complex fertilizers- Characteristics, advantages and disadvantages,
- 4.6 Mixed fertilizers - Characteristics, advantages and disadvantages.
- 4.7 Time and mode of applications of fertilizers in the solid and liquid form to plants.
- 4.8 Factors affecting efficiency of fertilizers.

Manures

- 4.9 Introduction, Definition and classification of manures.
- 4.10 Effect of bulky organic manures on soil.
- 4.11 Farm yard manures (FYM), improved methods of handling FYM- Trench method for FYM, Factors affecting the composition of FYM, losses during the handling and storage of FYM, Gobar gas-compost plant - construction and advantages.
- 4.12 Biofertilizers - Definition, classification, role & advantages.
- 4.13 Vermicompost - Preparation, effect of vermicompost on soil fertility.

Ref 2- Pages 205-213,

Ref 3- Pages 90-112, 137-149

Ref 5 Pages Relevant pages

Ref 12 – Pages 263- 275, 280-290,

Ref 18 – URL: Attached in reference.

Ref 19 - URL: Attached in reference.

Ref 20 URL: Attached in reference.

5. Protection of Plants

(06 L)

5.1 Classification of pesticides.

5.2 Insecticide- Definition, Classification on the basis of mode of action and chemical properties.

5.2.1 Inorganic insecticides - plants or animal origin insecticides- nicotine, pyrethrum, rotenone.

5.2.2 Synthetic organic insecticides – a) Organochlorine insecticides - DDT, BHC, Aldrin and dieldrin. b) Organophosphorus insecticides – Parathion, Malathion, c) Carbamate insecticides – Carbaryl, Baygon.

5.3 Fungicide – Definition and Classification of fungicides.

5.3.1 Inorganic fungicide- Copper fungicides a) Bordeaux mixture, b) Copper oxychloride.

5.3.2 Organic fungicides- Dithiocarbamate, Quinone fungicides, Heterocyclic fungicides.

5.3.3 Synthetic fungicides.

5.4 Herbicides- Definition, Classification on the basis of mode of action- Selective and non-selective herbicides, classification based on their effect on weeds- contact, systemic herbicides. Classification on the basis of their chemical structures.

5.5 Nano pesticides: Its Scope and Utility in Pest Management

Ref 6 - Relevant Pages

Ref 13 – Pages 80-177,

Ref 14 – Pages 73-110,

Ref 15 – Chapter 3 Pages 1-45

Ref 16 Pages 2-16,

Ref 19 URL: Attached in reference.

Ref 21 URL: Attached in reference.

Learning Objectives:

- 1) Know the different components and properties of soil.
- 2) Know classification of soil on the basis of pH.
- 3) Identify the problematic soil and recommend method for their reclamation.
- 4) Know the different plant nutrients required for plants and their functions.
- 5) Know the role of various fertilizers and manures required for plant growth.
- 6) Know the various methods and their techniques in analysis of soil.
- 7) Know importance of manures as compared to chemical fertilizers.

- 8) Know various techniques to protect the plants.
- 9) Have the knowledge of various pesticides, insecticides, fungicides and herbicides.

Course Outcomes:

After studying this course, student is expected to

- 1) Understood various components of soil and soil properties and their impact on plant growth.
- 2) Understood the classification of the soil.
- 3) Explores the problems and potentials of soil and decide the most appropriate treatment for land use.
- 4) Understood the Reclamation and management of soil physical and chemical constraints.
- 5) Useful in making decisions on nutrient dose, choice of fertilizers and method of application etc. practiced in crop production.
- 6) Got experience on advanced analytical and instrumentation methods in the estimation of soil.
- 7) Understood various Nutrient management concepts and Nutrient use efficiencies of major and micronutrients and enhancement techniques.
- 8) Proper understanding of chemistry of pesticides will be inculcated among the students.
- 9) Imparts knowledge on different pesticides, their nature and, mode of action and their fate in soil so as to monitor their effect on the environment.

Reference Books

1. A text book of soil science (Revise Edition) J. A. Daji. Revised by J. R. Kadam, N. D. Patil, Media promoters and publishers, Mumbai, 1996.
2. Text book of soil science, T. D. Biswas, S. K. Mukherjee, 2nd ed. Tata McGraw Hill Publishing company, New Delhi, 2017.
3. Introduction to Agronomy and soil, water management, V. G. Vaidya, K. R. Sahasrabudhe, (Continental Prakashan).
4. Principles of soil science, M. M. Rai, 4th ed. Million complex of India, Bombay, 1977.
5. Manures and fertilizers (12th ed.), K. S. Yawalkar, J. P. Agarwal and Bokde, Agri-horticulture publishing house, Nagpur, 2016.
6. Chemistry of insecticides and fungicides, U.S. Sreeramula (2nd ed.), Oxford and IBH Publishing company, New Delhi.
7. Fundamentals of soil sciences, Henry D. Foth, 8th ed. John Wiley and Sons, 1990. Book Soft copy URL: <https://1lib.in/book/634160/343570>

8. Soil, Plant, Water and fertilizer analysis, P. K. Gupta, 2nd ed. Agrobios Publication, Jodhpur, India. Book Soft copy URL:
https://content.kopykitab.com/ebooks/2016/06/7111/sample/sample_7111.pdf
9. Handbook of Biofertilizers and biopesticides, A. M. Deshmukh, R. M. Khobragade and P. D. Dixit, Oxford Book Company, Jaipur, India 2007. Book Soft copy URL:
<https://1lib.in/book/961124/8ecdcd>
10. Essential Plant Nutrients uptake use efficiency and Management, M. Naeem, Abid A. Ansari, Sarvajeet Singh Gill Editor, Springer International Publishing AG, 2017. Book Soft copy URL: <https://1lib.in/book/3376008/16ba17>
11. The Use of Nutrients in crop plants, N.K. Fageria, CRC Press, Taylor and Francis Group, LLC, 2009. Book Soft copy URL: <https://1lib.in/book/550595/3a2232>
12. Agronomic Handbook – Management of crops, soils and their fertility, J. Benton Jones, Jr. CRC Press LLC, Washington D.C. 2003. Book Soft copy URL:
<https://1lib.in/book/946311/37a879>
13. The chemistry of Organophosphorus Pesticide, Christa Fest, Karl-Julius Schmidt, 2nd revised ed., Springer, Verlag Berlin Heidelberg, New York, 1982. Book Soft copy URL:
<https://1lib.in/book/2137868/423f0a>
14. Chemical Pesticide - Mode of action and Toxicology, Jorgen Stenersen, CRC Press, 2004. Book Soft copy URL: <https://1lib.in/book/550607/97f6b8>
15. Agrochemical and Pesticide safety Handbook, Michel F. Waxman, CRC Press, 1998. Book Soft Copy URL: <https://1lib.in/book/2061906/6282cc>
16. Basic Guide to Pesticides: Their Characteristics and Hazards, Shirley A. Briggs, Rachel Carson Council, First Edition, CRC Press, Taylor and Francis Group, 2017. Book Soft copy URL: <https://1lib.in/book/3580723/94db6c>
17. Principles of Soil Chemistry, Kim H. tan, 4th ed. revised and expanded, Marcel Dekker AG, New York, 1998. Book Soft copy URL: <https://1lib.in/book/2572952/f500e1>
18. Nano fertilizers, Nano Urea- URL: <https://www.iffco.in/>
19. Nano fertilizers & Nano Pesticides, URL:
<https://www.sciencedirect.com/science/article/pii/S0570178320300440> ,
<https://www.sciencedirect.com/science/article/pii/B9780128200926000124>
20. Biofertilizers, URL: <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/biofertilizers> , https://agritech.tnau.ac.in/ta/org_farm/orgfarm_biofertilizers.html,
<https://en.wikipedia.org/wiki/Biofertilizer>
21. Nano Pesticides, URL: <https://link.springer.com/article/10.1007/s10311-016-0600-4>

22. A Practical Course in Agricultural Chemistry, D. W. Gilchrist Shirlaw and J. E. Nichols, First ed. Pergamon Press Ltd. Headington Hill Hall Oxford4 & 5 Fitzroy Square, London. 1967. Book Soft copy URL: <https://1lib.in/book/2275633/04aec0>
23. Laboratory Guide for Conducting Soil Tests and Plant Analysis, J. Benton Jones Jr. CRC Press, 2001. Book Soft copy URL: <https://1lib.in/book/665386/63e6f0>
24. Agricultural Chemistry, First Edition, R. P. Dhok, Amazon Digital Services, LLP-KDP E Book, US. 2021. Book Soft copy URL: <https://drive.google.com/file/d/1gnvIAzdN0aaZtKbX6TY9UZ2PC7M3ANN9/view?usp=sharing>
25. Methods in Agricultural Chemical Analysis: A Practical Handbook: N.T. Faithfull, CABI Publishing, 2002, Book Soft copy URL: <https://1lib.in/book/917802/0b4a71>

CH-610 (B) Introduction to Forensic Chemistry

Chapter No	Name of the Topic	Number of lectures
1	History of Development of Forensic Science in India	10
2	Introduction to Narcotics Drugs and Psychotropic Substances	10
3	Analysis of Narcotics Drugs and Psychotropic Substances	16
	Total Lectures	36

1. History of Development of Forensic Science in India

[10 L]

Functions of forensic science. Historical aspects of forensic science. Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science. Frye case and Daubert standard. Work nature of forensic science. Qualifications of forensic scientists. Duties & Code of conduct for forensic scientists.

Learning Objectives: After studying this paper the students will know –

- The significance of forensic science to human society.
- The fundamental principles and functions of forensic science.
- The work nature in a forensic science laboratory.
- Encourage academic students towards the noble career

Suggested Readings

- B.B. Nanda and R.K. Tiwari, *Forensic Science in India: A Vision for the Twenty First Century*, Select Publishers, New Delhi (2001).

2. M.K. Bhasin and S. Nath, *Role of Forensic Science in the New Millennium*, University of Delhi, Delhi (2002).
3. S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005). Page No : 1-13, 243-260, 667-678
4. W.G. Eckert and R.K. Wright in *Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997). Page No: 11-78
5. R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).Page No 5-29
6. W.J. Tilstone, M.L. Hastrup and C. Hald, *Fisher's Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013) Page No : 26-149
7. Directorate of Forensic Science services (DFSS) <http://dfs.nic.in/index.html>

2. Introduction to Narcotics Drugs and Psychotropic Substances

[10 L]

Definition of narcotics drugs and psychotropic substances. Broad classification – Narcotics, stimulants, depressants and hallucinogens. General characteristics and common example of each classification. Natural, synthetic and semi-synthetic narcotics drugs and psychotropic substances. Designer drugs. Tolerance, addiction and withdrawal symptoms of narcotics, drugs and psychotropic substances. Introduction to NDPS Act-1985 and awareness about Punishment for Offences.

3. Analysis of Narcotics Drugs and Psychotropic Substances

[16 L]

Crime scene search for narcotic drugs and psychotropic substances – searching a suspect, searching a dwelling, searching a vehicle. Clandestine drug laboratories. Collection and preservation of drug evidence. Testing of narcotics drugs and psychotropic substances. Isolation techniques for purifying narcotics drugs and psychotropic substances – thin layer chromatography, gas-liquid chromatography and high performance liquid chromatography. Presumptive and screening tests for narcotics drugs and psychotropic substances. Microcrystalline testing of Drug Abuse and Illicit Trafficking. Analysis of narcotics drugs and psychotropic substances in urine, and antemortem blood & in postmortem blood. Dope tests.

Learning Objectives: After studying this paper the students will know –

- a. The forensic identification of illicit liquors.
- b. The classification and characteristics of the narcotics, drugs and psychotropic substances.
- c. The menace of designer drugs.
- d. The methods of identifying of narcotics, drugs and psychotropic substance

Suggested Readings

1. R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004). Page No 10-26
2. S.B. Karch, *The Pathology of Drug Abuse*, CRC Press, Boca Raton (1996). Page No: 429-638

3. A. Poklis, Forensic toxicology in, *Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).Page No : 116-141
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013). Page No 323-337
5. THE NARCOTIC DRUGS AND PSYCHOTROPIC SUBSTANCES, ACT, 1985
<https://legislative.gov.in/sites/default/files/A1985-61.pdf>
6. THE NARCOTIC DRUGS SUBSTANCES AND PSYCHOTROPIC RULES, 1985
https://dor.gov.in/sites/default/files/Narcotic-Drugs-and-Psychotropic-Substances-Rules-1985_0.pdf
6. National Policy on NDPS Govt. of India
<https://dor.gov.in/narcoticdrugspychotropic/national-policy-ndps>
- 7.National Policy on NDPS & Punishment for Offences
<https://dor.gov.in/narcoticdrugspychotropic/punishment-offences>
8. J.W. Robinson, *Undergraduate Instrumental Analysis*, 5th Edition, Marcel Dekker, Inc., New York (1995). Page No : 721-797
9. Analytical Techniques in Forensic Science Rosalind Wolstenholme, Sue Jickells, Shari Forbes, edition first edition 2021 John Wiley & Sons Ltd Page No; 51-68
10. FORENSIC ANALYTICAL TECHNIQUES Barbara Stuart University of Technology, Sydney, Australia, first edition 2013 John Wiley & Sons, Ltd. 143-166

SEC-IV: CH-610: Skill Enhancing Course-IV**[Credit -2, 36 L]****Choose one out of the two options, A and B.****CH-611(A): Analytical Chemistry-II**

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Solvent extraction	08
2	Instrumental Methods of Chromatographic Analysis	04
3	High Performance Liquid Chromatography	06
4	Gas Chromatography	06
5	Atomic Absorption Spectroscopy	08
6	Flame Emission Spectroscopy	04
Total		36

1. Solvent extraction**(8 L)**

Introduction to solvent extraction, organic phase, Partition the theory of extraction (distribution coefficient, Distribution ratio, solute remaining unextracted, Separation coefficient), Factors favoring solvent extraction, Quantitative treatment to solvent extraction equilibrium, Ion association complexes, synergic extraction, some extraction reagent specifically used for inorganic ions (Acetylacetone, 8-Hydroxyquinoline, Diphenylthiocarbazone, Sodium diethyldithiocarbamate, Ammonium pyrrolidine dithiocarbamate), some practical aspects, Applications: determination of copper as the diethyldithiocarbamate complex, Determination of Fe(III) with 8-hydroxyquinoline, determination of nickel by synergistic extraction. Solid phase extraction (Ref-3) Numericals; **Key Reference-2:** 242- 253, [Supplementary Ref-3: 579-593]

2. Instrumental Methods of Chromatographic Analysis (4 L)

Principles of Chromatographic Separations, classification, Theory of Column Efficiency in Chromatography, (theoretical plate, rate theory of chromatography - the Van Deemter equation, efficiency and particle size in HPLC, retention factor efficiency and resolution,

Key Reference -4: 603-617, Supplementary reference-3: 547-556.

3. High Performance Liquid Chromatography (6 L)

Introduction, Types of liquid chromatography (liquid-solid, liquid-liquid, bonded phases), Choice of mode of separation, Equipment for HPLC: mobile phase, sample injection and column design (mobile phase, optimization of mobile phase, gradient elution, solvent delivery and sample injection, sample injection system, the column (effect of column length and column diameter), Choosing the Detector, Ultraviolet detector, Luminescence detector, RI detector, electrochemical detector, Column efficiency, HPLC chromatogram and its characteristics (retention time, peak height, peak area), method of quantitative analysis by HPLC, Example: determination of aspirin, phenacetin and caffeine in a mixture, numerical, **Key Reference -2:** 289-315, [Supplementary reference - Ref-3: 649 – 724, Ref-6: 1-325 -relevant part]

4. Gas Chromatography (6 L)

Introduction, Apparatus: A supply of carrier gas from a high-pressure cylinder, Sample injection system and derivatization, the column (Packed columns, Open tubular columns), the detector (properties, hot wire detector or TCD, FID, ECD), Quantitative analysis by GC (Area normalization method and internal standard addition method), Elemental analysis, numerical

Key Reference-2: 317- 337, [Supplementary reference - 7: 1-209 (relevant part)]

5. Atomic Absorption Spectroscopy (8 L)

Introduction, Elementary theory, Instrumentation, flames, the nebulizer-burner system, non-flame techniques, (graphite furnace, cold vapour technique), resonance line sources, monochromator, detectors, interferences, chemical interferences, background correction

methods, Atomic absorption spectrophotometers, Experimental preliminaries (calibration curve methods, standard addition method) Preparation of sample (wet ashing, fusion, Dry ashing, microwave dissolution, concentration procedures), Detection limits, Estimation of Ca and Mg in water.

Key Ref-2: 612 – 643

6. Flame Emission Spectroscopy

(4 L)

Introduction, emission spectra, flame emission spectroscopy, flame photometers. Evaluation methods, calibration curve procedure, the standard addition technique, Applications: determination of alkali metals by flame photometry, determination of trace elements in contaminated soil by AAS. Numerical,

Key Reference-2: 645-649, 655-656

References:

Ref-1: Vogel's textbook of Inorganic Quantitative Analysis, Jeffery, Basset, Mendham Deney, 5th Ed, Longman Scientific Technical, USA (copublished with John Wiley Sons)

Ref-2: Vogel's textbook of Inorganic Quantitative Analysis, Mendham, Deney Barnes, 6th Ed, Pearson education

Ref-3: Analytical Chemistry by G. D. Christian, et al, Wiley, 6th Ed.

Ref-4: Principles of Instrumental Analysis: Holler, Skoog, Crouch 6th Ed. Thomson Publication

Ref-5: Modern Analytical Chemistry, David Harvey, Mc-Graw Hill Higher education

Ref-6: High performance Liquid Chromatography, (Analytical Chemistry through open learning series) Second Ed, Sandie Lindsay, Wiley

Ref-7: Gas Chromatography, (Analytical Chemistry through open learning series) 2nd Ed, [Ian A. Fowles](#), Wiley

Course outcome: After completion of the course student should able to

1. Define basic terms in solvent extraction, basics of chromatography, HPLC, GC, and AAS and AES. Some important terms are: solvent extraction, aqueous and organic phase, distribution ratio and coefficient, solute remain unextracted, percent extraction, ion association complex, theoretical plate, HETP, retention time, selectivity, resolution, stationary phase, normal and reverse phase, ion exchange, column efficiency, carrier gas, split and spitless injection, packed column, tubular column, atomic absorption and emission spectroscopy, electronic excitation in atoms, nebulization, atomization, reduction of metal ions in flame, absorbance by atoms in flame, flame atomizers, furnace atomizers, interference in AES and FES, HCL, hydride generator, etc.

- Identify important parameters in analytical processes or estimations. Example: minimum analyte concentration in particular method, reagent concentration for particular analysis, reagent for particular analysis, reaction condition to convert analyte into measurable form, wavelength selection in HPLC with spectrophotometric and fluorometric detector, solvent or carrier gas in HPLC and GC, choice method for the sample preparation in atomic spectroscopic methods, choice of filter and HCL in atomic spectroscopic methods, etc.
- Explain different principles involved in the analyses using solvent extraction, basics of instrumental chromatography, HPLC, GC, and atomic spectroscopic techniques.
- Perform quantitative calculations depending upon equations students has studied in the theory. Furthermore, student should able to solve problems on the basis of theory.
- Discuss / Describe procedure for different types analyses included in the syllabus.
- Select particular method of analysis if analyte sample is given to him.
- Differentiate / distinguish / compare among the different analytical terms, process and analytical methods.
- Demonstrate / explain theoretical principles with help of practical.
- Design analytical procedure for given sample.
- Apply whatever theoretical principles he has studied in theory during practical in laboratory.

CH-611 (B): Chemistry of Cosmetics and Perfumes

Chapter No.	Title of Topic/Chapter	No. of lecture
1	Chemical composition, preparation and uses of some cosmetics	12
2	Chemistry of Perfumes and fragrances	12
3	Rules and regulations for cosmetic industry	12
Total		36

1. Chemical composition, preparation and uses of some cosmetics [12 L]

A general study including chemical composition, preparation and uses of the following:

Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), Eye make-up (Mascara, Eyeshadow, Eyeliner, Eyebrow pencil), Antiperspirants, (Ref. 1 – all relevant pages, Ref. 2 Pp. 149 - 177, 187 to 199, 233 to 255, 263, 291 to 310, 323 to 346, 406 to 422, 437 to 452, 457 to 490, 519 to 522)

2. Chemistry of Perfumes and fragrances [12 L]

History of perfume, classification sources of fragrance, Development and role of natural products in cosmetics, Extraction of Essential oils and their importance and uses in cosmetic industries with reference to Chemistry of - Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2-

phenyl ethyl alcohol, Jasmone, Civetone, Muscone. (**Ref. 3** Pages 3 to 67 and relevant pages from 68 to 360)

3. Rules and regulations for cosmetic industry

[12 L]

Understanding of regulations of Central Drugs Standard Control Organization, India Cosmetic Regulation, Steps for process of cosmetic registration in India (**Ref. 4, 5, 6**)

4. Projects: (students can choose any one of the following projects and submit a project report at the end of semester for evaluation)

1. Preparation of talcum powder. (**Ref.2** Pages 263)
2. Preparation of shampoo. (**Ref.2** Pages 323 to 346)
3. Preparation of enamels. (**Ref.2** Pages 495 to 522)
4. Preparation of hair remover. (**Ref.2** Pages 425 to 434)
5. Preparation of face cream. (**Ref.2** Pages 149 to 177)
6. Preparation of nail polish and nail polish remover. (**Ref.2** Pages 505 to 522)
7. Preparation of Emulsified and solid fragrances. (**Ref.2** Pages 575 to 583)
8. Isolation of Simple Floral fragrances and Alcoholic fragrances solution. (**Ref.2** Pp 569 to 573)

Reference Books:

1. Cosmetic Formulation: Principles and Practice - Heather A.E. Benson, Michael S. Roberts, Vania Rodrigues Leite-Silva, Kenneth Walters
2. COSMETICS Formulation, Manufacturing & Quality Control, Fourth Edition - P. P. Sharma, M pharm
3. Perfumes, Cosmetics and soaps, ninth edition, – W. A. Poucher.
4. <https://cdsco.gov.in/opencms/opencms/en/Cosmetics/cosmetics>
5. <https://cosmetic.chemlinked.com/cosmepedia/india-cosmetic-regulation>
6. <https://morulaa.com/cdsco/process-cosmetics-registration-india>

Additional References :

1. E. Stocchi: *Industrial Chemistry*, Vol -I, Ellis Horwood Ltd. UK.
2. Sharma, B.K. & Gaur, H. *Industrial Chemistry*, Goel Publishing House, Meerut (1996).
3. Indian medical plants: by Kirtikar & Basu
4. Naturals and Cosmetics – by Dr. Satish Sakharwade
5. Manufacture of Perfumes, Cosmetics & Detergents – Giriraj Prasad
6. Perfumes: History & Chemistry Vol-I- Dr. D. D. Wasule
7. Cosmetics: Science & Technology – Sagarin.
8. Essential oils Vol. I by Gunther.
9. Perfume flowers & essential oil industries by S.B. Srivastva.



SAVITRIBAI PHULE PUNE UNIVERSITY

(formerly University of Pune)

F.Y.B.A. Political Science Syllabus

(Credit and Semester System under NEP-2020)

**Revised syllabus will be implemented with effect from the
Academic Year 2024-2025**

SAVITRIBAI PHULE PUNE UNIVERSITY PUNE.

BOS, Political Science and Public Administration

F.Y.B.A. Political Science Semester I & II

Course structure as per NEP 2020 From Academic Year 2024-25

		DS C-1	DSC-2	DS C-3	GE/OE	SEC	IK S	AE C	VEC	C C	TOTAL
4.5/ 100	I	2T+ 2T/ P	2T+2T/P	2T+ 2T/ P	2T	2T	2T	2T	2		22
			POL-101-T Introduction to Political Science - I		OE-101-POL Good Citizenship	SEC-101-POL Communicati on Skills	–	-	VEC-102 Indian Constitution - I		
			POL-102-P Political Science – Practical - I								
	II	2T+ 2T/ P	2T+2T/P	2T+ 2T/ P	2P	2P		2T	2	2	22
			POL-151-T Introduction to Political Science - II		OE-151-POL Good Citizenship - Practical	SEC-151-POL Communicati on Skills - Practical			VEC-152 Indian Constitution - II		
			POL-152-P Political Science – Practical - II								
		4T+ 4P	4T +4P	4T+ 4P	2T+2P	2T/+2P	2T	2T+ 2T	2+2	2	44

Savitribai Phule Pune University, Pune

F.Y.B.A. Political Science Syllabus

Semester I (Total 10 Credits)

1. POL-101-T : Introduction to Political Science - I
2. POL-102-P : Political Science - Practical – I
3. OE-101-POL : Good Citizenship
4. SEC-101-POL : Communication Skills
5. VEC-102 : Indian Constitution - I

Semester II (Total 10 Credits)

1. POL-151-T : Introduction to Political Science – II
2. POL-152-P : Political Science - Practical – II
3. OE-151-POL : Good Citizenship - Practical
4. SEC-151-POL : Communication Skills - Practical
5. VEC - 152 : Indian Constitution - II

F. Y. B. A Political Science

Semester I (Total 10 Credits)

1. POL-101-T : Introduction to Political Science - I
2. POL-102-P : Political Science - Practical – I
3. OE-101-POL : Good Citizenship
4. SEC-102-POL : Communication Skills
5. VEC-102 : Indian Constitution - I

POL-101-T : Introduction to Political Science -I

Total Credits: 2T

Total Hours: 30

Objectives:

This course is designed to acquaint students with the –

1. Important concepts in Political Science.
2. Approaches to study Political Science.
3. Basic Concepts and Values in Political Science.

Course Outcomes :

1. The students will be able to understand the nature and scope of Political Science.
2. The students shall understand the various traditional and modern approaches to the study of Political Science.
3. The students will understand the basic concepts in Political Science and apply these concepts in making sense of social realities.

Unit I – Introduction to Political Science

15

- a. Meaning and Definition.
- b. Nature of Political Science.
- c. Scope of Political Science.
- d. Approaches to the Study Political Science -Traditional and Modern.

Unit II – The State

15

- a. Meaning and Definition.
- b. Evolution of State.
- c. Nature of State.
- d. Elements of the State.

References :

1. Bhargava Rajeev and Ashok Acharya (eds.), 2008, *Political Theory*, Delhi, Pearson.
2. Gupta Sachdeo and Singh S K, 1987, *Political Theory and Ideology*, Delhi, Ajanta Prakashan.
3. Henry D. Aiken, 1956, *The Age of Ideology*, New York, Mentor.
4. Heywood Andrew, 2004, *Political Theory – An Introduction*, Palgrave Basingstoke.
5. Gauba O. P, *An Introduction to Political Theory*, अनुवाद - जाधव तुकाराम, 2010, राजकीय सिद्धांतांची तोंडओळख, पुणे, के. सागर प्रकाशन.
6. Mackenzie I, *Political Concepts*, 2005, *A Reader and Guide*, Edinburg, Edinburg University Press.
7. भार्गव राजीव आणि अशोक आचार्य, अनुवाद - बनसोडे हेमंत, 2008, राजकीय सिद्धांत परिचय, नवी दिल्ली, पियरसन प्रकाशन.
8. भोळे भा.ल., 2002, राजकीय सिद्धांत, नागपूर, पिंपळापुरे पब्लिशर्स.
9. चौसाळकर अशोक, 2017, आधुनिक राजकीय सिद्धांत, पुणे, युनिक अकॅडमी.
10. देवरे सुरेश, २०२४, राज्यशास्त्राची ओळख , (सेमेस्टर – १, ई पुस्तक), अमेझॉन एशिया-पॅसिफिक होल्डिंग्स प्रायव्हेट लिमिटेड.
11. पाटील बी. बी., 2009, राजकीय संकल्पना, कोल्हापूर, फडके प्रकाशन.
12. पाटील बी.बी., 2009, राजकीय सिद्धांत आणि संकल्पना, कोल्हापूर, फडके प्रकाशन.
13. तिजारे रा. अ., घांगरेकर चिं.घ., 1994, आधुनिक राजकीय विश्लेषण, नागपूर, मंगेश प्रकाशन.

POL-102-P : Political Science - Practical

Total Credits: 2P

Total Hours : 60

Objective:

1. To enable the students to apply their understanding of basic concepts of Political Science and their application.
2. To understand the various dimensions of state, equality-freedom and democracy through their practical use.

Learning Outcomes :

1. Students will know how to apply the concepts learned in class in real life.
2. The students will know how the contents of Political Science are actually used.

Practical : Write a report on the challenges facing democracy through Newspapers

(Any Two)

60

1. Violation of Freedom
2. Violation of Equality
3. Violation of Sovereignty
4. Violation of Justice
5. Violation of Power of State
6. Other violations of Democracy.

Process of Activity:

1. Students have to complete each activity by studying the Newspapers and Films or Short films.
2. Each student has to complete these activities under the guidance of a guide/mentor. The Department of Political Science will allot the students respective guides/mentors. The Department of Political Science may also appoint guides/mentors from other faculties or subject related industry areas.
3. Students have to choose the topic of activity in consultation with the teacher/guide/mentor.
4. After the study the student has to submit two separate reports and each report will be a minimum of one thousand words. In the report along with write-up must be included photographs, newspaper clippings, images for the support of study. Students can give graphs, tables for statistics.
5. The report should contain objectives, observations and conclusions.
6. After the approval letter from the guide/mentor, students can submit the report to the department.
7. After submission of the report, the department will conduct an interview of students or arrange a presentation in the classroom.
8. Assessment will be done on the basis of a report and interview/presentation.
9. Activity reports will be of 35 marks and the interview will be of 15 marks.

OE-101-POL : Good Citizenship

Total Credits: 2 T

Total Hours: 30

Objectives

1. To explore the idea of citizenship, covering historical perspectives, civic responsibilities, and the evolving nature of good citizenship.
2. To stimulate thinking by prompting students to reflect on the dynamic aspects of good citizenship, including social justice, inclusivity, and the challenges associated with responsible civic participation.
3. To enable the students to develop the basic skill set to contribute to the well-being of the society as good citizens.

Learning Outcomes

1. The students will develop a basic understanding of citizenship theories and concepts, demonstrating a comprehension of the foundational elements that shape good citizenship.
2. They will be able to take on the challenges to citizenship in a more matured learned manner.
3. They will acquire the skills necessary for effective civic discussion, enabling students to actively contribute to community discussions, collaborate with peers, and work towards positive societal changes.

1. Introduction

15

- a. Meaning and Definition of Citizen and Citizenship
- b. Concept of Citizenship in Indian Context
- c. Responsible Citizenship : Fundamental Duties
- d. Citizenship Acts

2. Challenges to being Active Citizens

15

- a. Issues of Social Justice and Inclusiveness (gender equality, racial and ethnic diversity and promotion of equitable society)
- b. Digital Challenge (online privacy, digital rights and impact of social media on civic engagement)

- c. Environmental Challenge (climate change, sustainable development of responsibility of citizens)
- d. Political Participation and Disinformation Challenge (issues like voter suppression, voter polarization and role of civic education in fostering informed citizenship and impact of fake news, propaganda and digital manipulation on formation of informed and responsible citizens)

Readings:

1. Bhargav Rajeev & Acharya Ashok,, *Political Theory : An Introduction*, Pearson Longman (Topic 8 covers concept of Citizenship) Common Sense Education, *Digital CitizenshipCurriculum*,
<https://www.commonsense.org/education/digital-citizenship/curriculum>
2. De Rohit, 2018, *A People's Constitution : The Everyday Life of Law in the Indian Republic*, Princeton University Press.
3. Khilnani Sunil, 2004, *The Idea of India*, Penguin Books Ltd.
4. Varma Pavan, 2005, *Being Indian*, Penguin India.
5. Sen Amartya, 2006, *The Argumentative Indian : Writings on Indian Culture, History and Identity*, Penguin Books Ltd.
6. Roy Anupama, 2016, *Citizenship in India*, New Delhi, Oxford University Press.
7. आवटे श्रीरंजन, राही श्रुती गणेश, 2019, *आपलं आयकार्ड*, पुणे, द युनिक अकॅडमी पब्लिकेशन.
8. भार्गव राजीव आणि आचार्य अशोक, *राजकीय सिद्धांत: ओळख*, पिअर्सन प्रकाशन.
9. भोळे भा. ल., 2015, *गणराज्याचे शासन आणि राजकारण*, नागपूर, पिंपळापुरे बुक प्रकाशन.
10. डे रोहित, अनुवाद : अवधूत डोंगरे, 2023, *लोकांचं संविधान : भारतीय प्रजासत्ताकातील कायद्याचा दैनंदिन जीवनव्यवहार*, पुणे, मधुश्री प्रकाशन.
11. न्यूसम गॅविन, *सिटीझनविल* (डिजिटल माध्यम, लोक सहभाग आणि शासन), मराठी अनुवाद- सत्यजित तांबे.....
12. पठाण नूरखान, 2022, *आपले संविधान - राज्यपद्धती नव्हे तर जीवनपद्धती*, कल्याण, प्रियदर्शी पब्लिकेशन.
13. पळशीकर सुहास, 2020, *नागरिकत्व म्हणजे काय?*, पुणे, कर्तव्य साधना, <https://kartavyasadhana.in/view-article/suhas-palshikar-on-what-is-citizenship>
14. सुमंत यशवंत, 2018, *प्रा. यशवंत सुमंत यांची तीन भाषणे*, पुणे, युनिक अकॅडमी पब्लिकेशन.

SEC-101 POL : Communication Skills

Total Credits : 2 T

Total Hours : 30

Objectives:

1. Communication is a very important aspect in personal and social life. The purpose of this course is to explore and understand the theoretical concept of communication, including its process, types and significance in personal and social contexts.
2. To develop a comprehensive understanding of how to establish effective communication in both personal and professional settings, and to identify the necessary mediums for achieving successful communication.

Outcomes:

1. Through this course, students will gain a clear understanding of communication concepts.
2. They will learn the mechanism of the communication process including essential elements and effective mediums.

1. Understanding Communication

- a. Understanding the term Communication and Mass Communication, Historical origins of communication studies, Feature and Forms of Communication, Types of Communication.
(Feature: Two way process, Sender, Message, Medium, Receiver)
(Form: Verbal, Nonverbal)
(Types: Intrapersonal, Interpersonal, Group Communication, Mass Communication, Interactive Communication)
- b. Models of Communication (Lasswell model, Shannon and Weaver Model, Osgood and Schramm circular model)
- c. Barriers to Communication : Social, Cultural, linguistic and Mechanical barriers.
- d. Communication and Society

2. Tools, Message framing and Ethical issues

- a. Media for Communication: Traditional Media, Mass Media, Social Media, Digital Media
- b. Features of Effective Communicator, Ethical issues in communication.
- c. Message framing and shaping of public opinion
- d. Application of communication concept through workshop and case studies

Readings:

1. Keval J. Kumar, 1994, Mass Communication in India, Delhi, Jaico Publishing House.
2. Denis McQuail, 1983, McQuail's Mass Communication Theory, Delhi, Sage P.
3. Jeremy Harris, 2023, Social Media and Political Communication, New York, Routledge.
4. Taberez Ahmed Neyazi, 2018, Political Communication and Mobilization of the Hindi Media in India, UK, Cambridge University Press.
5. Sidney Kraus, Richard M Perloff, 1986, Mass Media and Political Thought, Sage publication.
6. Shanto Lyenger, 1997, Do the Media Govern?, Sage Publication
7. दातार सुषमा, २००१, संवादविश्व, पुणे, संवादविश्व प्रकाशन.
8. पवार सुधाकर, २०००, संवादशास्त्र, पुणे, मानसन्मान प्रकाशन.
9. जोशी श्रीपाद, २०००, जनसंवाद आणि जनमाध्यम, नागपूर, श्रीमंगेश प्रकाशन.
10. जोशी श्रीपाद, संवादशास्त्र, नागपूर, विजय प्रकाशन.
11. रवीश कुमार, २०१८, द फ्रीव्हाइस, पुणे, मधुश्री पब्लिकेशन.
12. प्रधान ग.प्र., राजकीय व्यक्तिमत्त्वे आणि त्यांची भाषा
<https://kartavyasadhana.in/view-article/g-p-pradhan-on-language-of-politics>
13. पळशीकर सुहास, २०२०, राजकारणाच्या भाषा म्हणजे काय?
<https://kartavyasadhana.in/view-article/what-is-politics-of-language-writes-suhas-palshikar>

VEC-102-POL : Indian Constitution - I

Total Credits: 2T

Total Hours: 30

Objective:

1. To sensitize the significance of the Constitution of India to students from all faculties and help them to understand the basic concepts of Indian Constitution.
2. To familiarize students with the working of the Constitution of India.
3. To help the students to understand the importance of fundamental rights as well as fundamental duties.

Learning Outcomes:

1. The students will be able to explain the core philosophy and ideals of the Indian Constitution.
2. The students will be able to understand the Indian values, ideals and the role of the Constitution in a democracy.
3. Students will know about the fundamental rights and how these rights are different from the Directive Principles of the State Policy.

Unit 1: Making of the Indian Constitution

15

- a) Historical Background
- b) Constituent Assembly
- c) Preamble
- d) Salient features of Indian Constitution

Unit 2: Fundamental Rights, Fundamental Duties and Directive Principles of State

Policy.

15

- a. Meaning and Importance
- b. Fundamental Rights.
- c. Fundamental Duties
- d. Directive Principles of State Policy

References:

1. Abbas, Kumar, Alam, 2010, *Indian Government and Politics*, Delhi, Pearson.
2. Austin Granville, 1999, *The Indian Constitution: Cornerstone of a Nation*, Oxford, Oxford University Press.
3. Austin Granville, 2003, *Working a Democratic Constitution: The Indian Experience*, Delhi, Oxford University Press.
4. Basu D. D., 2018, *Introduction to the Constitution of India*, New York, LexisNexis.
5. Brass Paul., 1994, *The Politics of India Since Independence*, Cambridge, Cambridge University Press,
6. Chakrabarty Bidyut, 2017, *Indian Constitution*, Sage Publications India Private Limited.
7. Jha Rajesh, 2012, *Fundamentals of Indian Political System*. Delhi, Dorling Kindersley (India) Pvt. Ltd., Pearson Education Society.
8. आवटे श्रीरंजन, राही श्रुती गणेश, 2019, आपलं आयकार्ड, पुणे, द युनिक अँकॅडमी पब्लिकेशन.
9. बाचल वि. म., 2004, भारतीय राज्यघटना आणि राजकीय व्यवहार, पुणे, के सागर पब्लिकेशन.
10. भोळे भा.ल., 2015, भारतीय गणराज्याचे शासन आणि राजकारण, नागपूर, पिंपळापुरे प्रकाशन.
11. चपळगावकर नरेंद्र, 2002, राज्यघटनेचे अर्धशतक, मुंबई, मौज प्रकाशन.
12. देवरे सुरेश, २०२४, भारतीय राज्यघटना (VEC- ई पुस्तक), अमेझॉन एशिया-पॅसिफिक होल्डिंग्स प्रायव्हेट लिमिटेड
13. जाधव तुकाराम, शिरापूरकर महेश, 2022, भारतीय राज्यघटना व घटनात्मक प्रक्रिया, पुणे, द युनिक अँकॅडमी पब्लिकेशन.
14. कश्यप सुभाष, 2005, *आपली संसद* (अनुवाद न. ब. पाटील) नॅशनल बुक ट्रस्ट इंडिया.
15. कांबळे बाळ, वकील अलिम, देवरे पी. डी., 2012, *भारताची राज्यघटना - राजकारण व कायदा*, पुणे, डायमंड प्रकाशन.
16. पठाण नूरखान, 2022, आपले संविधान, कल्याण, प्रियदर्शी पब्लिकेशन.
17. पाटील बी.बी., 2016, *भारतीय शासन आणि राजकारण*, कोल्हापूर, फडके प्रकाशन.
18. साठे सत्यरंजन, 2005, *भारताच्या राज्यघटनेची 50 वर्षे*, पुणे, कॉन्टिनेन्टल प्रकाशन.
19. व्होरा राजेंद्र व सुहास पळशीकर, 2010, *भारतीय लोकशाही: अर्थ आणि व्यवहार*, पुणे, डायमंड प्रकाशन.

F.Y.B.A Political Science

Semester II (Total 10 Credits)

1. POL-151-T : Introduction to Political Science – II
2. POL-152-P : Political Science - Practical – II
3. OE-151-POL : Good Citizenship - Practical
4. SEC-151-POL : Communication Skills - Practical
5. VEC-152 : Indian Constitution - II

POL-151-T : Introduction to Political Science -II

Total Credits: 2T

Total Hours: 30

Objectives:

This course is designed to acquaint students with the –

1. Important concepts in Political Science.
2. Approaches to study Political Science.
3. Basic Concepts and Values in Political Science.

Course Outcomes :

1. The students will be able to understand the nature and scope of Political Science.
2. The students shall understand the various traditional and modern approaches to the study of Political Science.
3. The students will understand the basic concepts in Political Science and apply these concepts in making sense of social realities.

Unit I – Sovereignty

15

- a. Meaning and Definition.
- b. Evolution of Sovereignty.
- c. Characteristics of Sovereignty.
- d. Types of Sovereignty.

Unit II – Liberty and Equality

15

- a. Meaning and Nature
- b. Aspects of Liberty and Equality
- c. Types of Liberty
- d. Dimensions of Equality

References :

1. Bhargava Rajeev and Ashok Acharya (eds.), 2008, *Political Theory*, Delhi, Pearson.
2. Gupta Sachdeo and Singh S K, 1987, *Political Theory and Ideology*, Delhi, Ajanta Prakashan.
3. Henry D. Aiken, 1956, *The Age of Ideology*, New York, Mentor.
4. Heywood Andrew, 2004, *Political Theory – An Introduction*, Palgrave Basingstoke.
5. Gauba O. P, *An Introduction to Political Theory*, अनुवाद - जाधव तुकाराम, 2010, राजकीय सिद्धांतांची तोंडओळख, पुणे, के. सागर प्रकाशन.
6. Mackenzie I, *Political Concepts*, 2005, *A Reader and Guide*, Edinburg, Edinburg University Press.
7. भार्गव राजीव आणि अशोक आचार्य, अनुवाद - बनसोडे हेमंत, 2008, राजकीय सिद्धांत परिचय, नवी दिल्ली, पियरसन प्रकाशन.
8. भोळे भा.ल., 2002, राजकीय सिद्धांत, नागपूर, पिंपळापुरे पब्लिशर्स.
9. चौसाळकर अशोक, 2017, आधुनिक राजकीय सिद्धांत, पुणे, युनिक अकॅडमी.
10. देवरे सुरेश, २०२४, राज्यशास्त्राची ओळख, (सेमेस्टर – २, ई पुस्तक), अमेझॉन एशिया-पॅसिफिक होल्डिंग्स प्रायव्हेट लिमिटेड
11. पाटील बी. बी., 2009, राजकीय संकल्पना, कोल्हापूर, फडके प्रकाशन.
12. पाटील बी.बी., 2009, राजकीय सिद्धांत आणि संकल्पना, कोल्हापूर, फडके प्रकाशन.
13. तिजारे रा. अ., घांगरेकर चिं.घ., 1994, आधुनिक राजकीय विश्लेषण, नागपूर, मंगेश प्रकाशन.

POL-152-P : Political Science - Practical - II

Total Credits: 2P

Total Hours : 60

Objective:

1. To enable the students to apply their understanding of basic concepts of Political Science and their application.
2. To understand the various dimensions of state, equality-freedom and democracy through their practical use.

Learning Outcomes :

3. Students will know how to apply the concepts learned in class in real life.
4. The students will know how the contents of Political Science are actually used.

Practical : Write a report on the challenges facing democracy through films and

Short Films. (Any Two)

60

1. Challenges before Freedom
2. Challenges before Equality
3. Challenges before Sovereignty
4. Challenges before Justice
5. Challenges before Power of State
6. Other challenges before Democracy.

Process of Activity:

1. Students have to complete each activity by studying the Newspapers and Films or Short films.
2. Each student has to complete these activities under the guidance of a guide/mentor. The Department of Political Science will allot the students respective guides/mentors. The Department of Political Science may also appoint guides/mentors from other faculties or subject related industry areas.
3. Students have to choose the topic of activity in consultation with the teacher/guide/mentor.
4. After the study the student has to submit two separate reports and each report will be a minimum of one thousand words. In the report along with write-up must be included photographs, newspaper clippings, images for the support of study. Students can give graphs, tables for statistics.
5. The report should contain objectives, observations and conclusions.
6. After the approval letter from the guide/mentor, students can submit the report to the department.
7. After submission of the report, the department will conduct an interview of students or arrange a presentation in the classroom.
8. Assessment will be done on the basis of a report and interview/presentation.
9. Activity reports will be of 35 marks and the interview will be of 15 marks.

OE-151-POL : Good Citizenship - Practical

Total Credits: 2P

Total Hours : 60

Objectives :

1. To engage students in hands-on experiences, such as community service projects and civic workshops, fostering the practical application of citizenship skills in real-world settings.
2. To appreciate the diversity in our society and integrate it meaningfully to create a better society.

Learning Outcomes :

1. They will be able to showcase the ability to translate theoretical knowledge into practical action through engagement in community service projects and active participation in civic initiatives.
2. This will help them to understand the real-life situations in our society and use their skills to practically deal with them

Activity 1 : College Campus need based Activity (Any one)

30

1. Cleanness
2. Tree plantation
3. Voter awareness and registration
4. Beautification
5. Group discussion and lectures
6. College need based other activity

Activity 2 : Society need based Activity (Any one)

30

1. Health awareness
2. Flag hoisting awareness
3. Tax pay awareness
4. Road safety awareness
5. Public property awareness
6. Society need based other activity

Process of Activity:

1. Students have to complete each activity by studying with active participation.
2. Each student has to complete this activity under the guidance of a guide/mentor. The Department of Political Science will allot the students respective guides/mentors. The Department of Political Science may also appoint guides/mentor from other faculties or subject related industry areas.
3. Students have to choose the college and society needs base activity in consultation with the teacher/mentor.
4. After the study the student has to submit two separate reports and each report will be a minimum of one thousand words. In the report along with writeup must be included photographs, newspaper clippings, images for the support of study. Students can give graphs, tables for statistics.
5. The report should contain objectives, observations and conclusions.
6. After the approval letter from the teacher/guide, students can submit the report to the department.
7. After submission of the report, the department will conduct an interview of the student or arrange a presentation in the classroom.
8. Assessment will be done on the basis of a report and interview/presentation.
9. Activity reports will be of 35 marks and the interview will be of 15 marks.

SEC-151-POL : Communication Skills - Practical

Total Credits: 2P

Total Hours: 60

Objectives:

1. To help students distinguish between various forms of communication (verbal, non-verbal, intrapersonal, interpersonal, group, mass, and interactive) and understand their applications in real-life scenarios.
2. To engage students in hands-on activities such as role-plays, discussions, and media analysis, fostering active participation and collaborative learning.

Outcomes:

1. Students will understand the fundamentals of communication and its various forms, types, and barriers.
2. Students will be able to apply communication techniques effectively in real-world scenarios.

Practical : Make a following activities and Write a separate reports on these activities. 60

Activity 1 : Group Discussion:

Form a group of students, assign each group a specific time period or technological milestone to study and present any one activity.

1. **Communication in Ancient Era:** Use of signals, symbols, smoke messages, and other communication methods.
2. **Traditional Communication:** Folk arts, Kirtan and other traditions.
3. **Invention of Printing Technology:** Gutenberg Printing Press and its impact on society.
4. **Rise of Newspaper, Radio and Television:** Development of newspaper, radio, television.
5. **Internet and Digital Communication:** Growth of digital and social media.

Each group of students should do a presentation on it in the classroom and also write a report on this activity.

Activity 2 : Expert-Led Workshop:

1. A communication specialist or trainer will conduct a practical session to explain verbal and non-verbal communication in depth.
2. After this workshop, divide the class into small groups. Each group will be given specific scenarios to demonstrate verbal and non-verbal communication.

Each student is required to participate in this activity and submit a detailed report reflecting their understanding and insights gained from this activity.

Activity 3 : Exploring Different Types of Communication

1. Divide a classroom in different groups and assign them activity of demonstration of intrapersonal, interpersonal, group, mass and interactive communication.

Each student is required to submit a detailed report reflecting their understanding and insights gained from this activity.

Activity 4 : Assignment on Media effectiveness

1. For this activity divide students into small groups and assign each group a specific type of media. For examples traditional media, mass media, and digital media in conveying specific messages.
2. Group of students can be selecting any message or government or social campaign and evaluate how effectively it is conveyed through their assigned media.
3. Each group will present their findings in the classroom, highlighting the strengths and limitations of particular media. This finding may include audience reach, clarity of message, audience engagement, audience feedback and in communication barriers.
4. Each student will have to write a report comparing the effectiveness of all media types discussed.

Process of Activity:

1. Students have to complete each activity by studying with active participation.
2. Each student has to complete this activity under the guidance of a guide/mentor. The Department of Political Science will allot the students respective guides/mentors. The Department of Political Science may also appoint guides/mentor from other faculties or subject related industry areas.
3. Students have to choose activities in consultation with the teacher/mentor.
4. After the study the student has to submit two separate reports and each report will be a minimum of one thousand words. In the report along with writeup must be included photographs, newspaper clippings, images, etc. for the support of study. Students can give graphs, tables for statistics.
5. The report should contain objectives, observations and conclusions.
6. After the approval letter from the teacher/guide, students can submit the report to the department.
7. After submission of the report, the department will conduct an interview of the student or arrange a presentation in the classroom.
8. Assessment will be done on the basis of a report and interview/presentation.
9. Activity reports will be of 35 marks and the interview will be of 15 marks.

VEC 152 : Indian Constitution - II

Total Credits: 2T

Total Hours: 30

Objective:

1. To sensitize students about the significance of the parliamentary and federal system in India.
2. To familiarize students with the working of the Parliament and Central Government.
3. To help the students to understand the powers and functions of Parliament and Central Government.

Learning Outcomes:

1. The students will be able to explain the nature, features and process of the Indian Federal System.
2. The students will be able to understand the role of the Parliament in the Indian political system.
3. Students will know about the different powers of Parliament and Central Government.

Unit1 : Indian Federal System

15

- a. Salient Feature
- b. Centre – State Relations
- c. Changing Nature of Centre-State Relations
- d. Challenges facing the Indian Federation

Unit 2: Central Government System in India

15

- a. Historical Background: British Era
- b. President and Vice President
- c. Parliament
- d. Prime Minister and Council of Ministers

References:

1. Abbas, Kumar, Alam, 2010, *Indian Government and Politics*, Delhi, Pearson.
2. Austin Granville, 1999, *The Indian Constitution: Cornerstone of a Nation*, Oxford, Oxford University Press.
3. Austin Granville, 2003, *Working a Democratic Constitution: The Indian Experience*, Delhi, Oxford University Press.
4. Basu D. D., 2018, *Introduction to the Constitution of India*, New York, LexisNexis.
5. Brass Paul., 1994, *The Politics of India Since Independence*, Cambridge, Cambridge University Press.
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MARATHA VIDYA PRASARAK SAMAJ'S KPG ARTS, COMMERCE & SCIENCE COLLEGE, IGATPURI

Take Ghoti, Tal. Igatpuri, Dist. Nashik,
Maharashtra-422403 (MH)

AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY,
PUNE, MAHARASHTRA : ID. NO. PU/NS/ASC/023/1981



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Curriculum Gap Identification and Action



K.P.G. Arts, Commerce & Science College, Igatpuri.
Name of the Report- Voter Registration Campaign 2024-25



Department

: Political Science

Programme

: "Voter Registration Campaign"

Location

: K. P. G. Arts, Commerec and Science
College Igatpuri. Tal. Igatpuri
Dist. Nashik.

Organizer

: Department of Political Science

Date

: 24/08/2024

Beneficiary

: **1) Teacher**

1) Male 0 Female 0 Total = 00

2) Student

1) Male 07 Female 36 Total= 43

S. R. Dholi

Mr. S. S. Pardeshi

Co-ordinator

IQAC

K.P.G.Arts Com and Sci.College,
Igatpuri, Dist. Nashik.

Dr. Kiran Rakibe

PRINCIPAL

M.V.P Samaj's

K.P.G.Arts,Com and Sci.College
Igatpuri,Dist-Nashik-422403



मराठा विद्या प्रसारक समाजाचे,
कर्मवीर पुंजाबाबा गोबर्धने कला, वाणिज्य व विज्ञान महाविद्यालय, इगतपुरी
राज्यशास्त्र विभाग व भाजपा युवा मोर्चा यांच्या संयुक्त विद्यमाने आयोजित
मतदार नोंदणी अभियान दि. 24.08.2024

(Voter Registration Campaign)

महाविद्यालयातील राज्यशास्त्र विभाग व भाजपा युवा मोर्चा, नाशिक यांच्या संयुक्त विद्यमाने महाविद्यालयात शनिवार दि. 24.08.2024 रोजी मतदार नोंदणी अभियान राबविण्यात आले.

आगामी विधानसभा निवडणूका विचारात घेऊन तरुनांनी जास्तीत जास्त मतदान करावे. या उद्देशाने 18 वर्षे पुर्ण असणा-या विद्यार्थ्यांनी मतदान नोंदणी करण्यासाठी या शिबिराचे आयोजन करण्यात आले. या कार्यक्रमाचे प्रास्ताविक महाविद्यालयाचे मा. प्राचार्य किरण रकिबे यांनी केले. त्यांनी आपल्या प्रास्ताविकात विद्यार्थ्यांना मतदान नोंदणी करणे का महत्वाचे आहे याविषयी मार्गदर्शन केले. तसेच युवा वर्गाचा राजकिय सहभाग याविषयीचे महत्व त्यांनी पटवून दिले.

या कार्यक्रमासाठी भाजपा युवा मोर्चाचे जिल्हा सचिव निखिल हांडोरे यांनी जास्तीत जास्त विद्यार्थ्यांनी मतदान नोंदणी करण्याचे आवाहन केले. तसेच घोटी महिला मोर्चाच्या अध्यक्षा दिपा रॉय यांनी मुलींचा राजकारणातील अतिशय कमी सहभाग असणे याविषयी चिंता व्यक्त केली. तसेच जास्तीत जास्त मुलींनी मतदान नोंदणी करण्याचे आवाहन केले. भाजपा युवा मोर्चाचे जिल्हा अध्यक्ष गणेश सुर्यवंशी यांनी विद्यार्थ्यांना ऑन-लाइन व ऑफ-लाइन मतदान नोंदणी कशी करावी याविषयी प्रात्याक्षिक करून दाखविले. तसेच विद्यार्थ्यांबरोबर त्यांच्या कुटुंबातील ज्या सदस्यांची नोंदणी झालेली नाही. त्यांचे फॉर्म भरून नोंदणी करण्याचे आवाहन केले.

या कार्यक्रमासाठी गौरव गायकवाड, संदिप पंडित, अंकुश कडवे, अविनाश गुंजाळ हे भाजपा युवा मोर्चाचे पदाधिकारी उपस्थित होते. तसेच राज्यशास्त्र विभागातील डॉ. कल्पना वाजे या सर्वांनी मतदारांची नोंदणी करून घेण्यात सहाय्य केले. या शिबिरात एकूण 43 विद्यार्थ्यांनी मतदान नोंदणी केली. हेच या कार्यक्रमाचे यश आहे. या कार्यक्रमाचे सुत्रसंचालन राज्यशास्त्र विभाग प्रमुख संदिप ढोली यांनी केले.

S. R. Dholi

Mr. S. S. Pardeshi
Co-ordinator

IQAC
K.P.G.Arts Com and Sci.College,
Igatpuri, Dist. Nashik.

Dr. Kiran Rakibe
PRINCIPAL

M.V.P Samaj's
K.P.G.Arts, Com and Sci. College
Igatpuri, Dist-Nashik-422403



Maratha Vidya Prasarak Samaj's
**Karmaveer Punjababa Govardhan Arts, Commerce and Science College,
Igatpuri.**

Organized in association with Political Science Department and
BJP Yuva Morcha.

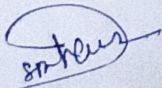
Voter Registration Campaign 24.08.2024

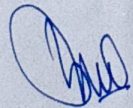
Political Science Department of the college and BJP Yuva Morcha, Nashik in association with the college on Saturday Voter registration campaign was conducted on 24.08.2024.

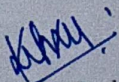
Youngsters should vote as much as possible considering the upcoming assembly elections. For this purpose, this camp was organized for the students who have completed 18 years to register to vote. Introductory program of the college Hon. Principal Kiran Rakibe did. In his introduction, he guided the students on why it is important to register to vote. He also convinced the importance of political participation of the youth.

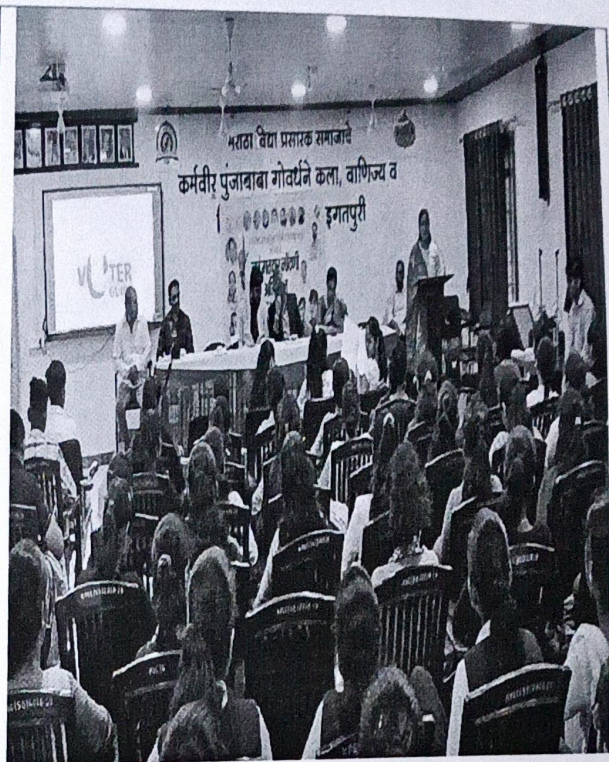
District Secretary of BJP Yuva Morcha Nikhil Handore appealed to maximum number of students to register to vote for this programme. Also, Ghoti Mahila Morcha President Dipa Roy expressed concern about the very low participation of girls in politics. He also appealed to maximum number of girls to register to vote. BJP Yuva Morcha District President Ganesh Suryavanshi demonstrated to the students how to register their votes online and offline. Also the members of their families who are not registered with the students. He urged them to fill the form and register.

BJP Yuva Morcha office bearers Gaurav Gaikwad, Sandeep Pandit, Ankush Kadve, Avinash Gunjal were present for this event. Also, in the Department of Political Science. Dr. Kalpana Waje all assisted in registering the voters. A total of 43 students registered to vote in this camp. That is the success of this program. The program was moderated by Sandeep Dholi, Head of the Department of Political Science.


S.R. Dholi


Mr. S.S. Pardeshi
Co-ordinator
IQAC
K.P.G.Arts Com and Sci.College,
Igatpuri, Dist. Nashik.


Dr. Kiran Rakibe
PRINCIPAL
M.V.P Samaj's
K.P.G.Arts.Com and Sci.College
Igatpuri, Dist-Nashik-422403



S.R.Dholi

S.R.Dholi

Mr. S.S.Pardeshi

Mr. S.S.Pardeshi
Co-ordinator
IQAC

K.P.G.Arts Com and Sci.College,
Jambhale, Dist. Solapur.

Dr. Kiran Rakibe

Dr. Kiran Rakibe
PRINCIPAL
MVP Sannaj's

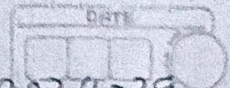
K.P.G.Arts Com and Sci.College

नाम-मतदार नोंदणी आधीच्या - २०१५-१६



क्र.सं.	विद्यार्थ्याचे नाव	नाम	महिला	मोबा. नं.	पॅनल
१)	मांडाडे पार्वती पुनम	F.Y.BA		9236134754	66121672778
२)	बाजिला गोवर्धनाथ गोंगळे	F.Y.BA		9307483833	23073070507
३)	पुजा लक्ष्मण बाजळे	F.Y.BA		76932416	52309774311
४)	सविता विजेश चव्हाण	F.Y.BA		8788609463	58763991162
५)	शोनाली कचरु नवले	F.Y.BA		8169561461	
६)	अर्चना गोकुळ धार	S.Y.BA		9130266261	20660225941
७)	प्रतिभा यशवंत शेगरे	S.Y.BA		9422681943	77935077134
८)	प्रशेरा विनायक शिरसाठ	F.Y.BA		9214366186	968115300382
९)	पुदिप चंदर, हेली	F.Y.BA		7620243738	82577890690
१०)	सिद्धेश वसंत वाघकर	F.Y.BA		9158584131	24646143974
११)	गणेशधाम शाकु, अमरपूर	12.Com		9226612482	776734390634
१२)	प्रविण भागिरथ गतीर	F.Y.BA		8087696811	36618465020
१३)	आर्यन गोपीनाथ रुपवत	F.Y.BA		9359941694	69100675354
१४)	किती चंद्रकांत आरसे	F.Y.BA		8329883169	7704667130
१५)	लक्ष्मी नंदु आडोळे	F.Y.BA		9209359310	8355653377
१६)	साधना शिवाजी शिंगडे	F.Y.BA		9834629633	59356227400
१७)	लेळावी नामदेव धारवट	F.Y.BA		7821986506	6178320094
१८)	संस्कृती राजेंद्र जाधव	F.Y.BA		9356721233	90788022591
१९)	राधिका राजेंद्र तिरकर	F.Y.BA		9145757297	335465405759
२०)	दिपाली विनायक भोडवे	F.Y.BA		7276875941	7905294564
२१)	शशनी आळामराम मोर	S.Y.BA		9307491801	76785292305
२२)	मानवे लक्ष्मी देवराव	S.Y.BA		9270787851	95798241799
२३)	दिवा प्रकाश धार	S.Y.BA		9250078654	
२४)	गौरी धनंजय गोवर्धने	F.Y.BA		9923250849	70459719986
२५)	लक्ष्मी निवृत्ती ठोके	F.Y.BA		9373715948	891065761175
२६)	अपार्ण मल्लिकार्जुन	F.Y.BA		9972001562	531143105508
२७)	आनिका जेपट शिंगोळे	12.Com		9225158083	723716499406
२८)	अदिती रामचंद्र नवले	12.Com		7666847609	813978726691
२९)	निकिता दत्तात्रय दानवराव	F.Y.BA		9881330400	219426506817
३०)	वायसी लक्ष्मी धार	F.Y.BA		9881863989	59299197354
३१)	मेधा पंढरीनाथ भांबकर	F.Y.BA		9146934479	259999940589

सर्व जनदार नोंदणी अभियान - 2024-25



क्र.सं.	विद्यार्थ्याचे संपूर्ण नाव	class	mobile No.	Adhar No.	Sing
327	वेळारी संतोष लहाने	F.Y.B.Com	9322106938	201210979520	सिंग
337	मोहिनी गणपत लहाने	F.Y.B.Com	9699573472	817316204326	सिंग
347	सरिता रमेश भातिंगे	11.	8007131210	8007131210	सिंग
357	रोमा विजय भातिंगे	11.	7387413579	7387413579	सिंग
367	मोहुर पायल दत्तात्रय	T.Y.B.Com	8261023892	24052465960	सिंग
377	आजोळे पूनम सुभाष	F.Y.B.Com	7775870372	4220437744	सिंग
387	हाळभगत हिना ठाकूर	F.Y.B.Com	9529683179	5251464879	सिंग
397	आजोळे मोनिका भाऊदास	F.Y.B.Com	8767083335	92048325669	सिंग
407	जलप्री लक्ष्मण भगत	11th	8454849741		सिंग
417	शेखरी आत्माराम भोर	S.Y.BCS	9307491801	7678529299	सिंग
427	किसन भूषु खोते	12th Com.	9226658714	38114716617	सिंग
437	गणपत सोमनाथ लोते	12th Arts	9834259640	921853029006	सिंग
447	सिद्धेश संतोष रायकर	F.Y.BA.	9158684131	2464643742	सिंग
457	कुसुम शरद गुंताळ	F.Y.BA.	8488927455	62513824550	सिंग
467	दिवा भाग्यलक्ष्मी गिरे	F.Y.BA.	9529562429	8757000892	सिंग
477	अश्विनी भाऊसाहेब सुकुडे	F.Y.BCS	9377724972	2418657587	सिंग
487	दर्शन भाद्रींग लहाने	12th Arts	8329298102	74681094663	सिंग
497	तन्वी अशोक चव्हाण	T.Y.B.Com	7030743618	46926389112	सिंग
507	पायल दत्तात्रय मोहुर	T.Y.B.Com	8261023892	24052465960	सिंग



Maratha Vidya Prasarak Samaj's Nashik
K.P.G Arts, Commerce & Science College, Igatpuri.
Department of Computer Science



Report on Computer & Printer Installation, Repair, and Practical Demonstration

1. Introduction

The Department of Computer Science organized a **Practical Demonstration on Computer and Printer Installation and Repair** with the objective of strengthening the students' technical knowledge and practical skills. The event was designed to provide students with real-time exposure to essential hardware components and their operational procedures, along with fault detection and resolution techniques.

2. Objectives

- To familiarize students with the assembly and configuration of computer systems.
- To demonstrate the setup, installation, and troubleshooting of printers.
- To provide hands-on experience in diagnosing and repairing hardware faults.
- To encourage skill-based learning and technical confidence among students.

3. Event Overview

The demonstration was divided into two main segments:

A. Computer Installation and Repair

- Identification of key hardware components (CPU, RAM, motherboard, SMPS, hard drive, etc.).
- Step-by-step guide to assembling a desktop computer.
- BIOS settings, OS installation (Windows/Linux), and driver setup.
- Troubleshooting issues like power failure, display error, faulty RAM, and system overheating.
- Maintenance tips and preventive practices.

B. Printer Installation and Repair

- Introduction to various types of printers: Inkjet, Laser, and Dot Matrix.
- Physical setup and configuration of printers.
- Installing printer drivers and network printing setup.
- Troubleshooting common issues: paper jams, connectivity errors, ink/toner replacement, alignment problems.

- Cleaning and maintenance of printer hardware.
-

4. Resource Persons

The sessions were conducted by **Mr. Girish Chavan**, a skilled technician and hardware expert, along with the support team from the Computer Science Lab. Their practical insights and demonstration techniques helped in delivering a clear understanding of the concepts.

5. Student Participation

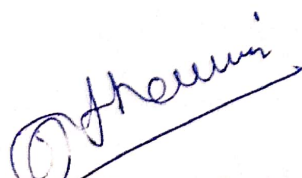
More than **40** students from BA, BCOM, BSc CS participated in the demonstration. Students took part actively in the hands-on tasks and question-answer sessions.

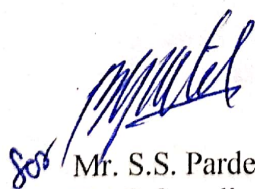
6. Learning Outcomes

- Improved technical knowledge of computer and printer hardware.
 - Practical experience in handling installation and repair tools.
 - Ability to troubleshoot and fix basic hardware problems independently.
 - Awareness of maintenance practices to extend the life of hardware devices.
-

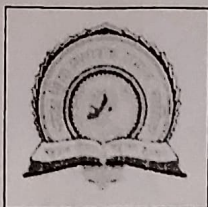
7. Conclusion

The **Practical Demonstration on Computer and Printer Installation & Repair** was a valuable learning opportunity for students. It successfully met its objectives and received positive feedback from both students and faculty. The department plans to organize more technical workshops in the future to promote experiential learning.

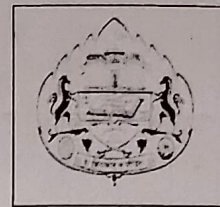

Adv. C.D. Chaudhari
Course Coordinator


Mr. S.S. Pardeshi
IQAC Coordinator


Dr. Kiran Rakibe
Principal



Maratha Vidya Prasarak Samaj's Nashik
K.P.G Arts, Commerce & Science College, Igatpuri.
Soil & Water Analysis 2024-25



Department : Department of Chemistry
Programme : Soil & Water Analysis
Location : Take Ghoti & K.P.G. College, Igatpuri
Organizer : Department of Chemistry
Date : 10.01.2025
Beneficiary : Total students: 30
Total Teachers: 20
Total farmers: 31
Total: 81

Dr. Dnyaneshwar Sanap
Coordinator

Mr. S. S. Pardeshi
Hod Chemistry
Department of Chemistry
K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.

Mr. S. S. Pardeshi
IQAC Coordinator
K.P.G. Arts, Com. & Sci. College,
Igatpuri, Dist. Nashik.

Dr. Kiran Rakibe
Principal

K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik



Collection of water sample from farmers



Collection of Soil sample by student



Soil and water analysis team with Farmers and HoD Chemistry

Dr. Dnyaneshwar Sanap
 Coordinator

Mr. S. S. Pardeshi
 Hod Chemistry

Department of Chemistry
 K.P.G. Arts, Com. & Sci. College
 Igatpuri, Dist. Nashik.

Mr. S. S. Pardashi
 IQAC Coordinator

K.P.G. Arts, Com. & Sci. College,
 Igatpuri, Dist. Nashik.

Dr. Kiran Rakibe
 Principal

K.P.G. Arts, Com. & Sci. College
 Igatpuri, Dist. Nashik



Maratha Vidya Prasarak Samaj
K.P.G. Arts, Commerce and Science College Igatpuri
Affiliated to Savitribai Phule Pune University, Pune
NAAC reaccredited 'B' Grade (CGPA: 2.52) ID NO. PU/NS/ASC/023/1982

Soil & Water Testing Report 2024-25

As a part of community services, the Department of Chemistry started "Soil and Water Testing" keeping the view of the farmers on problems regarding quality and productivity. The laboratory was set up in September 2018. The main crop in Igatpuri Tehsil is rice. So, it becomes prime importance to examine the quality of soil and water, which would help in increasing crop productivity and quality. The laboratory was set up on a vision "No Profit" basis. Therefore, the soil and water testing are done free of cost.

In this laboratory following parameters of soil and water were checked.

SN	Water Parameters Studied	Soil Parameters Studied
1	TDS	Bulk Density
2	pH	Specific Gravity
3	Electrical Conductivity	Acidity
4	Acidity	Alkalinity
5	Alkalinity	TDS (Total Dissolve Salt)
6	Oxidizable Substance	Total Soluble Salt %
7	Chloride	Electrical Conductivity
8	Sulphate	--
9	Calcium	--
10	Ammonium	--
11	Nitrate	--
12	Magnesium	--
13	Residue on evaporation	--

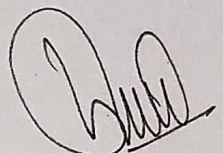
The parameters are checked by volumetric analysis and instruments such as the furnace, pH meter, Conductivity meter, Colorimeter, etc.

The department created awareness through local newspapers to submit samples of soil and water. A total of 15 samples of Water and 16 samples of Soil have been collected and analysed.

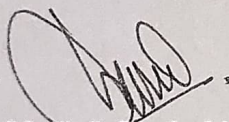
Mr. S. S. Pardeshi, Head Department of Chemistry, Dr. Dnyaneshwar Sanap, Coordinator, Mr. R. P. Bharsat, Expertise monitored and verified the testing report of soil and water analysis. The feedback and suggestions are also noted down by each beneficiary during the submission of the report.



Dr. Dnyaneshwar Sanap
Coordinator

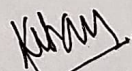


Mr. S. S. Pardeshi
HOD
Department of Chemistry
K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.



Mr. S. S. Pardashi
IQAC Coordinator

K.P.G. Arts Com and Sci. College,
Igatpuri, Dist. Nashik.



Dr. Kiran Rakibe
Principal

M.V.P. Sanap's
K.P.G. Arts, Com. and Sci. College
Igatpuri, Dist. Nashik

Enclose:

1. Detail of Soil Sample Collection
2. Detail of Water Sample Collection
3. List of Students involved in the analysis
4. List of Students involved in the activity
5. List of Faculty Members involved in the activity



Maratha Vidya Prasarak Samaj's Nashik
K.P.G Arts, Commerce & Science College, Igatpuri.
Cleanliness Program Report



Department : **Chemistry**

Programme : **Chemiad Competition**

Location : **K.P.G. College, Igatpuri**

Organizer : **Chemistry Department**

Collbration: : **Department of Chemistry, SPPU,**
Pune

Date : **25 Feb 2024**

Beneficiary : **Total: 55**

For
Ms.A.B. Dhongade
Coordinator

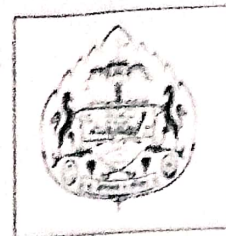
[Signature]
Mr.S.S. Pardeshi
HOD Chemistry
Department of Chemistry
K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.

[Signature]
Mr.S.S. Pardeshi
IQAC Coordinator
Co-ordinator
IQAC
K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.

[Signature]
Dr. Kiran Rakibe
Principal
PRINCIPAL
M.V.P Samaj's
K.P.G.Arts,Com and Sci.College
Igatpuri,Dist-Nashik-422403



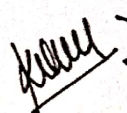
Maratha Vidya Prasarak Samaj's Nashik
K.P.G Arts, Commerce & Science College, Igatpuri.
Cleanliness Program Report



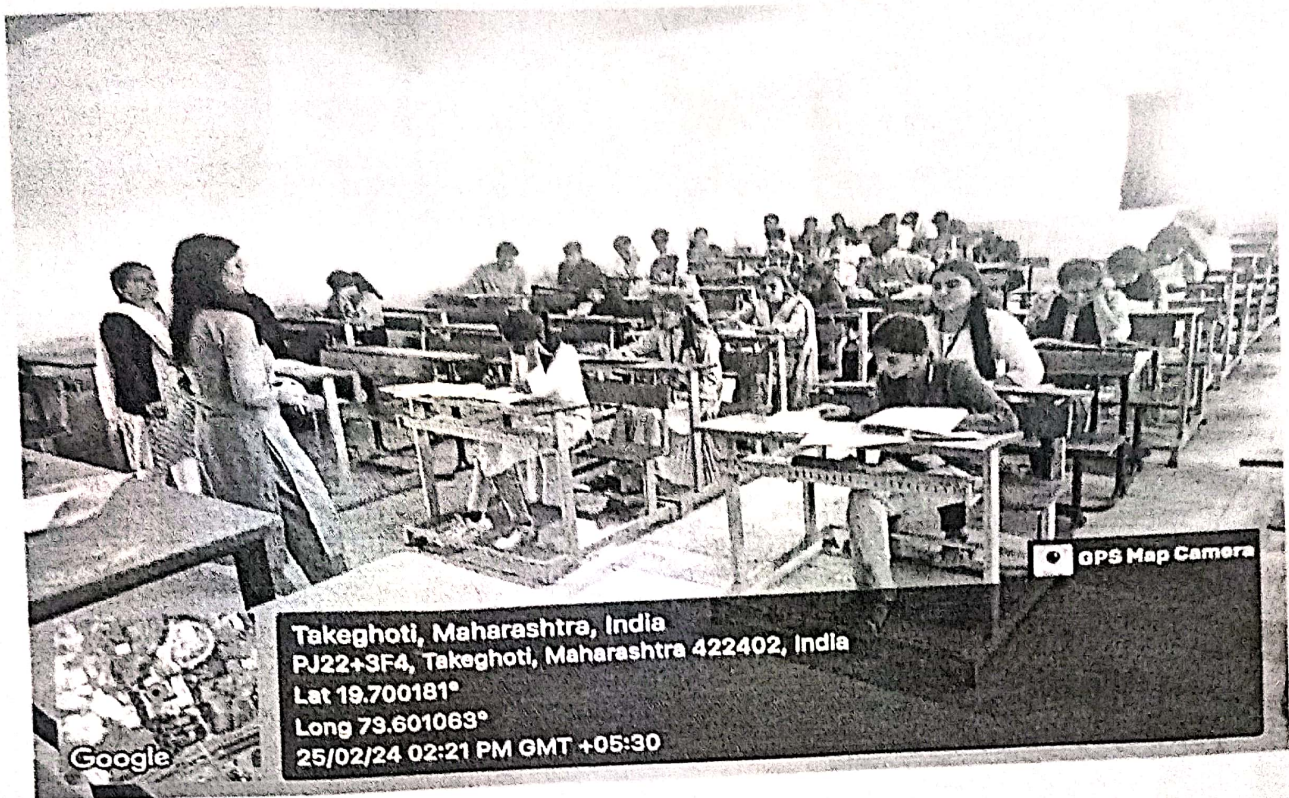
Chemiad Competition Report
2023-24

Department of Chemistry

In the academic year 2023-24 in our college jointly organized the Chemiad exam In collaboration with the Chemistry department of SPPU and Department of Chemistry. On the 25th Feb 2024 Chemiad competition held in the college according to the guidelines of SPPU, Chemistry department. For these competition total 55 students was enroll. CHEMIAD exam results as a factor in their hiring decisions, especially for positions that require a strong foundation in chemistry. Demonstrating proficiency in the subject through a successful performance on the exam could make candidates more competitive in the job market participated in the competition. Examination were done in the presence of Principal Dr. Kiran Rakibe Head of the deparatment Mr. S. S. Pardeshi, Smt. A.B.Dhongade and external coming from the SPPU, Pune.


Principal
MVP Samaj's
K.P.G.Arts,Com and Sci.College
Igatpur,Dist-Nashik-422403

Pic capture during Examination



Pic capture After Examination



CHEMIAD COMPETITION 2024, Date Sunday the 25th Feb 2024, Time 2 to 4 pm



CHEMIAD - 2024

NAME OF THE COLLEGE:	K.P.G. Arts Science & commerce College Igatpuri			CN-214
COMPLETE POSTAL ADDRESS:	K.P.G. Arts Science & commerce College Igatpuri, near take ghto, Tal- Igatpuri, Dist- Nashik 422403			
TEACHER INCHARGE - 1	FULL NAME: PARDESHI SHAKTISING SANJAYSING		EMAIL: Pardeshi9999@gmail.com	MOB: +91 98608 38457
TEACHER INCHARGE - 2	FULL NAME: ARCHANA BHAGWAN DHONGADE		EMAIL: archanadhongde16@gmail.com	MOB: 7887538395
TOTAL STUDENTS REGISTERED-55	ENROLLED STUDENTS 55	PRESENT STUDENTS 35	ABSENT STUDENT 20	AUTHORITY SIGNATURES (TO BE SIGNED AT THE TIME OF EXAM)

CHEMIAD COMPETITION 2024, Date Sunday the 25th Feb 2024, Time 2 to 4 pm

LIST OF PARTICIPANTS

SR NO	NAME OF THE STUDENT (USE CAPITAL LETTERS ONLY)	MOBILE NO	ROLL NO	OMR NO	SIGNATURE
1	ADINATH NAVNATH KHARATE	9284148302	214001	1569	A.N. V. Kharate
2	SACHIN KUNDALI SHIRSATH	9511879214	214002	1	
3	MAHEK SAYYAD GULAB	8830216234	214003	1545	Gulab
4	MADHURI JAYPRAKASH ZOLE	8080741485	214004	1546	
5	SAKSHI DNYANESHWAR BHOR	9209510967	214005		
6	PATEL FAIZAN MUDASSAR	9067414739	214006	1547	Faizan
7	GITANJALI SHRIPAD BHAGWAT	7498886968	214007		
8	DARSHAN KUNDLIK BHAGADE	9322551824	214008	1548	Darshan
9	DINKAR SURESH HAMBIR	8788240682	214009	1548	Dinkar
10	SIMRA ZAHID KHAN	9766334109	214010	1550	Simra
11	YASH SANJAY PARDESHI	9011538209	214011	1551	Yash

CHEMIAD COMPETITION 2024, Date Sunday the 25th Feb 2024, Time 2 to 4 pm

12	VAISHNAVI SURESH PANDE	9021992422	214012	1552	Vaishnavi
13	ANURADHA VISHWANATH GANGAD	8767443979	214013	1553	Anuradha
14	KARTIK PRALHAD SABLE	8262924115	214014	1554	Kartik
15	OMKAR JAGAN GATIR	9637133767	214015	1555	Omkar
16	BHOSALE RUSHIKESH UTTAM	9881974146	214016	1556	Bhosale
17	DAKE ADITI TRYAMBAK	8796329887	214017		
18	PRATHAMESH NIVRITTI KADU	8830478847	214018		
19	KULDEEP BHAUNATH KAFU	9322932313	214019		
20	GAURAV DATTATRAY KADU	7887307846	214020		
21	OMKAR JAGANNATH BHOPE	9373361557	214021		
22	KHALIFA SAMREEN AKHLAQUE	9209257614	214022	1549	Samreen
23	YASHWANT BHAGWAN RERE	7498897574	214023		
24	NUTAN SHANTARAM BHOR	8796871428	214024	1575	Nutan
25	NISHA KALU CHAURE	8263905240	214025	1567	Nisha

CHEMIAD COMPETITION 2024, Date Sunday the 25th Feb 2024, Time 2 to 4 pm

26	ROHAN NANDU JADHAV	7498791299	214026	1559	<i>[Signature]</i>
27	ANOL DAULAT DAHALE	9322060226	214027		
28	YASH SANJAY RATHOD	7498370877	214028		
29	OMKAR BHIMRAJ JADHAV	8767682526	214029		
30	MANALI KRUSHNA JADHAV	8767835602	214030		
31	OMKAR SATISH PAWAR	9028106787	214031	1563	<i>[Signature]</i>
32	KALYANI DNYANESHWAR KALE	9011443476	214032	1564	<i>[Signature]</i>
33	PREM SANTOSH MANE	9975963746	214033		
34	GOKUL DNYANESHWAR KALE	8329586575	214034		
35	DIVYA VIJAY KADU	7385351046	214035	1565	<i>[Signature]</i>
36	SAKSHI BHASKAR SHELKE	8767619030	214036	1572	<i>[Signature]</i>
37	DIPALI MANOHAR DAMALE	8010092547	214037	1558	<i>[Signature]</i>
38	SANIYA BALU ADOLE	7057390097	214038	1566	<i>[Signature]</i>
39	ROHAN ARUN KARPE	8459807074	214039		

CHEMIAD COMPETITION 2024, Date Sunday the 25th Feb 2024, Time 2 to 4 pm

40	MINISHA KISAN UMBARE	7391018617	214040	1578	<i>Umbare</i>
41	SANIYA MITIN UBALE	8149524147	214041	1573	<i>Udale</i>
42	SAKSHI JAGANNATH BARHE	8805764345	214042	1551	<i>Barhe</i>
43	SHRAVAN PRAMOD GAIKWAD	8766832581	214043	1519	<i>GaiKWAD</i>
44	KAJAL DAMU SHINDE	9529585655	214044	1562	<i>Shinde</i>
45	SAONALI SURESH GOVARDHANE	9673583689	214045	1561	<i>Sonli</i>
46	AKSHAY VASANT UGALE	9529420261	214046		
47	PUSHKARAJ JAGDISH INDORIYA	7499531415	214047		
48	KARISHMA SHIVNATH DAWKHAR	7666392539	214048	1577	<i>Dawkhare</i>
49	ARUN PANDURANG CHIMATE	9309976558	214049	1560	<i>Chimate</i>
50	YASHWANT BHAGWAN RERE	7498897574	214050		
51	SHITAL SITARAM SHETE.		214051		
52	TEJASWINI RAVINDRA CHANDRAMORE	8411926619	214052	1571	<i>Chandramore</i>
53	DIPALI PRALHAD SABLE	7350333729	214053		

CHEMIAD COMPETITION 2024, Date Sunday the 25th Feb 2024, Time 2 to 4 pm

54	SAKSHI HIRAMAN PARADE	9766528667	214054	1574	<i>Parade</i>
55	ARATI DATTU KOKANE	7888271192	214055	1576	<i>Kokane</i>

For
Ms.A.B. Dhongade
Coordinator

[Signature]
Mr.S.S. Pardeshi
HOD Chemistry
Department of Chemistry
K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.

[Signature]
Mr.S.S. Pardeshi
IQAC Coordinator
Co-ordinator
IQAC
K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.

[Signature]
Dr. Kiran Rakibe
Principal
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K.P.G.Arts,Com and Sci.College
Igatpuri,Dist-Nashik-422403



Maratha Vidya Prasarak Samaj's Nashik
K. P. G Arts, Commerce & Science College, Igatpuri
Best Practice

**Title: The study and Guidance about Digital
Economic Literacy**

Objective:

1. To educate individuals and businesses about the risks and consequences of digital financial fraud
2. To provide knowledge and skills to prevent and detect digital financial fraud
3. To promote a culture of security and responsibility in digital financial transactions

Context:

Digital financial fraud is a growing concern worldwide, with increasing incidents of phishing, identity theft, and online scams. The rise of digital banking and online transactions has created new opportunities for fraudsters to exploit vulnerabilities. Individuals and businesses need to be aware of the risks and take proactive measures to protect themselves

The Practice:

- The awareness program was conducted through a series of workshops, seminars, and online webinars
- Expert speakers and trainers provided interactive sessions on digital financial fraud prevention and detection
- Participants were provided with educational materials, including brochures, posters, and info graphics
- A dedicated website and social media channels were created to provide updates, tips, and resources on digital financial fraud prevention



Evidence of Success:

- Over 1,000 individuals and businesses participated in the awareness program
- 90% of participants reported an increase in their knowledge and awareness of digital financial fraud
- 80% of participants reported taking proactive measures to protect themselves from digital financial fraud, such as using strong passwords and being cautious of phishing emails
- A 20% reduction in reported incidents of digital financial fraud was observed in the six months following the awareness program

Key Outcomes:

- Increased awareness and knowledge of digital financial fraud among individuals and businesses
- Improved prevention and detection of digital financial fraud
- Reduced incidents of digital financial fraud
- Promoted a culture of security and responsibility in digital financial transactions

Dr. B. C. Patil

Head
HEAD

Department of Economics
Karamveer Punjababa Goverdhane
Arts, Commerce & Science College
Igatpuri, Dist. Nashik-422 403

Mr. S. S. Pardeshi

IQAC
Co-ordinator
IQAC

K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.

Dr. Kiran Rakibe

Principal
PRINCIPAL

M. V. P. Samaj's
K. P. G. Arts, Comm. and Sci. College
Igatpuri, Dist. Nashik





MARATHA VIDYA PRASARAK SAMAJ'S
K.P.G. ARTS, COMMERCE & SCIENCE COLLEGE, IGATPURI
TAL. IGATPURI, DIST. NASHIK - 422403



Affiliated to Savitribai Phule Pune University, Pune

DEPARTMENT OF ECONOMICS

दि. ०८/०१/२०२५

नोटीस

अर्थशास्त्र विभाग मार्फत दि. १०/०१/२०२५ रोजी टाके घोटी (इगतपुरी)

गावात डिजिटलआर्थिक साक्षरता याविषयासंबंधी अभ्यास व मार्गदर्शन करण्यासाठी
T.Y.BA, MA Economics या वर्गातील सर्वविद्यार्थ्यांनी उपस्थित राहणे अनिवार्य आहे.

या साठी दिनांक 9 जानेवारी 2025 रोजी सकाळी १० वा . सर्व विद्यार्थ्यांनी
बैठकीसाठी रूम न. K-11मध्ये उपस्थित राहावे . या बैठकीत सविस्तर माहिती दिली जाईल.

विभाग प्रमुख

प्रचारार्थ

मराठा विद्या प्रसारक समजाचे
कर्मवीर एंगलूभाय कदमने
कला, वाणिज्य व शास्त्र विद्यालय
टाके घोटीजवळ, मुयस आग्रा रोड,
इगतपुरी-४२२४०३, जि. नाशिक



Maratha Vidya Prasarak Samaj's Nashik
K. P. G Arts, Commerce & Science College, Igatpuri



**Name of the Report: The Study and Guidance about
Digital Economic Literacy**

Department : ECONOMICS

**Programe : The Study and Guidance about Digital Economic
Literacy**

Organizer : DEPARTMENT OF ECONOMICS

Date : 10/01/2025

Beneficiaries : 100

**Head
HEAD**

**Department of Economics
Karamveer Punjababa Goverdhane
Arts, Commerce & Science College
Igatpuri, Dist. Nashik-422 403**

**IQAC
Co-ordinator
IQAC**

**K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.**

**Principal
PRINCIPAL**

**M.V.P. Samaj's
K.P.G. Arts, Com. and Sci. College
Igatpuri, Dist. Nashik**



Brief Report

Digital Literacy Programs organized by the department of Economics awareness and study sessions to improve basic economic literacy skills, online safety, and using online resources. Advocate for improved internet infrastructure and affordable internet plans in Take-Take-Ghoti. Establish community centers with access to computers and internet, and trained volunteers to assist residents. Conduct awareness campaigns on online safety, cyber threats, and responsible online behavior. Partner with local schools, NGOs, and government agencies to implement digital literacy programs. Increase the sample size for more statistically significant results. Include qualitative questions to gather more in-depth insights into residents' experiences and challenges. Conduct periodic surveys to track progress and identify emerging digital literacy needs. Use data analysis to inform and target specific interventions to address identified needs. This report provides a starting point for understanding the digital literacy landscape in Take-Ghoti. By implementing the recommended actions, the community can strive to bridge the digital divide and empower residents with the necessary skills to thrive in the digital age.

This report outlines the findings of a digital economic literacy survey conducted in Take Take-Ghoti village, aiming to assess the digital financial inclusion and economic empowerment of its residents. The study reveals a mixed picture, with varying levels of digital literacy and significant potential for leveraging digital technologies to improve economic outcomes. While smart phone penetration is high, internet connectivity remains a challenge, particularly in remote areas. A majority of households have bank accounts, but usage for digital transactions is limited. Awareness of digital payment methods like UPI and mobile wallets is growing, but adoption is still low. Limited awareness and usage of digital financial products like loans, insurance, and investments. Minimum participation in online market places for buying or selling goods and services. Lack of basic digital skills hinders effective utilization of digital tools and services. Concerns about data privacy and security deter adoption of digital financial services. Expand internet connectivity and affordability in the village. Promote Digital Financial Literacy: Conduct awareness campaigns and training programs on digital payments, online banking, and financial products. Empower Women: Focus on empowering women through digital literacy programs and access to digital financial services.


Head
HEAD

Department of Economics
Ramveer Punjababa Goverdhane
Arts, Commerce & Science College
Igatpuri, Dist. Nashik-422 403


Co-ordinator
IQAC

K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik.


Principal
PRINCIPAL

M.V.P. Samaj's
K.P.G. Arts, Com. and Sci. College
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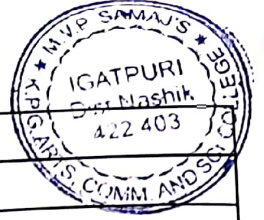
The Study and Guidance about Economic Literacy at Gram Panchayat Take-Ghoti

Department Of Economics

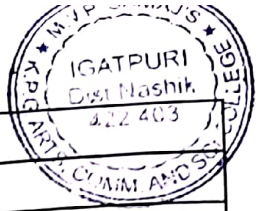
Participated Students and beneficiaries list

Date:10-01-2025

SN	Name of the student	Contact No.	SN	Name of The Benifighries
1	Kajal Govind Avhad	8010395698	1	Adole Suresh Ramkisan
			2	Adole Dnyandev Kondaji
			3	Dalbhat Kisan Dunda
2	Yamuna Nandu Date	8010330341	4	Barku punja adole
			5	Ravindra tulshiram lahane
			6	Krishna kalu adole
3	Sonawane Pratiksha Sanjay	8830979410	7	Sagar balu bhatate
			8	Sakshi Ramdas Adole
			9	Rajendra narayan pagare
4	Handore pranali murlidhar	8999367069	10	Dnyaneshvar manohar adole
			11	Lahanu ramchandra tokade
			12	Kalubai Mohan bhatate
5	Harshada Tukaram Dubhashe	9307955048	13	Rakhmabai Shankar Adole
			14	Gautam narayan pagare
			15	Bhikaji laxman tokade
6	Nitika Nivrutti Tangade	9021648038	16	Babae bhika dhalbhagt
			17	Harichandra gopinath layare
			18	Gorakh baburav lahane
7	Akshada Arjun bhor	8308581262	19	Hira ramkrushan lahane
			20	Santosh ramchandra
			21	Vishnu baban aadole
8	Diksha Ankush Arashende	9270468549	22	Sukhraj namdev tokade
			23	Anusaya raghunath lahne
			24	Kalabai Dinkar Donda
9	Shraddha Santosh mhasne	7219806425	25	Yashoda mohan adole
			26	Krushna balu adole
			27	Kalabai dhondu aagpile
			28	Babulal natthu lahane
10	Usha kalu Gavali	8830020397	29	Aarjun Namdev adole
			30	Bhagvan pandurang shingole
			31	Kisan shnkar adole
			32	Ramdas dadu tokde



11	Rutika Nivrutti Navale	8668982773	33	Baban ramchandra tokade
			34	Sanjanabai Suresh Tokade
			35	Bhika govind adole
12	Divya Gajanan Navale	9273671599	36	Bhaudas barku Adole
			37	Uttam kisan lahane
			38	Ravindra tulshiram lahane
13	Vaishali prabhakar potkule	7021023966	39	Pandurang Kacharu Adole
			40	Murlidar gunja adole
			41	Chandrakant kisan lahne
14	Nikita Ganesh Gatir	9022060844	42	Savitribai vitthal Adole
			43	Sanjay bhika adole
			44	Gurunath tukaram adole
15	Sonali pandit khatale	9322402029	45	Tanaji bhoru dalbhagat
			46	Bhaurav bandu adole
			47	Tanubai ganesh dalbhagat
16	Manvi dhanraj vispute	8080928124	48	Shankar lahuu adole
			49	Manohar chahanu Adole
			50	Gorakh valu Dalbhagat
17	Yash rajaram porhe	9307033791	51	Bhahagirat pundlik dalbhagat
			52	Hirabai pandurang shingole
			53	Popat balu adole
18	Payal shivaji gatkhal	7666403691	54	Shivam santosh tokde
			55	Sanjay ramchandra adole
			56	Shankar bala Adole
			57	Dasrath tulshiram lahane
19	Vaibhavi vijay khatale	9403932763	58	Nivruti murlidhar bhagat
			59	Dattatray valuu adole
			60	Jagan gopal bhagat
			61	Savitra baban adole
20	Bhumika Ajay Gade	8788460957	62	Dnayneswar tulshiram lahane
			63	Mukta suresh adole
			64	Kashinath valu adole
			65	Ashok pandurang gatkhal
21	Vaishnavi madhukar khatale	7822012268	66	Dnyaneshwar gurunath bhatate
			67	Balu tukaram gatkhal



			68	Sagar dnyaneshwar adole
			69	Vijay kisan khatale
22	Sakshi rajaram chaudhari	8149234246	70	Nivruti dattu bhagat
			71	Santosh harichandra adole
			72	Machindra bhaurao aadole
23	Ashwini valmik ahire	7447394006	73	Kailas pandurang bhagat
			74	Dashrath namdev adole
			75	Vanita valu bhor
24	Shreya jagdish kharche	8446668369	76	Kashinath yashvant chaudhari
			77	Ramdas arjun aadole
			78	Dharmraj rambhau aadole
25	Divya nagesh khatri	7776943744	79	Bhagwan fakira bhor
			80	Ravindra madhukar chaudhari
			81	Kamal vitthal bhor
			82	Dnyaneshwar Nivruti rakshe
26	Pooja Devram Gavhane	9623838419	83	Rangnath vitthal bhor
			84	Sudam harale
			85	Madhukar kisan khatale
			86	Pandit narayan khatale
			87	Somanath nivrutti aadole
27	Lina ravindra chaudhari	9226502369	88	Arjun kachru tokde
			89	Jalindar rambhau aadole
			90	Anusaya bhagvat aadole
			91	Sattapa Sambhaji Kamble
			92	Vishvas Mhalarrao Bhosale
28	Nisha gopal sonawane	8010723981	93	Savitire Bujaga Gaikwad
			94	Prakash Gundu Kamble
			95	Suvarna Sadashiv Sarambalkar
			96	Vishvas Mhalarrao Bhosale
29	Vaishnavi bhagwat ashtekar	9881198742	97	Savita Prakash Powar
			98	Uday Jiten Malik
			99	Reshma Anil Vanjole
			100	MUSALE AJAY BHAUSAHEB

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Department of Economics
Amveer Prasad Govardhane
K.P.G. Arts, Com. & Sci. College
Igatpuri, Dist. Nashik-422 403

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K.P.G. Arts, Com. & Sci. College
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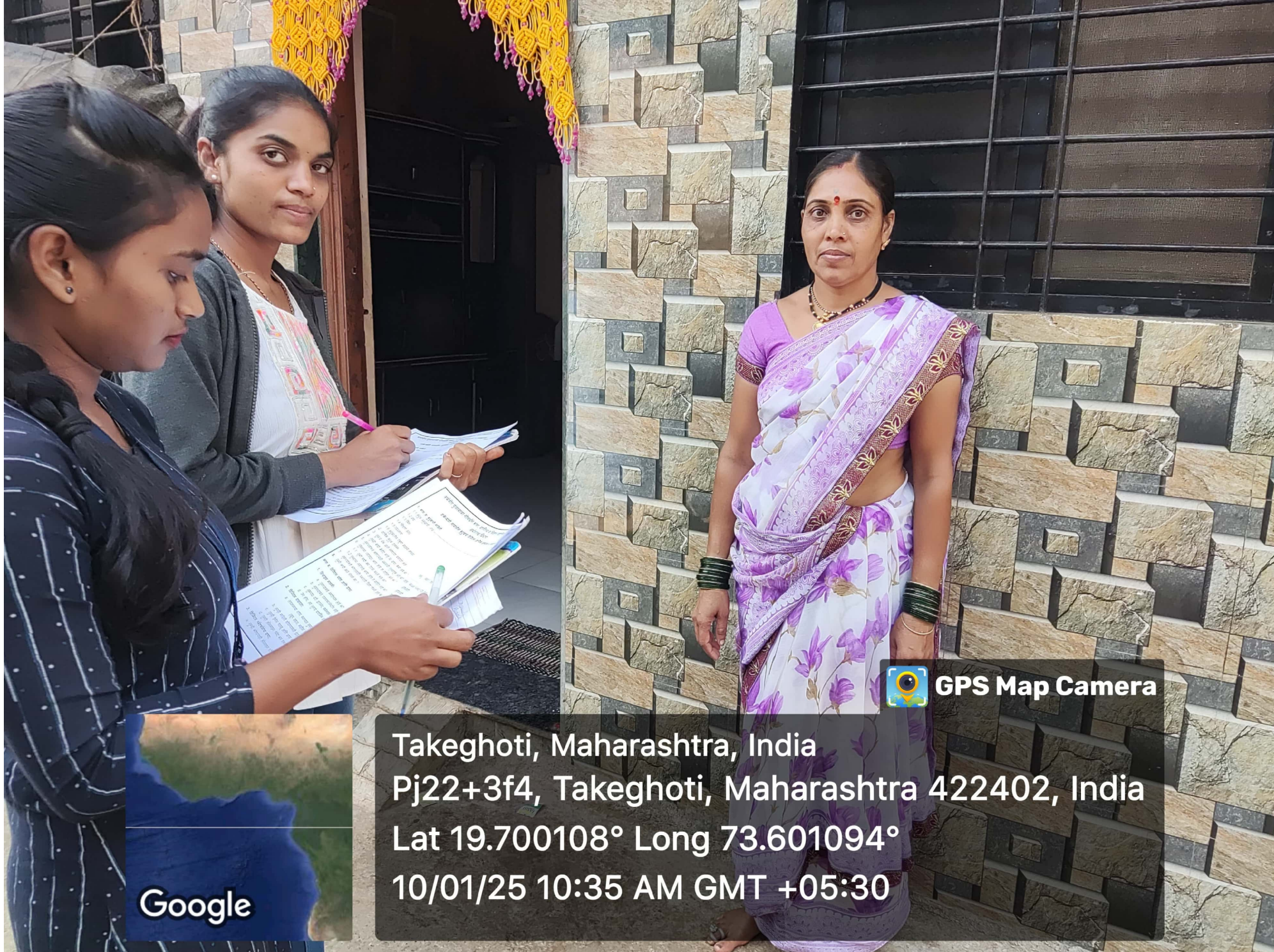
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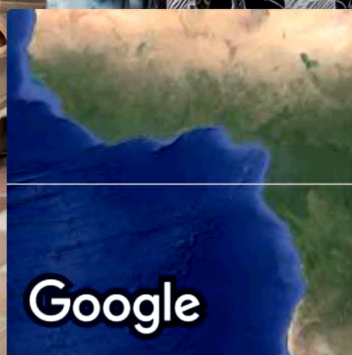
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