

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

Revised Syllabus For

B. A. Part-III & B. A. B. Ed.

Geography

(Evolution of Geographical Thought)

CBCS PATTERN

Syllabus to be implemented from

(Subject to the modifications to be made from time to time)

Syllabus to be implemented from June 2020 onwards

**B. A. Part – III & B. A. B. Ed. Geography
(Evolution of Geographical Thought)
Sem-V**

Syllabus to be implemented from June 2020 onwards

1. TITLE : Evolution of Geographical Thought

Optional under the Faculty of Science

2. YEAR OF IMPLEMENTATION :

Revised Syllabus will be implemented from June 2020 onwards.

3. PREAMBLE

This curriculum focuses on the understanding of core and fundamental branches of the discipline. This paper is specially designed to cater to foundation building of the students by imparting knowledge about the pillars of geography. It encompasses the evolution of the subject right from the experiences and understanding of travelers and explorers regarding space, place and people to the progression towards establishment of the discipline geography in sciences.

4. GENERAL OBJECTIVES OF THE COURSE

- 1) To study the historical evolution of geographic thought.
- 2) An analysis of different paradigms in geography.
- 3) To evaluating the contemporary trends in geographical studies.
- 4) To study the paradigms and debates in the geographical studies.
- 5) To study the recent trends in geography.

5. COURSE OUTCOMES

- 1) Student should be able to understand in-depth about the Evolution of Geographical Thought.
- 2) Students should be able to analyse the recent trends in geography.
- 3) Student should be able to make use of various models of paradigms and debates in the geographical studies.
- 4) Understanding of recent trends in geography.

6. DURATION

- The course shall be a full time course
- The duration of course shall be of one year (Sem. – V)

7. PATTERN

Pattern of Examination will be Semester

8. FEE STRUCTURE

(As per the Shivaji University rules; and as applicable to regular)

9. ELIGIBILITY FOR ADMISSION :

As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

10. MEDIUM OF INSTRUCTION :

The medium of instruction shall be in English or Marathi. (as applicable to the course /programme concerned.)

11. STRUCTURE OF COURSE 50 MARKS

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.)

SEMESTER FIFTH

Paper No.

Title Marks

DSE-E106 or VII, Evolution of Geographical Thought

50

12. SCHEME OF TEACHING AND EXAMINATION

[The scheme of teaching and examination should be given as applicable to the course/paper concerned.]

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	T	P	Total	Theory	Term Work	Total
1	Evolution of Geographical Thought	04	04	00	04	40	10	50

13. SCHEME OF EXAMINATION :

- The examination shall be conducted at the end of each semester
- The theory paper shall carry 40 marks
- The term work shall carry 10 marks
- The evaluation of the performance of the students in theory papers shall be on the basis of Semester Examination of 50 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

14. STANDARD OF PASSING:

As Prescribed under rules & regulation for each degree/ programme.

15. NATURE OF QUESTION PAPER AND SCHEME OF MARKING :

(Unit wise weightage of marks should also be mentioned)

Semester V	Marks
Question : 1) Objective Type Question (Multiple Choice)	05
Question: 2) Short Notes (Any three out of five)	15
Question: 3) Detailed Answer Type Question (Any two out of three)	20

16. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Sr. No.	Title of Old Paper	Old paper No.	Title of New paper	New Paper No.
1	Physical Geography of India	VII	Evolution of Geographical Thought	E106 or VII

17. SPECIAL INSTRUCTIONS, IF ANY.

**NEW/REVISED SYLLABUS FOR
B. A. Part-III and B. A. B. Ed. Geography
(Introduced from June 2020 onwards)
Semester - V**

(i) E106 or Paper No. VII

(ii) Title of Paper: Evolution of Geographical Thought

Module	Teaching Hours	Credit
Module – I Geography in Ancient Period	15	1
1.1 Contribution of Greeks and Romans		
1.2 Arab Geographical Thoughts		
1.3 Indian Geographical Thoughts		
1.4 Exploration and Development of Geography		
Module – II Schools of Geography	15	1
2.1 German School of Geography – Alexander von Humboldt		
2.2 French School of Geography – Vedal de la Blache		
2.3 American School of Geography – William Moris Davis		
2.4 British School of Geography – Halford J. Mackinder		
Module – III Dualisms in Geography	15	1
3.1 Determinism Vs Possibilism		
3.2 Systematic Vs Regional geography		
3.3 Physical Vs Human geography		
3.4 Historical Vs Contemporary		
Module – IV Trends in Geography	15	1
4.1 Quantitative Revolution		
4.2 Model Building in Geography		

4.3 Man-nature relationship: Radicalism, Behaviourism and Humanism

4.4 Future of Geography

Books Recommended :

Adhkari, S. (2006) *Fundamentals of Geographical Thought*, Chaitanya Publishing House, Allahabad.

Bunkse, V.E. (2004) *Geography and the art of Life*, John Hopkins University Press, Baltimore,

Dikshit, R. D. (1997). *Geographical Thought: A Contextual History of Ideas*. Delhi, India: Prentice– Hall India.

Dixit, R.D. (2001) *Geographical Thought : A critical History of ideas*, Prentice Hall of India, New Delhi

Dixit, R.D. (2001) *भौगोलिक चिंतन*, Prentice Hall of India, New Delhi

Gaile, G. and Wilmot, C. (ed) (2003) *Geography in America at the Dawn of the 21st Century*, Oxford University Press, Oxford & New York.

Harvey, David., (1969): *Explanation in Geography*, London: Arnold.

Hubbard, P. et al (2002) *Thinking Geographically : Space, Theory and Contemporary Human Geography*, Continuum, London

Johnston, R.J. (1988) *The Future of Geography*, Methuen, London,

Johnston, R.J. and Claval, P. (1984) *Geography since the Second World War : An International survey*, Crown Haim, Sydney.

Majid Husain (2007): *Evolution of Geographic Thought* Rawat Publication, Jaipur

Marcus, D. (1999) *Post – Structuralism in Geography, The Diabolical Arts of Spatial Sciences*, Edinburgh University Press, Edinburgh.

Martin Geoffrey J. (2005). *All Possible Worlds: A History of Geographical Ideas*, UK: Oxford.

Singh, R.B. (2016). *Progress in Indian Geography*. New Delhi, India: Indian National Science Academy.

Sudepta, A. (2015). *Fundamentals of Geographical Thought*. Delhi, India: Orient black swan private limited.

e-PG Pathshala: <https://epgp.inflibnet.ac.in/>

MOOCS - NPTEL: <https://nptel.ac.in/>

MOOCS - SWAYAM: <https://swayam.gov.in/>

National Digital Library of India: <https://ndl.iitkgp.ac.in/>

Shivaji University Library (E-Resources): <http://www.unishivaji.ac.in/library/E-Resources>

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

Revised Syllabus For

B. A. Part-III & B. A. B. Ed.

Geography
(Economic Geography)

CBCS PATTERN

Syllabus to be implemented from

(Subject to the modifications to be made from time to time)
Syllabus to be implemented from June 2020 onwards

B. A. Part – III & B. A. B. Ed.
Geography (Economic Geography)
Syllabus to be implemented from June 2020 onwards
Semester-VI

1. TITLE : Economic Geography

Optional under the Faculty of Science

2. YEAR OF IMPLEMENTATION :

Revised Syllabus will be implemented from June 2020 onwards.

3. PREAMBLE

[**Note :-** The Board of Studies should briefly mention foundation, core and applied components of the course/paper. The student should get into the prime objectives and expected level of study with required outcome in terms of basic and advance knowledge at examination level.]

4. GENERAL OBJECTIVES OF THE COURSE

- 6) To study the basics of economic geography.
- 7) To study the locational factors of economic activities with special reference to agriculture and industry.
- 8) To study the basics concepts related to manufacturing and major manufacturing industries of selected countries of the world.
- 9) To study the transport and trade.

5. COURSE OUTCOMES

- 5) In depth understanding about the economic geography.
- 6) Detailed knowledge about locational factors of economic activities with special reference to agriculture and industry.
- 7) Detailed understanding of the basics concepts related to manufacturing and major manufacturing industries (selected countries) of the world.
- 8) Understanding of the transport and trade.

6. DURATION

- The course shall be a full time course
- The duration of course shall be of one year (Sem. – VI)

7. PATTERN

Pattern of Examination will be Semester

8. FEE STRUCTURE

(As per the Shivaji University rules; and as applicable to regular)

9. ELIGIBILITY FOR ADMISSION :

As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

10. MEDIUM OF INSTRUCTION :

The medium of instruction shall be in English or Marathi. (as applicable to the course /programme concerned.)

11. STRUCTURE OF COURSE 50 MARKS

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.)

SEMESTER SIX

Paper No.

DSE-E231 or X, Economic Geography

Title Marks

50

12. SCHEME OF TEACHING AND EXAMINATION

[The scheme of teaching and examination should be given as applicable to the course/paper concerned.]

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	T	P	Total	Theory	Term Work	Total
1	Economic Geography	04	04	00	04	40	10	50

14. SCHEME OF EXAMINATION :

- The examination shall be conducted at the end of each semester
- The theory paper shall carry 40 marks
- The term work shall carry 10 marks
- The evaluation of the performance of the students in theory papers shall be on the basis of Semester Examination of 50 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

15. STANDARD OF PASSING:

As Prescribed under rules & regulation for each degree/ programme.

16. NATURE OF QUESTION PAPER AND SCHEME OF MARKING :

(Unit wise weightage of marks should also be mentioned)

Semester -VI	Marks
Question: 1) Objective Type Question (Multiple Choice)	05
Question: 2) Short Notes (Any three out of five)	15
Question: 3) Detailed Answer Type Question (Any two out of three)	20

17. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Sr. No.	Title of Old Paper	Old paper No.	Title of New paper	New Paper No.
1	Economic Geography of India	X	Economic Geography	DSE-E231 or X

18. SPECIAL INSTRUCTIONS, IF ANY.

**NEW/REVISED SYLLABUS FOR
B. A. Part-III and B. A. B. Ed. Geography
(Syllabus to be implemented from June 2020 onwards)
Semester - VI**

(iii) E231 or Paper No. X

(iv) Title of Paper: Economic Geography

Module	Teaching Hours	Credit
Module – I Introduction to Economic Geography	15	1
1.1 Definition, Nature and Scope		
1.2 Concept and Classification of Economic Activity		
1.3 Branches of Economic Geography		
1.4 Significance of Economic Geography		
Module – II Economic Activity	15	1
2.1 Factors Affecting on Location of Agricultural Activity		
2.2 Factors Affecting on Location of Industrial Activity		
2.3 Alfred Weber’s Theory of Industrial Location		
Module – III Manufacturing Activity	15	1
3.1 Concept of Manufacturing Region		
3.2 Concept of Special Economic Zone		
3.3 Major Industries: i) Cotton Textile Industry - USA		
ii) Iron and Steel Industry – USA		
iii) Sugar Industry – Brazil		
iv) Automobile Industry – India		
Module – IV Transport and Trade	15	1
4.1 Significance of Transportation		
4.2 Major Transport Routs: Roadway, Railway, Airway and Ocean Routs		

4.3 International Trade: India and USA

4.4 Trade Policies: India and USA

Books Recommended:

References

- Alexander J. W., (1963): Economic Geography, Prentice Hall Inc Englewood Cliffs, New Jersey.
- Boesch H. (1964) : A Geography of world Economy” D. Van Nostrand co. New York.
- Coe N. M., and others, (2007): Economic Geography: A Contemporary Introduction, Wiley-Blackwell.
- Combes P., Mayer T. and Thisse J. F., (2008) Economic Geography: The Intergration of Regions and Nations, Princeton University Press.
- Goh Chang & Morgan, G.C. (1997): Human and Economic Geography, Oxford University Press.
- H. Robinson (1978): Economic Geography, Macdonald & Evans.
- Hamilton, I (1992) : Resources and Industry, Oxford University Press New York.
- Hartshorn, T.N. and Alexander, J.W. (1994): Economic Geography, Prentice Hall, New Delhi.
- Hodder B. W. and Lee Roger, (1974): Economic Geography, Taylor and Francis.
- Meyer, B. S., Anderson, D. B. and Bohning, R. H. (1960): An Introduction to Plant Physiology, Von Nostrand Company, New York.
- Roborston D (2001) : Globalization and Environment E. Elgar CO.U.K.
- Sadhukhan S. K., (1990): Economic Geography An Appraisal of Resources, S. Chand and Company Ltd., New Delhi.
- Truman A. Hartshorn and John W. Alexander, (1988): Economic Geography, PHI Learning Private Limited, New Delhi.
- Walker, D. F., Collins, L. (Eds.), (1975): Locational Dynamics of Manufacturing Activity, John Wiley and Sons, New York.
- Wheeler J. O., (1995) : Economic Geography John Wiley, New York.
- White H.P. and Senior M.L. (1983) Transport Geography, Longman, London.
- Willington D. E., (2008): Economic Geography, Husband Press.
- Zimmermann, E. W., (1933): World's Resources and Industries, Harper and Row, New York.
- खतीब के. ए. — आर्थिक भूगोल, अजब प्रकाशन, कोल्हापूर
- धारपूरे विठ्ठल — आर्थिक भूगोल, पिंपळापुरे अँड कं, नागपूर
- सवदी, कोळेकर — आधुनिक भूगोल, निराली प्रकाशन, पुणे.
- सवदी कोळेकर (२००८) — भूगोलाची मुलतत्वे, खंड दुसरा, निराली प्रकाशन

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

Revised Syllabus For

B. A. Part-III & B. A. B. Ed.

Geography of India

CBCS PATTERN

(Subject to the modifications to be made from time to time)

Syllabus to be implemented from June 2020 onwards

**Accredited By NAAC
With 'A' Grade
New/Revised Syllabus For**

B. A. Part – III / B. A. B. Ed.

DSE (Discipline Specific Elective) – E107 (Paper No. VIII) Geography (Sem. V)
Syllabus to be implemented from June 2020 onwards

A] Ordinance and Regulations:-

(As applicable to degree/program)

B] Shivaji University, Kolhapur

New/Revised Syllabus for Bachelor of Arts and B. A. B. Ed.

1. TITLE: Subject – GEOGRAPHY OF INDIA

Optional/Compulsory/Additional/IDS under the Faculty of Science

2. YEAR OF IMPLEMENTATION: - New/Revised Syllabi will be implemented from June 2020 onwards.

3. PREAMBLE:-

The present course focuses on the studies of Geography of India should briefly mention foundation, core and applied components. The student should get into the prime objectives and expected level of study with required outcome in terms of basic and advance knowledge of physiography, climate, drainage, soils, vegetation, agriculture and industry etc.

4. GENERAL OBJECTIVES OF THE COURSE/ PAPER/:

(As applicable to the Degree /Subject- Paper concerned)

- 1) To acquaint the students with distinct dimensions of India and physical setup of the country.
- 2) To focus the climate of India and mechanism of monsoon of India.
- 3) To get information about soils and vegetations in India.
- 4) To help the students to understand recent trends in regional study.
- 5) To focus on the mineral, agricultural and industrial product of the country.
- 6) To understand the economic setup of the country.

4.1 COURSE OUTCOMES

- 1) In depth understanding the dimensions and physiography of India.
- 2) The students are fully aware about the climatic seasons in India.

- 3) Detailed knowledge about soils, vegetations, drainage systems in India.
- 4) Understanding an importance of agriculture and industry in Indian economy.
- 5) Detailed knowledge about the economic setup of the India.

5. DURATION

- **The course shall be a full time course.**
- **The duration of course shall be of Three years, as applicable to the respective degree.**

6. PATTERN:-

Pattern of Examination will be Semester.

7. FEE STRUCTURE :-

As per Government /University rules.

[Note: - In case of any New degree/Program started at university/college, the respective colleges/ Dept. should submit a separate proposal of fee structure to BOS office. (i. e. Tution Fee & Laboratory Fee, if any.)

8. ELIGIBILITY FOR ADMISSION:-

As per eligibility criteria prescribed for respective degree program and the merit in the qualifying examination (i.e. Entrance Examination), if any.

9. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English or Marathi. (as applicable to the course / programme concerned.)

10. STRUCTURE OF COURSE = 50 marks

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.)

SEMESTER FIFTH

Paper No.	Title Marks
E107 (DSE)/Paper No. VIII, Geography of India	50

11. SCHEME OF TEACHING:

The scheme of teaching and examination should be given as applicable to the course / paper concerned.

Sr. No.	Subject/Papers	Teaching Scheme Per Week				Examination Scheme (Marks)			
		L	T	P	Total	Theory	Practical	Term work	Total
1	Geography of India	04	04	-	04	40	-	10	50

12. SCHEME OF EXAMINATION:

- The examination shall be conducted at the end of each term for semester pattern.
- The Theory paper shall carry 40 marks and term work shall carry 10 marks (as applicable to the course).
- The evaluation of the performance of the students in theory papers shall be on the basis of Semester Examination of 40 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

13. STANDARD OF PASSING:

As per Prescribed rules and regulation for each degree / programme.

14. NATURE OF QUESTION PAPER AND SCHEME OF MARKING:

(Unit wise weightage of marks should also be mentioned)

Semester V	Marks
Question: 1) Objective Type Question (Multiple Choice)	05
Question: 2) Short Notes (Any three out of five)	15
Question: 3) Detailed Answer Type Question (Any two out of three)	20

15. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Sr. No.	Title of Old Paper	Old paper No.	Title of New paper	New Paper No.
1	Economic Geography	VIII	Geography of India	DSE-E 107 Or VIII

16. SPECIAL INSTRUCTIONS, IF ANY – Nil

**New/ Revised syllabus for
B. A. Part-III and B. A. B. Ed. (Semester -V)
(Syllabus to be implemented from June 2020 onwards)**

(i) Paper – E107 or VIII

(ii) Title of Paper - Geography of India.

(iii) Specific Objectives: -----

(iv) A brief note: - (On expected level of study from examination and assessment point of view) :- -----

Module	Lectures	Credit
Module -I) Physical Profile of India	20	1
1.1) Location (Absolute and Relative)		
1.2) Physiographic Divisions (Characteristics and Importance)		
1.3) Climate: Summer, Rainy and Winter Seasons in India (weather conditions and Characteristics)		
1.4) Major Drainage Systems: a) Northern River Systems (Sindhu, Ganga & Brahmaputra) b) Southern River Systems (Godavari, Krishna & Cauvery) (Characteristics and Importance)		
Module -II) Soils and Forests	14	1
2.1 Major soil types, characteristics and its distribution in India		
2.2 Soil degradation and soil conservation in India		
2.3 Major forest types: characteristics and their distribution		
2.4 Deforestation and conservation of forests in India		
Module -III) Mineral and Power Resources	13	1
3.1 Conventional Resources: Iron Ore and Manganese (Distribution, Production and Trade)		
3.2 Power Resources: Coal and Mineral Oil (Distribution, Production and Trade)		

3.2 Non Conventional Resources: Solar and Wind (Distribution, Production and Trade)

Module -IV) Agriculture and Industry

13

1

4.1 Importance of Agriculture in Indian Economy.

4.2 Major Crops: Rice and Sugarcane (Distribution, Production and Trade)

4.3 Importance of Industries in Indian Economy.

4.4 Industries: Location Factors, Sugar Industry, Iron and Steel Industry and Fertilizer Industry (Distribution, Production and Trade)

References:

1. Majid H., (2013): Geography of India, Tata Mcgraw Hill Education (India) Private Limited, New Delhi.
2. Khullar R. D. (2007): India- A Compressive Geography, Kalayani Publisher.
3. Tiwari, R.C. (2007) Geography of India. Prayag Pustak Bhawan, Allahabad.
4. Singh R. L., (1971): India: A Regional Geography, National Geographical Society of India.
5. Deshpande C. D., (1992): India: A Regional Interpretation, ICSSR, New Delhi.
6. Johnson, B. L. C., ed. (2001). Geographical Dictionary of India. Vision Books, New Delhi.
7. Mandal R. B. (ed.), (1990): Patterns of Regional Geography – An Intenational Perspective. Vol. 3 –
Indian Perspective.
9. Sdyasuk Galina and Sengupta P., (1967): Economic Regionalisation of India, Census of India
10. Sharma, T. C. 2003: India - Economic and Commercial Geography. Vikas Publ., New Delhi.
11. Singh, J., (2003),: India - A Comprehensive & Systematic Geography, Gyanodaya Prakashan, Gorakhpur.
12. Spate O. H. K. and Learmonth A. T. A., (1967): India and Pakistan: A General and Regional
Geography, Methuen.
13. Geography, Methuen.

14. Tirtha, R., (2002): Geography of India, Rawat Publs., Jaipur & New Delhi.
15. Pathak, C. R. (2003): Spatial Structure and Processes of Development in India. Regional Science
Assoc., Kolkata.
16. Sharma, T.C. (2013): Economic Geography of India. Rawat Publication, Jaipur.
17. Savadi, Kolekar: Bharatacha Samarag Bhugol, Nirali Prakashan, Pune.
18. Khatib K. A.,: Geography of India
19. Pawar C.T. & Others : Geography of India.
20. Soil and Water conservation manual Govt. of India.

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC
Revised Syllabus For
Bachelor of Arts Part III and B. A. B. Ed.

Geography
(Choice Based Credit System)
Semester-VI

Urban Geography
Or
Regional Planning and Sustainable Development

(Subject to the modifications to be made from time to time)
Implemented From June, 2020 onward

**B. A. Part – III & B. A. B. Ed.
Geography (Urban Geography), Semester-VI
Implemented From June, 2020 onward**

**A] Ordinance and Regulations:-
(As applicable to degree/programme)**

**B] Shivaji University, Kolhapur
Revised Syllabus For B. A. Part – III and B. A. B. Ed.**

1. TITLE: Subject – Urban Geography

2. FACULTY of SCIENCE:- Optional under the Faculty of Science

3. YEAR OF IMPLEMENTATION: - Revised Syllabus will be implemented from June 2020 onwards.

4. PREAMBLE:-

[**Note:** - The Board of Studies should briefly mention foundation, core and applied components of the course/paper. The student should get into the prime objectives and expected level of study with required outcome in terms of basic and advance knowledge at examination level.]

5. GENERAL OBJECTIVES OF THE COURSE:

- 1) To Study the basic of Urban Geography.
- 2) To Study the types of Urban Settlements, Site and Situations.
- 3) To get an ideas of relationship between human activities and urban development.
- 4) To make the students capable for handling the present problematic situation in Urban and rural areas.
- 5) To make students as a good urban planner and environmental conservator.

6. COURSE OUTCOMES:

- 1) The students were known the importance of urban settlements through urban geography.
- 2) The students understood the types of Urban Settlements, Site and Situations.
- 3) The students were familiar with an idea of relationship between human activities and urban development.
- 4) Detail understanding of students regarding present urban problems and students are capable to handling of present problematic situations in urban areas.
- 5) The students are developed as a good urban planner and environmental conservator.

6. DURATION

- The course shall be a full time course.
- The duration of course shall be of one semester.

7. PATTERN:-

Pattern of Examination will be Semester

8. FEE STRUCTURE:-

(as applicable to regular course determined by the university and other fee will be applicable as per University rules/norms)

9. ELIGIBILITY CRITERIA FOR ADMISSION:

As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

10. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English or Marathi. (as applicable to the course/programme concerned.)

11. STRUCTURE OF COURSE-

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.)

SEMESTER SIXTH

Paper No.

DSE-E232 or XI, Urban Geography

Title Marks

50

12. SCHEME OF TEACHING AND EXAMINATION:

[The scheme of teaching and examination should be given as applicable to the course/paper concerned.]

THIRD YEAR

Scheme of Teaching and Examination

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)				Examination Scheme Sr. (Marks)		
		L	T	P	Total	Theory	Term work	Total
1	Urban Geography	04	04	00	04	40	10	50

SCHEME OF EXAMINATION:

- The examination shall be conducted at the end of each semester
- The Theory paper shall carry 50 marks
- The term work shall carry 10 marks
- The evaluation of the performance of the students in theory papers shall be on the basis of semester Examination of 50 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

13. STANDARD OF PASSING:

As Prescribed under rules & regulation for each degree/programme.

14. NATURE OF QUESTION PAPER AND SCHEME OF MARKING:

(Unit wise weightage of marks should also be mentioned)

Semester VI	Marks
Question 1) Objective Type Question (Multiple Choice)	05
Question 2) Short Note Type Question (Any four out of six)	15
Question 3) Detail Answers Type Question (Any two out of three)	20

15. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Sr. No.	Title of Old Paper	Old paper No.	Title of New paper	New Paper No.
1	Urban Geography	XI	Urban Geography	DSE-E232 or XI

16. SPECIAL INSTRUCTIONS, IF ANY.

REVISED SYLLABUS FOR
(Choice Based Credit System)
B. A. Part-III and B. A. B. Ed, Geography
(Introduced from June 2020 onwards)

Semester – VI

(i) DSE- E232 or XI

(ii) Title of Paper: - Urban Geography

(iii) Specific Objectives:-

(iv) A brief note: - (On expected level of study from examination and assessment point of view):- -----

Modules	No. of Lectures
Credit	
Module-I: Introduction to Urban Geography	15
	01
1.1 Urban Geography: Meaning and Definitions	
1.2 Nature and Scope of Urban Geography	
1.3 Approaches of Urban Geography	
1.4 Significance of Urban Geography	
Module-II: Urbanization	15
	01
2.1 Site and Situation: Significance and Types	
2.2 Concept and Factors of Urbanization	
2.3 Patterns of Urbanization in developed and developing countries	
2.4 Functional classification of cities (Quantitative and Qualitative)	
Module-III: 3 Structure and Morphology of Urban Centers	15
	01
3.1 Structure and Morphology	
3.2 City Region and C.B.D.	
3.3 Rural-Urban Fringe	
3.4 Models of Town Morphology: The Concentric Zone Theory, the Sector Theory and the Multi-Nuclei Theory	

01

- 4.1 Urban Issues: problems of housing, slums, civic amenities (water and transport)
- 4.2 Concept of Garden City
- 4.3 Urban Planning in India
- 4.4 Case studies of Mumbai and Chandigarh with reference to Land use and Urban Issues

References

1. Tim Hall. (1998): Urban Geography, Routledge ,London.
 2. Verma L.N.: Urban Geography, Rawat Publications, Jaipur.
 3. Johnson J. H. (1967): Urban Geography, An Introductory Analysis.
 4. Bose A., : India's Urbanization 1974-2000, Tata McGraw Hill, New Delhi.
 5. Carter H. (1972): The study of urban Geography, Edward Arnold, London.
 6. Smailes A. E. : The Geography of Towns.
 7. Taylor and Pntnam : Geography of UrbanPlaces.
 8. Hudson F : SettlementGeogrpahy
- १दशपाइसी.डी.१९८३.शहरे—कॉन्सिडरप्रकाशन,पुणे
१०. स्वामी वदी,कोळेकर,२००५.आधुनिकभूगोलनिरालीप्रकाशन,पुणे. खतीबके. ए. २००७ : पुणे
- वसाहतीभूगोल, अजबप्रकाशन, कोल्हापूर
12. Mandal : Urban Geography

B. A. Part – III & B. A. B. Ed. Geography
Semester-VI
(Regional Planning and Sustainable Development)
Implemented From June, 2020 onward

A] **Ordinance and Regulations:-**
(As applicable to degree/programme)

B] **Shivaji University, Kolhapur**
Revised Syllabus For **B. A. Part – III and B. A. B. Ed.**

1. TITLE: Subject – Regional Planning and Sustainable Development

2. FACULTY of SCIENCE:- Optional under the Faculty of Science

3. YEAR OF IMPLEMENTATION: - Revised Syllabus will be implemented from June 2020 onwards.

4. PREAMBLE:-

Regional Planning is the need of time to everyone. Geography subject can lead to the development of human activities through regional planning. In the process of development of geography, the changing nature of subject will make aware to the students about the recent technologies used in geography. This will further help to improve the use of geographical techniques and methods in teaching, learning and research work through regional planning.

5. GENERAL OBJECTIVES OF THE COURSE:

- 1) To introduce the students with the importance of regional planning.
- 2) To understand the concepts of region, regionalization, regional planning & development.
- 3) To give basic information to the students about the region.
- 4) To get familiar with indicators of measurement of development.
- 5) To understand Perroux's Growth Pole Model & Growth Center Model in Indian context.
- 6) To develop skills for demarcation of region.
- 7) To aware the students regional planning with recent technology.

6. COURSE OUTCOMES:

- 6) The students were known the importance of regional planning.
- 7) The students understood the concepts of region, regionalization, regional planning & development and detailed knowledge of region.

- 8) The students were familiar with indicators of measurement of development.
- 9) Detail understanding of Perroux's Growth Pole Model & Growth Center Model in Indian context.
- 10) The students are develop skills for demarcation of region and aware the regional planning with recent technology.

6. DURATION

- **The course shall be a full time course.**
- **The duration of course shall be of one semester.**

7. PATTERN:-

Pattern of Examination will be Semester

8. FEE STRUCTURE:-

(as applicable to regular course determined by the university and other fee will be applicable as per University rules/norms)

9. ELIGIBILITY CRITERIA FOR ADMISSION:

As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

10. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English or Marathi. (as applicable to the course/programme concerned.)

11. STRUCTURE OF COURSE-

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.)

SEMESTER SIXTH

Paper No.	Title Marks
DSE-E232 or XI, Regional Planning and Sustainable Development	40

12. SCHEME OF TEACHING AND EXAMINATION:

[The scheme of teaching and examination should be given as applicable to the course/paper concerned.]

THIRD YEAR

Scheme of Teaching and Examination

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)				Examination Scheme Sr. (Marks)		
		L	T	P	Total	Theory	Term work	Total
1	Regional Planning and Sustainable Development	04	04	00	04	40	10	50

SCHEME OF EXAMINATION:

- The examination shall be conducted at the end of each semester
- The Theory paper shall carry 50 marks
- The term work shall carry 10 marks
- The evaluation of the performance of the students in theory papers shall be on the basis of semester Examination of 50 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

13. STANDARD OF PASSING:

As Prescribed under rules & regulation for each degree/programme.

14. NATURE OF QUESTION PAPER AND SCHEME OF MARKING:

(Unit wise weightage of marks should also be mentioned)

Semester VI	Marks
Question 1) Objective Type Question (Multiple Choice)	05
Question 2) Short Note Type Question (Any four out of six)	15
Question 3) Detail Answers Type Question (Any two out of three)	20

15. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Sr. No.	Title of Old Paper	Old paper No.	Title of New paper	New Paper No.
1	Urban Geography	XI	Regional Planning and Sustainable	DSE-E232 or XI

16. SPECIAL INSTRUCTIONS, IF ANY.

REVISED SYLLABUS FOR
(Choice Based Credit System)
B. A. Part-III and B. A. B. Ed, Geography
(Implemented From June, 2020 onward)

Semester – VI

(i) DSE- E232 or XI

(ii) Title of Paper: - Regional Planning and Sustainable Development

(iii) Specific Objectives:-

(iv) A brief note: - (On expected level of study from examination and assessment point of view):- -----

Modules	No. of Lectures	
Credit		
Module I: Region and Regionalization	(15)	1
1.1 Definition, Concept of Region and Regionalization		
1.2 Characteristics of Region		
1.3 Types of Region		
1.4 Demarcation of Region		
Module II: Regional Planning	(15)	1
2.1 Concept of Regional Planning		
2.2 Need for Regional Planning and Types of Regional Planning		
2.3 Choice of a Region for Planning		
2.4 Planning Regions of India		
Module III: Models for Regional Planning	(15)	1
3.1 Spread and Backwash Concept		
3.2 Walter Christaller's Central Place Theory		
3.3 Francois Perroux,s Growth Pole Model		
3.4 R. P. Misra's Growth Foci Concept		
Module IV: Sustainable Development	(15)	1
4.1 Concept of Sustainable Development and Underdevelopment		
4.2 Rostow's Growth Model- Stages of Development		
4.3 An Indicators of Measuring Development		
4.4 Human Development Index (HDI)		

18. Recommended Reading Material:

1. Alden, J. and Morgan, (1974): Regional Planning: A Comprehensive View, Leonard Hill Books, Beds.
2. Adrill, J. (1974): New Citizens Guide to Town and Country Planning, Charies knight and Company Ltd. London.
3. Chand, M. & Puri, V. (1983): Regional Planning in India, Allied Publishers Ltd., New Delhi.
4. Chandra, R.C. (2000): Regional Planning and Development, Kalyani Publishers, Ludhiana.
5. Cook. P. (1983): Theories of Planning and Spatial Development, Hutchinson & Company Ltd. London.
6. Diamond, D. (ed) (1982): Regional Disparities and Regional Policies, Pergamon Press, Oxford.
7. Dickinson R.E. (1964): City and Region: A Geographical Interpretation. Routledge and Keagan Paul.
8. Friedman, J. & Alonson W. (1964): Regional Development and Planning. MIT Press. Cambridge.
9. Galasson, John (1974): An Introduction to Regional Planning Hutchinson. Educational London.
10. Hilborot, J.G.M (1971): Regional Planning. Rotterdam University Press, Rotterdam.
11. Misra, R.P. Sundaram K.V. & Rao, V.L.S. Prakasa (1974): Regional Development Planning In India.
12. Misra, R.P. (1992): Regional Planning. Concept Publishing Company. New Delhi.
13. Reddi, K. V. (1988): Rural Development in India, Himalaya Pub, Mumbai.
14. Singh, R.L.(2008): Fundamentals of Human Geography, Sharada Pustak Bhawan, Allahabad.
15. Sundran, K.V. (1977): Urban and Regional Planning in India, Vikas Publishing, New Delhi.
16. Swawy, M.C.K., Bhaskara, R. Hegde, V.M. (eds.) (2008): Urban Planning and Development at Cross Roads, BC Books for Change, Bangalore.
17. Whynnes, Charles & Hammand (1979): Elements of Human Geography, George Aflen & Unwin, London.
Kothari, C. R. (1985): Research Methodology- Methods and Techniques, Wiley Eastern Limited, New Delhi
18. सवदी ए. बी. व कोळेकर पी. एस. (2008): भूगोलाची मूलतत्वे, खंड दुसरा, निराली प्रकाशन, पुणे

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

Revised Syllabus For

B. A. Part-III & B. A. B. Ed.

Population Geography

Or

Social Geography

CBCS PATTERN

Syllabus to be implemented from

(Subject to the modifications to be made from time to time)
Syllabus to be implemented from June 2020 onwards

B. A. Part – III and B. A. B. ED.
DSE (Discipline Specific Core Course) E108 Geography (Course / Paper No. IX)
June 2020 onwards
Semester - V

A) Ordinance and Regulations:

(As applicable to degree/program)

B) Shivaji University, Kolhapur

New/Revised Syllabus For **Bachelor of –Arts and B. A. B. Ed.**

1. TITLE: POPULATION GEOGRAPHY

Optional/Compulsory/Additional/IDS under the Faculty of Science

2. YEAR OF IMPLEMENTATION:

New/Revised Syllabi will be implemented from June 2020 onwards.

3. PREAMBLE:-

This curriculum focuses on the understanding of core and fundamental branches of the discipline. This paper is specially designed to learn the role of demography and population studies as a distinct field of human geography. It encompasses sound knowledge of key concept, different components of population. The curriculum has been carefully designed to include conceptual, basic themes, population dynamics and characteristic with contemporary issues.

4. GENERAL OBJECTIVES OF THE COURSE/ PAPER/:

- 1) To study the basics of population geography.
- 2) To study the population growth trends and its distribution.
- 3) To study the population dynamics.
- 4) To study the population compositions and its characteristics.

5. Course Outcomes:

- 1) This paper would bring an understanding of population geography along with relevance of demographic data.
- 2) The students would get an understanding of distribution and trends of population growth in the developed and less developed countries, along with population concepts.
- 3) The students would get an understanding of the dynamics of population.
- 4) An understanding of the implications of population composition in different regions of the world.
- 5) An appreciation of the contemporary issues in the field of population studies

5. DURATION:

- The course shall be a full time course.
- The duration of course shall be of Three years, as applicable to the respective degree.

6. PATTERN:

Pattern of Examination will be Semester.

7. FEE STRUCTURE :

As per Government /University rules.

[Note: - In case of any New degree/Program started at university/college, the respective colleges/ Dept. should submit a separate proposal of fee structure to BOS office. (i. e. Tuition Fee & Laboratory Fee, if any.)]

8. ELIGIBILITY FOR ADMISSION:

As per eligibility criteria prescribed for respective degree program and the merit in the qualifying examination (i.e. Entrance Examination), if any.

9. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English or Marathi. (as applicable to the course / programme concerned.)

10. STRUCTURE OF COURSE = 40 + 10 = 50 marks

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.)

THIRD YEAR / SEMESTER

Paper No.	Title	Marks
Course / Paper DSE-E108 or IX, Population Geography		50

11. SCHEME OF TEACHING:

The scheme of teaching and examination should be given as applicable to the course / paper concerned.

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	T	P	Total	Theory	Term Work	Total
1	Population Geography	04	04	00	04	40	10	50

12. SCHEME OF EXAMINATION:

- The examination shall be conducted at the end of each term for semester pattern.
- The Theory paper shall carry 40 marks (as applicable to the course).
- The term work shall carry 10 marks
- The evaluation of the performance of the students in theory papers shall be on the basis of Semester Examination of 40 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus

and preferably covering each unit of syllabi.

13. STANDARD OF PASSING:

As per Prescribed rules and regulation for each degree / programme.

14. NATURE OF QUESTION PAPER AND SCHEME OF MARKING:

(Unit wise weightage of marks should also be mentioned)

Semester V		Marks
Question: 1)	Objective Type Question (Multiple Choice)	05
Question: 2)	Short Notes (Any three out of five)	15
Question: 3)	Detailed Answer Type Question (Any two out of three)	20

15. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Sr. No.	Title of Old Paper	Old paper No.	Title of New paper	New Paper No.
1	Research Methodology	IX	Population Geography	E108 or IX

16. SPECIAL INSTRUCTIONS, IF ANY – Nil

REFERENCES:

1. Barrett H. R., 1995: Population Geography, Oliver and Boyd.
2. Bhende A. and Kanitkar T., 2000: Principles of Population Studies, Himalaya Publishing House.
3. Chandna R. C. and Sidhu M. S., 1980: An Introduction to Population Geography, Kalyani Publishers.
4. Clarke J. I., 1965: Population Geography, Pergamon Press, Oxford.
5. Jones, H. R., 2000: Population Geography, 3rd ed. Paul Chapman, London.
6. Lutz W., Warren C. S. and Scherbov S., 2004: The End of the World Population Growth in the 21st Century, Earthscan
7. Newbold K. B., 2009: Population Geography: Tools and Issues, Rowman and Littlefield Publishers.
8. Pacione M., 1986: Population Geography: Progress and Prospect, Taylor and Francis.
9. Wilson M. G. A., 1968: Population Geography, Nelson.
10. Panda B P (1988): Janasankya Bhugol, M P Hindi Granth Academy, Bhopal
11. Maurya S D (2009) Jansankya Bhugol, Sharda Putak Bhawan, Allahabad
12. Chandna, R C (2006), Jansankhya Bhugol, Kalyani Publishers, Delhi
14. Trewartha, G T (1969), A Geography of Population: world patterns, John Wiley, New York.
15. e-PG Pathshala: <https://epgp.inflibnet.ac.in/>
16. MOOCS - NPTEL: <https://nptel.ac.in/>
17. MOOCS - SWAYAM: <https://swayam.gov.in/>
18. National Digital Library of India: <https://ndl.iitkgp.ac.in/>
19. Shivaji University Library (E-Resources): <http://www.unishivaji.ac.in/library/E-Resources>

**B. A. Part – III & B. A. B. Ed.
Semester - V**

**SOCIAL GEOGRAPHY
Syllabus to be implemented from June 2020 onwards**

1. TITLE : Social Geography

Optional under the Faculty of Science

4. YEAR OF IMPLEMENTATION :

Revised Syllabus will be implemented from June 2020 onwards.

5. PREAMBLE

This curriculum focuses on the understanding of social geography of the discipline. This paper is specially designed to cater to social study of the students by imparting knowledge about the society. Social geography is the branch of human geography that is most closely related to social problems and well being, dealing with the relation of social phenomena and its spatial components. The different conceptions of social geography have been overlapping with other sub-fields of geography. It was basically applied as a synonym for the search for patterns in the distribution of social groups and their problems.

9. GENERAL OBJECTIVES OF THE COURSE

- 1) Understanding the concept, origin, nature and scope of social geography.
- 2) To study the migration, technological and occupational changes in India peoples.
- 3) An analysis of different social categories and their spatial distribution.
- 4) To understand the geographies of social welfare and well being.

4.1 COURSE OUTCOMES

- 6) In depth understanding the problems and prospects of society in India.
- 7) The students are fully aware about the migration, technological and occupational changes in India peoples.
- 8) Detailed knowledge about the social categories and communities in world.
- 9) Understanding concepts of social well being and welfare.

5. DURATION

- The course shall be a full time course
- The duration of course shall be of one year (Sem. – V)

6. PATTERN:

Pattern of Examination Will Be Semester

7. FEE STRUCTURE:

As per Government /University rules.

[Note: - In case of any New degree/Program started at university/college, the respective colleges/ Dept. should submit a separate proposal of fee structure to BOS office. (i. e. Tution Fee & Laboratory Fee, if any.)

9. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English or Marathi. (as applicable to the course / programme concerned.)

10. STRUCTURE OF COURSE = 50 marks

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.)

SEMESTER FIFTH

Paper No.

Title Marks

DSE-E108 or IX, Social Geography

50

12. SCHEME OF TEACHING AND EXAMINATION

[The scheme of teaching and examination should be given as applicable to the course/paper concerned.]

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	T	P	Total	Theory	Term Work	Total
1	Social Geography	04	04	00	04	40	10	50

15. SCHEME OF EXAMINATION :

- The examination shall be conducted at the end of each semester.
- The Theory paper shall carry 50 marks.
- The term work shall carry 10 marks.

- The evaluation of the performance of the students in theory papers shall be on the basis of semester Examination of 50 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

14. STANDARD OF PASSING: As Prescribed under rules & regulation for each degree/ programme.

15. NATURE OF QUESTION PAPER AND SCHEME OF MARKING :-

(Unit wise weightage of marks should also be mentioned)

Semester V	Marks
Question : 1) Objective Type Question (Multiple Choice)	05
Question: 2) Short Notes (Any three out of five)	15
Question: 3) Detailed Answer Type Question (Any two out of three)	20

**18. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS-
(FOR REVISED SYLLABUS)**

Sr. No.	Title of Old Paper	Old paper No.	Title of New paper	New Paper No.
1	Research Methodology	IX	Social Geography	E108 or Paper No. IX

17. SPECIAL INSTRUCTIONS, IF ANY.

**NEW/REVISED CBCS PATTERN SYLLABUS FOR
B. A. - Part III and B. Ed. Geography Elective Discipline Specific
DSE –E108 or Paper No. IX
(Introduced from June 2020 onwards)**

Semester – V

(v) Paper – E108 or IX

(vi) Title of Paper: Social Geography

Module	Teaching Hours	Credit
Module-I: Introduction to Social Geography	15	(1)
1.1 Definitions, Nature and Scope of Social Geography		
1.2 Sub-branches of Social Geography		
1.3 Relationship with other Social Sciences		
1.4 Approaches and Significance of Social Geography		
Module-II: Peopling Process in India	15	(1)
2.1 Educational Changes		
2.2 Technological Changes		
2.3 Occupational Changes		
2.4 Migration		
Module-III: Social Categories and their Spatial Distribution	15	(1)
3.1 Race		
3.2 Religions		
3.3 Gender		
Module-IV: Geographies of Welfare, Well Being and Social Problems in India	15	(1)
4.1 Concept of Social Welfare and Well being		
4.2 Healthcare and Housing Facilities		
4.3 Slums		
4.4 Communal Conflicts and Crime		

References

1. Ahmed A., 1999: Social Geography, Rawat Publications.

2. Casino V. J. D., Jr., 2009) Social Geography: A Critical Introduction, Wiley Blackwell.
3. Cater J. and Jones T., 2000: Social Geography: An Introduction to Contemporary Issues, Hodder Arnold.
4. Holt L., 2011: Geographies of Children, Youth and Families: An International Perspective, Taylor & Francis.
5. Panelli R., 2004: Social Geographies: From Difference to Action, Sage.
6. Rachel P., Burke M., Fuller D., Gough J., Macfarlane R. and Mowl G., 2001: Introducing Social Geographies, Oxford University Press.
7. Smith D. M., 1977: Human geography: A Welfare Approach, Edward Arnold, London.
8. Smith D. M., 1994: Geography and Social Justice, Blackwell, Oxford.
9. Smith S. J., Pain R., Marston S. A., Jones J. P., 2009: The SAGE Handbook of Social Geographies, Sage Publications.
10. Sopher, David (1980): An Exploration of India, Cornell University Press, Ithasa.
11. Valentine G., 2001: Social Geographies: Space and Society, Prentice Hall

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

**Revised Syllabus For
B. A. Part-III & B. A. B. Ed.
Political Geography
Or
Geography of Health and Wellbeing**

CBCS PATTERN

(Subject to the modifications to be made from time to time)
Syllabus to be implemented from June 2020 onwards

**Accredited By NAAC
With 'A' Grade
New/Revised Syllabus For
B. A. Part – III and B. A. B. Ed.**

DSE (Discipline Specific Elective) – E233 or Paper No. XII
Geography (Political Geography), Sem.-VI
Syllabus to be implemented from June 2020 onwards

A] Ordinance and Regulations:-

(As applicable to degree/program)

B] Shivaji University, Kolhapur

New/Revised Syllabus For **Bachelor of -Arts.**

1. TITLE: Subject – POLITICAL GEOGRAPHY

Optional/Compulsory/Additional/IDS under the Faculty of Science

2. YEAR OF IMPLEMENTATION: - New/Revised Syllabi will be implemented from June 2020 onwards.

3. PREAMBLE:-

Political Geography is the most important branch of Human Geography. But after 1960 this branch of Geography becomes popular due to its own significance in the World. Therefore, it has been introduced to B. A. Part-III. In this course the fundamental as well basic concepts and knowledge of Political Geography have been included. The present syllabus of this course includes nature, scope,

4. GENERAL OBJECTIVES OF THE COURSE/ PAPER/:

(As applicable to the Degree /Subject- Paper concerned)

- i) To study the Political geography as a fundamental branch of Human Geography.
- ii) To familiarize the students with the basics and fundamental concepts and theories of Political Geography.
- iii) To aware the students about resource conflicts and politics of displacement.

4.1 COURSE OUTCOME

- i) The students are fully aware about the Political geography as a fundamental branch of Human Geography.
- ii) The students are familiarized with the basics and fundamental concepts and theories of Political Geography.
- iii) The students are aware about resource conflicts and politics of displacement.

5. DURATION

- **The course shall be a full time course.**
- **The duration of course shall be of Three years, as applicable to the respective degree.**

6. PATTERN:-

Pattern of Examination will be Semester.

7. FEE STRUCTURE :-

As per Government /University rules.

[Note: - In case of any New degree/Program started at university/college, the respective colleges/ Dept. should submit a separate proposal of fee structure to BOS office. (i. e. Tuition Fee & Laboratory Fee, if any.)

8. ELIGIBILITY FOR ADMISSION:-

As per eligibility criteria prescribed for respective degree program and the merit in the qualifying examination (i.e. Entrance Examination), if any.

9. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English or Marathi. (as applicable to the course / programme concerned.)

10. STRUCTURE OF COURSE = 50 marks

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.)

SEMESTER SIXTH

Paper No.

DSE-E233 or Paper No. XII, Political Geography

Title Marks

50

11. SCHEME OF TEACHING:

The scheme of teaching and examination should be given as applicable to the course / paper concerned.

Sr. No.	Subject/Papers	Teaching Scheme Per Week				Examination Scheme Sr. (Marks)			
		L	T	P	Total	Theory	Practical	Term Work	Total
1	Political Geography	04	04	-	04	40	-	10	50

12. SCHEME OF EXAMINATION:

- The examination shall be conducted at the end of each term for semester pattern.
- The Theory paper shall carry 40 marks (as applicable to the course).
- The term work shall carry 10 marks.
- The evaluation of the performance of the students in theory papers shall be on the basis of Semester Examination of 50 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

13. STANDARD OF PASSING:

As per Prescribed rules and regulation for each degree / programme.

14. NATURE OF QUESTION PAPER AND SCHEME OF MARKING:

(Unit wise weightage of marks should also be mentioned)

Semester V	Marks
Question: 1) Objective Type Question (Multiple Choice)	05
Question: 2) Short Notes (Any three out of five)	15
Question: 3) Detailed Answer Type Question (Any two out of three)	20

15. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Sr. No.	Title of Old Paper	Old paper No.	Title of New paper	New Paper No.
1	Political Geography	XII	Political Geography	E 233 or XII

16. SPECIAL INSTRUCTIONS, IF ANY – Nil

**NEW/REVISED SYLLABUS FOR
B. A. Part-III and B. A. B. Ed. Geography
(Syllabus to be implemented from June 2020 onwards)
Semester - VI**

(i) DSE – E 233 or XII

(ii) Title of Paper:- POLITICAL GEOGRAPHY

(iii) Specific Objectives:- -----

(iv) A brief note:- (On expected level of study from examination and assessment point of view):- -----

Module	Teaching Hours	Credits
Module I: Introduction to Political Geography	15	01
1.1 Definition of Political Geography		
1.2 Nature and Scope of Political Geography		
1.3 Approaches of Political Geography		
1.4 Significance of Political Geography		
Module II: Concepts in Political Geography	15	01
2.1 State		
2.2 Nation		
2.3 Boundary		
2.4 Frontier		
Module III: Theories in Political Geography	15	01
3.1 Hartland Theory - Halford J. Mackinder		
3.2 Rimland Theory – Nicholas J. Spykeman		
Module IV: Resource Disputes and Conflicts	15	01
4.1 Krishna Water Dispute		
4.2 Ganga Water Dispute		
4.3 Sardar Sarovar Project: Issues of Relief, Compensation and Rehabilitation		
4.4 Chandoli Dam Project: Issues of Relief, Compensation and Rehabilitation		

Reading List

1. Adhikari, S. (1997) : Political Geography, Rawat Publications, Jaipur.
2. Dikshit, R. D. (1985) : Political Geography, A Contemporary Perspective, McGraw Hill, New Delhi
3. Dwivedi, R. L. (1996): Political Geography, ChaitanyaPrakashan, Allahabad.

4. Muir, Richard (1995): Modern Political Geography, Macmillan, London.
5. Pounds, N. J. G. (1972): Political Geography 2nd Ed. McGraw Hill, N. Y.
6. Sharma, T. C. : Political Geography.
7. Agnew J., 2002: Making Political Geography, Arnold.
8. Agnew J., Mitchell K. and Toal G., 2003: A Companion to Political Geography, Blackwell.
9. Cox K. R., Low M. and Robinson J., 2008: The Sage Handbook of Political Geography, Sage Publications.
10. Cox K., 2002: Political Geography: Territory, State and Society, Wiley-Blackwell
11. Gallaher C., et al, 2009: Key Concepts in Political Geography, Sage Publications.
12. Glassner M., 1993: Political Geography, Wiley.
13. Jones M., 2004: An Introduction to Political Geography: Space, Place and Politics, Routledg.
14. Mathur H M and M M Cernea (eds.) Development, Displacement and Resettlement – Focus on Asian Experience, Vikas, Delhi
15. Painter J. and Jeffrey A., 2009: Political Geography, Sage Publications.
16. Taylor P. and Flint C., 2000: Political Geography, Pearson Education.
17. Verma M K (2004): Development, Displacement and Resettlement, Rawat Publications, Delhi
18. Hodder Dick, Sarah J Llyod and Keith S McLachlan (1998), Land Locked States of Africa and Asia (vo.2), Frank Cass

Accredited By NAAC
With 'A' Grade
New/Revised Syllabus For
B. A. Part – III and B. A. B. Ed.
DSE-E233 (Discipline Specific Elective) Paper No.XII
Geography (Geography of Health and Wellbeing), Semester-VI
Syllabus to be implemented from June 2020 onwards

A] Ordinance and Regulations:-

(As applicable to degree/program)

B] Shivaji University, Kolhapur

New/Revised Syllabus for Bachelor of Arts and B. A. B. Ed.

1. TITLE: **Geography of Health and Wellbeing**
Optional/Compulsory/Additional/**DSE**

2. FACULTY: Faculty of Science.

3. YEAR OF IMPLEMENTATION:

New/Revised Syllabi will be implemented from June 2020 onwards.

4. PREAMBLE:

Geography of Health and Wellbeing considers the significance for physical and mental health of interactions between people and their environment. This branch of Geography becomes popular due to its significance. Therefore, it has been introduced to B. A. Part-III. In this course the fundamental concepts and knowledge of Geography of Health and wellbeing have been included. The present syllabus of this course includes perspectives of health, pressure on environmental quality and health, exposure and health risks, health and disease patterns.

5. GENERAL OBJECTIVES OF THE COURSE/PAPER:

(As applicable to the Degree/Subject-Paper concerned)

- i) To know Geography of Health and Wellbeing.
- ii) To study the fundamental concepts health and environmental trends.
- iii) To study the pressure on environmental quality and health.
- iv) To study the exposure and health risks.
- iv) To understand the health and various disease patterns in environmental context with special reference to India.

6. COURSE OUT COME:

After the completion of course, the students will have ability to:

1. Understand various geographical perspectives related to human health.

2. Create awareness of human health and environmental trends.
3. The students are familiar with geographical background of diseases and their regional pattern.
4. Detail understanding of pressure on environmental quality and human health.
5. Create awareness among the students of malnutrition and hygiene.
6. The students are familiar with the process of health care planning in India.
7. The students are aware about impact of climate change on human health.

6. DURATION

- The course shall be a full time course.
- The duration of course shall be of Three years, as applicable to the respective degree.

8. PATTERN:

Pattern of Examination will be Semester.

8.FEE STRUCTURE:

As per Government/University rules.

[Note: In case of any New degree/Program started at university/college, the respective colleges/Dept. should submit a separate proposal of fee structure to BOS office.(i.e. Tution Fee & Laboratory Fee, if any.)]

9. ELIGIBILITY FOR ADMISSION:-

As per eligibility criteria prescribed for respective degree programme and the merit in the qualifying examination (i.e. Entrance Examination), if any.

10.MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English or Marathi. (as applicable to the course/programme concerned.)

11.STRUCTUREOFCOURSE = 50 marks

(Note–The structure & title of papers of the degree as a whole should be submitted at The time of submission/revision of first year syllabus.)

SEMESTER SIXTH Paper No.

Course E 233/Paper- XII, Geographyof Health and Wellbeing

TitleMarks
50

12. SCHEME OF TEACHING AND EXAMINATION:

The scheme of teaching and examination should be given as applicable to the course /paper concerned.

Sr. No.	Subject/Papers	Teaching Scheme Per Week				Examination Scheme (Marks)			
		L	T	P	Total	Theory	Practical	Term Work	Total
1	Geography of Health and Wellbeing	04	04	-	04	40	-	10	40

13. Scheme of Examination:

- The examination shall be conducted at the end of each academic year.
- The paper shall carry 40 marks.
- The term work shall carry 10 marks.
- The evaluation of the performance of the students in theory papers shall be on the basis of Semester Examination of 50 marks.
- Question Paper will be set in the view of the / in accordance with the entire syllabus and preferably covering each unit of syllabi.

14. Standard of Passing:

(As prescribed under rules & regulation for each degree / program)

15. Nature of Question Paper and Scheme of Marking:

(Unit wise weightage of marks should also be mentioned)

Semester V	Marks
Question: 1) Objective Type Question (Multiple Choice)	05
Question: 2) Short Notes (Any three out of five)	15
Question: 3) Detailed Answer Type Question (Any two out of three)	20

16. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (For revised Syllabus)

Sr. No.	Title of Old Paper	Title of New Paper
1	Political Geography (Paper -I)	Geography of Health and Wellbeing E233 (Paper No. XII)

17. Special Instructions, If any.

NEW/REVISED SYLLABUS FOR
B. A. Part-III and B. A. B. Ed. Geography
(Syllabus to be implemented from June 2020 onwards)
Semester-VI

- (i) Course/Paper No. E233 or XII
(ii) Title of Paper:- GEOGRAPHY OF HEALTH AND WELLBEING
(iii) Specific Objectives:-----
(iv) A brief note:-

(On expected level of study from examination and assessment point of view):- -----

Module	Teaching Hours	Credits
Module I: Perspectives on Health	15	01
1.1 Definition, Nature and Scope		
1.2 Trends and Applications		
1.3 Linkages with Environment and Development		
1.4 Health and Environmental Trends: Population Dynamics, Urbanization, Poverty and Inequality		
Module II: Pressure on Environmental Quality and Health	15	01
2.1 Human Activities and Environmental Pressure		
2.2 Land use and Agricultural Development		
2.3 Industrialization		
2.4 Transportation		
Module III: Exposure and Health Risks	15	01
3.1 Air and Water Pollution		
3.2 Household Wastes		
3.3 Housing		
3.4 Workplace		
Module IV: Health and Disease Patterns	15	01
(In Environmental Context with special reference to India)		
4.1 Communicable diseases and their regional pattern – AIDS and Dengue		
4.2 Lifestyle related diseases and their regional pattern – Cancer and Diabetes		
4.3 Climate change and human health		
4.4 Food production and nutrition		

REFERENCES

1. Akhtar Rais (Ed.), 1990: Environment and Health Themes in Medical Geography, Ashish Publishing House, New Delhi.
2. Avon Joan L. and Jonathan A. Patzed., 2001: Ecosystem Changes and Public Health, Baltimore, John Hopling Unit Press (ed).
3. Bradley, D., 1977: Water, Wastes and Health in Hot Climates, John Wiley Chichester.
4. Brown T., S. McLafferty, and G. Moon. 2009. *A companion to health and medical geography*. Chichester, UK: Wiley-Blackwell. DOI: [10.1002/9781444314762](https://doi.org/10.1002/9781444314762)
5. Christaler George and Hristopoles Dionissios, 1998: Spatio Temporal Environment Health Modelling, Boston Kluwer Academic Press.
6. Cliff, A.D. and Peter, H., 1988: Atlas of Disease Distributions, Blackwell Publishers, Oxford.
7. [Emch](#), M., [Root](#), E.D., [Carrel](#), M., 2017, Health and Medical Geography, Fourth Edition Guilford Publications
8. Gatrell, A., and Loytonen, 1998: GIS and Health, Taylor and Francis Ltd, London.
9. Gatrell A., and S. Elliott. 2009. *Geographies of health*. Chichester, UK: Wiley-Blackwell.
10. Gesler, W., and W. Kearns. 2002. *Culture place and health*. Critical Geographies. London: Routledge.
11. Hardham T. and Tannav M., (eds): Urban Health in Developing Countries; Progress, Projects, Earthgoan, London.
12. Jones, K., and G. Moon. 1987. *Health disease and society*. London: Routledge.
13. Meade, M., and R. Earickson. 2000. *Medical geography*. New York: Guildford.
14. Murray, C. and A. Lopez, 1996: The Global Burden of Disease, Harvard University Press.
15. Moeller D. ed., 1993: Environmental Health, Cambridge, Harvard University Press.
16. Phillips, D. and Verhasselt, Y., 1994: Health and Development, Routledge, London.
17. Shelar, S.K., 2012: Introduction to Medical Geography, Chandralok Pub., Kanpur.
18. Tromp, S., 1980: Biometeorology: The Impact of Weather and Climate on Humans and their Environment, Heydon and Son.

19. मस्कीडी., भैसेएस.,२०१४, आरोग्यभूगोल, अथर्वप्रकाशन,पुणे

Websites:

e-PGPathshala: <https://epgp.inflibnet.ac.in/>

MOOCS - NPTEL: <https://nptel.ac.in/>

MOOCS - SWAYAM: <https://swayam.gov.in/>

National Digital Library of India: <https://ndl.iitkgp.ac.in/>

Shivaji University Library (E-Resources): <http://www.unishivaji.ac.in/library/E-Resources>

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

Revised Syllabus For

B. A. Part-III & B. A. B. Ed.

Geography (Practical)

(Fundamentals of Map Making and Map Interpretation)

CBCS PATTERN

(Subject to the modifications to be made from time to time)

Syllabus to be implemented from June 2020 onwards

**A) Ordinance and Regulations
(As applicable to degree)
B) Shivaji University, Kolhapur.
Revised Syllabus for
Bachelor of Arts and B. A. B. Ed.
Sem -VI**

DSE-E234 (Paper XIII or Practical Paper -I)

1. Title: Fundamentals of Map Making and Map Interpretation

Optional Subject under the Faculty of Science

2. Year of Implementation: Revised Syllabi will be implemented from June 2020 onwards.

3. Preamble:

Practical Work is the most important part of Geography. Map is an indispensable tool in Geographical Studies & Research activities. The present syllabus of this paper includes study of maps and their types, Map Projections, S.O.I. Topomaps, I.M.D. Weather Maps, and Cartographic Techniques. In the process of development of science and technology, the changing nature of subject of geography will make aware to the student about the map work and map interpretation. This will further help to improve the use of maps, cartographic techniques and methods in teaching-learning and research work.

4. General objectives of the Paper:

(As applicable to the – paper concerned)

- 1) To introduce the students with the importance of map making and map Interpretation.
- 2) To make the students to understand map, concept of scale and concept of projection.
- 3) To provide training in analysis of landforms.
- 4) To give basic information to the students about S.O.I. topomaps and I.M.D. weather maps.
- 5) To develop the skill of map Interpretation among the students.
- 6) To familiarize the students with the different cartographic techniques and methods used for representation of demographic and physio- socio-economic database.

5. COURSE OUTCOMES

1. In depth understanding the map, concept of scale and projection.
2. Detailed knowledge about the analysis of landforms and its identification.
3. The students are deeply aware about basic information to the students about S.O.I. topomaps and I.M.D. weather maps and obtained the skills about map interpretation.

4. The students are deeply familiar with different cartographic techniques and methods used for representation of demographic and physio- socio-economic database

6. Duration:

- The course shall be a full time course.
- The duration of course shall be of three years, as applicable to the respective degree.

7. Pattern:

Pattern of Examination will be **ANNUAL**.

8. Fee Structure:

As per Government / University rules.

9. Eligibility for Admission:

As per eligibility criteria prescribed for respective degree program and the merit in the qualifying examination, if any.

10. Medium of Instruction:

The medium of instruction shall be in English or Marathi. (As applicable to the course / programme concerned)

11. Structure of Course: Theory & Practical's

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission / revision of first year syllabus.)

Third Year (Semester VI) Paper No. XIII

Sr. No.	Subjects/Papers	Theory	Practical	Total marks
1	Fundamentals of Map Making and Map Interpretation	-----	100	100

12. Scheme of Teaching and Examination:

(The Scheme of teaching and examination should be given as applicable to the course / paper concerned)

B. A. part –III

Sr. No.	Subjects/Papers	Theory				Examination scheme (Marks)		
		L	T	P	Total	Practical	Term Work	Total (Annual)
1	Fundamentals of Map Making and Map Interpretation	---	---	10	10	100	---	100

13. Scheme of Examination:

- The examination shall be conducted at the end of each academic year.
- The Practical paper shall carry 100 marks.
- The evaluation of the performance of the student in practical papers shall be on the basis of annual practical examination of 100 marks.
- Question Paper will be set in the view of the / in accordance with the entire syllabus and preferably covering each Module of syllabi.

14. Standard of Passing:

(As prescribed under rules & regulation for each degree / program)

15. Nature of Question Paper and Scheme of Marking:

(Module wise weightage of marks should also be mentioned)

16. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS

(For revised Syllabus)

Sr. No.	Title of Old Paper	Title of New Paper
1	Map Work & Map Reading Paper XIII (Practical Paper -I)	Fundamentals of Map Making and Map Interpretation E 234 or Paper XIII (Practical Paper - I)

17. Special Instructions, If any.

2.2 Graphical Construction of the following Projections with Properties and Use:

- i) Zenithal Polar Gnomonic Projection
- ii) Zenithal Polar Equal Area Projection
- iii) Simple Conical Projection with one standard Parallel
- iv) Cylindrical Equal Area Projection
- v) Mercator's Projection and Reference to Universal Transverse Mercator (UTM) Projection

Module – III : Identification, Mapping of Slope, Relief Features and Profiles

Periods 50

Marks 15

3.1 Slope and Gradient

3.1.1 Types of Slope: Gentle, Steep, Even, Uneven, Convex, Concave, Terraced.

3.1.2 Expression of Slopes: a) Gradient b) Degree c) Per Cent d) Mills

3.1.2 Representation of Relief by Contours: Hill, Mountain, Ridge, Cliff, Saddle, Plateau, Knoll, Spur, Col or Pass, Volcanic Col or Crater, Gorge, 'V' Shaped Valley, Waterfall, 'U' Shaped Valley, Cirque, Hanging Valley, Ria Coast, Fiord Coast, Sea cliff.

3.2 Profiles

3.5.1 Superimposed Profile

3.5.2 Composite Profile

3.5.3 Projected Profile

3.5.4 Longitudinal Profile

Module – IV : Topographical Maps

Periods 50

Marks 15

4.1 Indexing of S.O.I. Topographical Map

4.2 Signs, Symbols and Colors used in SOI Toposheet

4.3 Interpretation of S.O.I.'s Topographical Maps

a) Marginal Information

b) Physical environment: Relief, Drainage and Vegetation

c) Cultural environment: Settlements, Transportation and Communication, Irrigation.

d) Land Use

Module V: Weather Instruments and IMD Maps

Periods 70

Marks 20

5.1 Study of weather Instruments with reference to Principle, Mechanism, and Function

- a) Thermograph
- b) Barograph
- c) Dry and Wet Bulb Thermometer
- d) Cup Anemometer
- e) Rain Gauge

5.2 Isobaric Patterns: Cyclone, Anticyclone, Col, Ridge, Secondary Depression

5.3 Signs and Symbols used in Indian Daily Weather Maps

5.4 Interpretation of Indian Daily Weather Maps

Marginal Information, Pressure, Winds, Clouds, Rainfall, Other Conditions, Sea Condition, Temperature departure from normal

Module VI : Representation Techniques of Statistical Data

Periods 30

Marks 10

- a) Divided Rectangle
- b) Proportional Circle
- c) Proportional Square
- d) Choropleth Map
- e) Dot Map
- f) Isopleths

Module VII: Journal and Viva Voce

Marks 10

Note :

1. Use of stencils, log tables, computer and calculator is allowed.
2. Journal should be completed and duly certified by practical in-charge and Head of the Department.

Reference:

1. Bygoot, J: An Introduction to Mapwork and Practical Geography, University Tutorial, London 1964.
2. London 1964.

3. Khan MD. Zulfequar Ahmad : Text Book of Practical Geography, Concept Publishing Company, New Delhi, 1998
 4. Mishra, R.P. and Ramesh A. : Fundamentals of Cartography, Concept Publishing Company, New Delhi, 2000
 5. Monkhouse F.J. and Wilkison, H.R.: Maps and Diagrams, Mathuen. London, 1971.
 6. Negi. , Dr. Balbir Singh : Practical Geography, Kedar Nath Ram Nath, Meerut, Delhi.
 7. Raisz, E.: Principals of Cartography, McGraw Hill Book Com., Inc, New York, 1962.
 8. Robinson, A.H. and Sale, S.D.: Elements of Cartography, John Witey and Sons, Inc, New York, 1969.
 9. Saha, Pijushkanti and Basu Partha : Advanced Practical Geography – A Laboratory Manual Books and Allied (P) Ltd, Kolkata. 2010.
 10. Sarkar, Ashis : Practical Geography: A systematic Approach, Orient Longman limited, Calcutta, 1997.
 11. Singh, Gopal : Map work and Practical Geography Vikas Publishing House Pvt. Ltd. New Delhi, 1996.
 12. Singh, R and Kanaujia, L.R.S.: Map Work and Practical Geography, Central Book Depot, Allahabad.
 13. Singh, R. L. and Rana P.B. : Elements of Practical Geography, Kalyani Publishers, New Delhi – Ludhiana, 1998.
 14. Aher A. B., Chodhari A. P. & Bharambe S. N. Techniques of Spatial Analysis Prashant Publication Jalgaon 2015
 15. Maurice Yeats, An Introduction to Quantitative Analysis in Human Geography, McGraw Hill, New York, 1974.
 16. P. Saha and P. Basu (2006): Advanced Practical Geography, Books and Allied Publication, Kolkata, India.
 17. Khullar, Essentials of Practical Geography, New Academic Publishing Co, India.
 18. Singh L R (2011): Fundamentals of Practical Geography
 19. Robinson Rep. (2010): Elements of Cartography 6/e
 20. Khan Za (1998): Text Book of Practical Geography
२१. कुंभार अर्जुन, प्रात्यक्षिक भूगोल,

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

Revised Syllabus For

**B. A. Part-III & B. A. B. Ed.
Sem VI**

Geography (Practical)
(Advanced Tools, Techniques & Field Work in Geography)

CBCS PATTERN

(Subject to the modifications to be made from time to time)
Syllabus to be implemented from June 2020 onwards

**A) Ordinance and Regulations
(As applicable to degree)
B) Shivaji University, Kolhapur.
Revised Syllabus for
Bachelor of Arts and B. A. B. Ed.
Sem-VI
DSE-E235 or Paper XIV (Practical Paper -II)
Syllabus to be implemented from June 2020 onwards**

1. Title: Advanced Tools, Techniques & Field Work in Geography

Optional Subject under the Faculty of Science

2. Year of Implementation: Revised Syllabi will be implemented from June 2020 onwards.

3. Preamble:

Modern science & technology have gained momentum. The last couple of Decades have witnessed a sudden expansion of knowledge. In the process of development of science and technology, the changing nature of subject of Geography will make aware to the students about the advanced techniques such as Remote Sensing, GIS, and GPS. The application of computers has revolutionized the use of methods & techniques. The present syllabus of this paper includes study of Aerial Photographs, Remote Sensing, GIS, Application of Computer and use of field work in Geography. This will further help to improve the use of advanced techniques and methods in teaching-learning and research work.

4. General objectives of the Paper:

- 1) To introduce the students with the importance of field work and advanced Techniques in Geography.
- 2) To provide training in application of modern tool and techniques in Geography.
- 3) To enable the students to understand the use of computer for analysis of Geographical data.
- 4) To enhance the skill of the students in instrumental survey.
- 5) To give basic information to the students about Aerial Photographs, Remote Sensing, GIS and GPS.

6. COURSE OUTCOMES

5. In depth understanding the importance of field work and advanced Techniques in Geography.
6. The students are trained to implement modern tool and techniques in Geography.
7. Detailed knowledge about the use of computer for analysis of Geographical data.
8. The students are deeply aware about the basics and trained in instrumental survey.

9. The students are deeply familiar with computer, GIS, GPS and Remote Sensing.

6. Duration:

- The course shall be a full time course.
- The duration of course shall be of three years, as applicable to the respective degree.

7. Pattern:

Pattern of Examination will be ANNUAL.

8. Fee Structure:

As per Government / University rules.

9. Eligibility for Admission:

As per eligibility criteria prescribed for respective degree program and the merit in the qualifying examination, if any.

10. Medium of Instruction:

The medium of instruction shall be in English or Marathi. (As applicable to the course / programme concerned)

11. Structure of Course: Theory & Practical's

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission / revision of first year syllabus.)

Third Year (Semester VI) Paper No. XIV

Sr. No.	Subjects/Papers	Theory	Practical	Total marks
1	Advanced Tools, Techniques & Field Work in Geography	-----	100	100

12. Scheme of Teaching and Examination:

(The Scheme of teaching and examination should be given as applicable to the course / paper concerned)

B. A. part –III

Sr. No.	Subjects/Papers	Theory				Examination scheme (Marks)		
		L	T	P	Total	Practical	Term Work	Total (Annual)
1	Advanced Tools, Techniques & Field Work in Geography	---	---	10	10	100	---	100

13. Scheme of Examination:

- The examination shall be conducted at the end of each academic year.
- The Practical paper shall carry 100 marks.

- The evaluation of the performance of the student in practical papers shall be on the basis of annual practical examination of 100 marks.
- Question Paper will be set in the view of the / in accordance with the entire syllabus and preferably covering each Module of syllabi.

14. Standard of Passing:

(As prescribed under rules & regulation for each degree / program)

15. Nature of Question Paper and Scheme of Marking:

(Module wise weightage of marks should also be mentioned)

16. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS

(For revised Syllabus)

Sr. No.	Title of Old Paper	Title of New Paper
1	Advanced Tools, Techniques & Field Work	Advanced Tools, Techniques & Field Work in Geography (DSE-E235 or Paper No. XIV)

17. Special Instructions, If any.

Revised Syllabus for B. A. – III and B. A. B. Ed.

(Introduced from June 2020 Onwards)

Revised Syllabus for

B. A. (Part III) Geography

DSE-E235 or Paper No. XIV (Practical Paper -II)

**(ii) Title of Paper - Advanced Tools, Techniques & Field Work in
Geography(100 Marks)**

Module-I: Introduction to Computer

Lectures- 50

Marks-10

1.1: Introduction to Computer

1.2: Application of computer in geography

1.2.1: Construction of Line Graphs, Bar Graphs

1.2.2: Construction of Pie Diagram and Scatter Diagram

1.3: Application of Excel for Data Analysis

Module-II: Remote Sensing

Lectures- 50

Marks-15

2.1 Definition of Remote Sensing

2.2 Fundamentals of Remote Sensing: EMR, Sensors and Platforms

2.3 Application of Remote Sensing in Geography

2.4 Aerial photographs and Satellite imagery: Definition, types and difference between them

2.5 Determination of Photo Scale

2.6 Elements of image interpretation

2.7 Identification of Physical and cultural features from Aerial Photographs or Satellite Imagery

Module-III: GIS and GNSS

Lectures- 50

Marks-15

3.1 Geographical Information System (GIS)

3.1.1 Definition and components

3.1.2 GIS Data Structure: Types (spatial and non-spatial), Raster and Vector data

3.1.3 Georeferencing, Digitization, Map Layout Preparation

- Introduction – Aims – Objectives - Review of the literature - Data collection –
Methodology - Data Analysis – Interpretation - Findings – Suggestions - Bibliography
2. The duration of the field work should not exceed than 20 days.
 4. The word count of the report should be about 8000 to 12,000 excluding figures, tables, photographs, maps, references and appendices.
 5. One copy per student of the report as per research standard should be submitted at the time of examination.

Module- VII: Study Tour

Marks-10

Maximum 15 days of Study Tour and preparation of Tour Report.

The Study Tour Report must be content of following points:

Introduction – Necessity – Importance - Route map – Objectives – Methodology -
Geographical Profile (Natural, Socio-economic and Cultural) - Geographical importance of
visited tourist places – Conclusion – References

Journal and Viva Voce

Marks 10

Note :

1. Use of stencils, log tables, computer and calculator is allowed.
2. Journal should be completed and duly certified by practical in-charge and Head of the Department.

Reference:

21. Lo C. P., Albert K. W. Yeung, (2011): Concepts and Techniques of Geographic Information Systems, PHI Learning Private Limited, New Delhi-110001.
22. Bygoot, J: An Introduction to Mapwork and Practical Geography, University Tutorial, London 1964.
23. Khan MD. Zulfequar Ahmad : Text Book of Practical Geography, Concept Publishing Company, New Delhi, 1998
24. Mishra, R.P. and Ramesh A. : Fundamentals of Cartography, Concept Publishing Company, New Delhi, 2000
25. Monkhouse F.J. and Wilkison, H.R.: Maps and Diagrams, Mathuen. London, 1971.
26. Negi. , Dr. Balbir Singh : Practical Geography, Kedar Nath Ram Nath, Meerut, Delhi.
27. Raisz, E.: Principals of Cartography, McGraw Hill Book Com., Inc, New York, 1962.
28. Robinson, A.H. and Sale, S.D.: Elements of Cartography, John Witey and Sons, Inc, New York, 1969.

30. Saha, Pijushkanti and Basu Partha : Advanced Practical Geography – A Laboratory Manual Books and Allied (P) Ltd, Kolkata. 2010.
 31. Sarkar, Ashis : Practical Geography: A systematic Approach, Orient Longman limited, Calcutta, 1997.
 32. Singh, Gopal : Map work and Practical Geography Vikas Publishing House Pvt. Ltd. New Delhi, 1996.
 33. Singh, R and Kanaujia, L.R.S.: Map Work and Practical Geography, Central Book Depot, Allahabad.
 34. Singh, R. L. and Rana P.B. : Elements of Practical Geography, Kalyani Publishers, New Delhi – Ludhiana, 1998.
 35. Aher A. B., Chodhari A. P. & Bharambe S. N. Techniques of Spatial Analysis Prashant Publication Jalgaon 2015
 36. Maurice Yeats, An Introduction to Quantitative Analysis in Human Geography, McGraw Hill, New York, 1974.
 37. P. Saha and P. Basu (2006): Advanced Practical Geography, Books and Allied Publication, Kolkata, India.
 38. Khullar, Essentials of Practical Geography, New Academic Publishing Co, India.
 39. Singh L R (2011): Fundamentals of Practical Geography
 40. Robinson Rep. (2010): Elements of Cartography 6/e
 41. Khan Za (1998): Text Book of Practical Geography
२२. कुंभार अर्जुन, प्रात्यक्षिक भूगोल,

**SHIVAJI UNIVERSITY,
KOLHAPUR**



Accredited By NAAC with 'A' Grade

CHOICE BASED CREDIT SYSTEM

Syllabus For

B.Sc. Part -III Mathematics

SEMESTER V AND VI

(Syllabus to be implemented from June, 2020 onwards.)

B.Sc.Part-III [Semester V] (Credit - 8]

Course code	Title o the course	Instructio ns Lectures /Week	Duration of term end exam	Marks of Term end exam	Marks (Internal) Of Continuous Assessment	Credit
DSE E9	Mathematical Analysis	3	2 hours	40	10	2
DSE E10	Abstract Algebra	3	2 hours	40	10	2
DSE E11	Optimization Techniques	3	2 hours	40	10	2
DSE E12	Integral Transforms	3	2 hours	40	10	2

B.Sc.Part-III [Semester VI] (Credit - 8]

Course code	Title o the course	Instructions Lectures/Week	Duration of term end exam	Marks Term end exam	Marks (Internal) Of Continuous Assessment	Credit
DSE F9	Metric Spaces	3	2 hours	40	10	2
DSE F10	Linear Algebra	3	2 hours	40	10	2
DSE F11	Complex Analysis	3	2 hours	40	10	2
DSE F12	Discrete Mathematics	3	2 hours	40	10	2

Core Course Practical in Mathematics [CCPM IV to VII]

The practical examination will be conducted at the end of second term that is annual pattern

Total Credit 16

Course code	Title o the course	Instructions Lectures/Week	Duration of term end exam	Marks [End of academic year]	Credit
CCPM IV	Operations Research	5	6 hours	50	4
CCPM V	Laplace and Fourier Transforms	5	6 hours	50	4
CCPM VI	Mathematical Computation Using Python	5	6 hours	50	4
CCPM VII	Project, sturdy tour, viva.	5	6 hours	50	4

EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED SYLLABUS

Sem - V

Old Paper number	Equivalence	New Course code	Title of the course
IX	Real Analysis	DSE E9	Mathematical Analysis
X	Abstract Algebra	DSE E10	Abstract Algebra
XII	Numerical Methods - I	DSE E11	Optimization Techniques
XI	Partial Differential Equations	DSE E12	Integral Transforms

Sem - VI

Old Paper number	Equivalence	New Course code	Title of the course
XIII	Metric spaces	DSE F9	Metric Spaces
XIV	Linear Algebra	DSE F10	Linear Algebra
XV	Complex Analysis	DSE F11	Complex Analysis
XVI	Numerical Methods	DSE F12	Discrete Mathematics

CCPM

Old course code	Equivalence	New Course code	Title of the course
CML – IV	Operations Research Techniques	CCPM IV	Operations Research
CML – V	Numerical Methods	CCPM V	Laplace and Fourier Transforms
CML – VI	Numerical Recipes in C++, SciLab	CCPM VI	Mathematical Computation Using Python
CML – VII	Project, study tour, viva.	CCPM VII	Project, study tour, Seminar, viva.

B.Sc. (Mathematics) (Part-III) (Semester-V)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: DSE – E9

Theory: 32 Hrs. (40 Lectures of 48 minutes)

Title of Course: Mathematical Analysis

Marks – 40 (Credits: 02)

Course Objectives: The objectives of course is to understand and learn about

1. The integration of bounded function on a closed and bounded interval
2. Some of the families and properties of Riemann integrable functions
3. The applications of the fundamental theorems of integration
4. Extension of Riemann integral to the improper integrals when either the interval of integration is infinite or the integrand has infinite limits at a finite number of points on the interval of integration
5. The expansion of functions in Fourier series and half range Fourier series

Unit -1 : Riemann Integration

(16 hours)

Definition of Riemann integration, Inequalities for lower and upper Darboux sums, Necessary and sufficient conditions for Riemann integrability, Definition of Riemann integration by Riemann sum and equivalence of the two definitions, Riemann integrability of monotonic functions and continuous functions, Algebra and properties of Riemann integrable functions, First and second fundamental theorems of integral calculus, and the integration by parts.

Unit -2 : Improper Integrals and Fourier Series

(16 hours)

Improper Integrals: Definition of improper integral of first kind, Comparison test, μ – test for Convergence, Absolute and conditional convergence, Integral test for convergence of series, Definition of improper integral of second kind and some tests for their convergence, Cauchy principle value.

Fourier Series: Definition of Fourier series and examples on the expansion of functions in Fourier series, Fourier series corresponding to even and odd functions, half range Fourier series, half range sine and cosine series

Recommended Books:

1. **Kenneth.A.Ross**, Elementary Analysis: The Theory of Calculus, Second Edition, Undergraduate Texts in Mathematics, Springer, 2013.
(Chapter 6, Art. 32.1 to 32.11, 33.1 to 33.6 and 34.1 to 34.4)
2. **D Somasundaram and B Choudhary**, First Course in Mathematical Analysis, Narosa Publishing House New Delhi, Eighth Reprint 2013 (Chapter 8, Art. 8.5 and Chapter 10, Art. 10.1)

Reference Books:

1. **R.R.Goldberg**, Methods of Real Analysis, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. **R.G.Bartle and D.R.Sherbert**, Introduction to Real Analysis, Wiley India Pvt. Ltd., Fourth Edition 2016.
3. **Shanti Narayan and Dr.M.D.Raisinghania**, Elements of Real Analysis, S.Chand & Company Ltd. New Delhi, Fifteenth Revised Edition 2014
4. **Shanti Narayan and P.K.Mittal**, A Course of Mathematical Analysis, S.Chand & Company Ltd. New Delhi, Reprint 2016.
5. **Kishan Hari**, Real Analysis, Pragati Prakashan, Meerut, Fourth Edition 2012.

B.Sc. (Mathematics) (Part-III) (Semester-V)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: DSE – E10

Theory: 32 Hrs. (40 Lectures of 48 minutes)

Title of Course: Abstract Algebra

Marks – 40 (Credits: 02)

Course Objectives: After successful completion of this course the students will able to

1. Basic concepts of group and rings with examples
2. Identify whether the given set with the compositions form Ring, Integral domain or field.
3. Understand the difference between the concepts Group and Ring.
4. Apply fundamental theorem, Isomorphism theorems of groups to prove these theorems for Ring.
5. Understand the concepts of polynomial rings, unique factorization domain.

Unit -1: Groups and Rings

16 hours

Groups: Definition and examples of groups, group S_3 and Dihedral group D_4 , Commutator subgroups and its properties, Conjugacy in group and class equation.

Rings: Definition and example of Rings, Ring with unity. Zero divisor, Integral Domain, Division Ring, Field, Boolean ring, Subring, Characteristic of a ring: Nilpotent and Idempotent elements. Ideals, Sum of two ideals, Examples. Simple Ring.

Unit-2: Homomorphism and Imbedding of Ring , Polynomial Ring and Unique Factorization Domain.

16 hours

Quotient Rings, Homomorphism, Kernel of Homomorphism ,Isomorphism theorems,imbedding of Ring. Maximal Ideals. Polynomial Rings, degree of Polynomial, addition and multiplication of Polynomials and their properties, UFD, Gauss' Lemma.

Recommended Books:

- 1) Vijay K. Khanna, S.K. Bhambri, A Course In Abstract Algebra, Vikas publishing House Pvt.Ltd., New –Delhi-110014, Fifth Edition 2016.
(Chap. 3 Art. The Dihedral Group, commutator, Chap. 4 Art. Conjugate elements, Chap.7 Art. Subrings, characteristic of a ring, Ideals, Sum of Ideals, Chap. 8 Art. Quotient rings, Homomorphisms, Embedding of Rings, More on Ideals, Maximal Ideals, Chap 9 Polynomial Rings, Unique Factorization Domain.)

Reference Books:

1. Jonh B. Fraleigh, A First Course in Abstract Algebra Pearson Education, Seventh Edition(2014).
2. Herstein I. N, Topics in Algebra, Vikas publishing House,1979.
3. Malik D. S. Moderson J. N. and Sen M. K., Fundamentals of Abstract Algebra, McGrew Hill,1997.
4. Surjeet Sing and Quazi Zameeruddin, Modern Algebra, Vikas Publishing House,1991.
5. N.Jacobson, Basic Algebra Vol. I&II, Freeman and Company, New York 1980.

B.Sc. (Mathematics) (Part-III) (Semester-V)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: DSE – E11

Title of Course: Optimization Techniques

Theory: 32 Hrs. (40 Lectures of 48 minutes)

Marks – 40 (Credits: 02)

Course Objectives: The aim of this course is to

1. provide student basic knowledge of a range of operation research models and techniques, which can be applied to a variety of industrial and real life applications.
2. Formulate and apply suitable methods to solve problems.
3. Identify and select procedures for various sequencing, assignment, transportation problems.
4. Identify and select suitable methods for various games .
5. To apply linear programming and find algebraic solution to games.

Unit-1 Network optimization models :

[16 hours]

Introduction ,Formulation of Linear Programming Problems., Graphical methods for Linear Programming problems. General formulation of Linear Programming problems, Slack and surplus variables, Canonical form, Standard form of Linear Programming problems. Transportation problem: Introduction, Mathematical formulation ,Matrix form of Transportation problem. Feasible solution, Basic feasible solution and optimal solution, Balanced and unbalanced transportation problems. Methods of Initial basic feasible solutions: North west corner rule [Stepping stone method], Lowest cost entry method [Matrix minima method], Vogel's Approximation method [Unit Cost Penalty method] ,The optimality test.[MODI method], Assignment Models :Introduction ,Mathematical formulation of assignment problem, Hungarian method for assignment problem. Unbalanced assignment problem. Travelling salesman problem.

Unit-2 Quantitative techniques:

[16 hours]

Game theory: Basic definitions , Minimax [Maximin] Criterion and optimal strategy, Saddle point , optimal strategy and value of game. Solution of games with saddle point. Fundamental theorem of game theory [Minimax theorem] , Two by two (2 X 2) games without saddle point. Algebraic method of Two by two (2 X 2) games. Arithmetic method of Two by two (2 X 2) games. Graphical method for 2 x n games and m x 2 games. Principle of dominance, Job sequencing : Introduction. Terminology and notations. Principal assumptions. Solution of sequencing problems. Processing n jobs through 2 machines. Processing n jobs through 3 machines. Processing 2 jobs through m machines. Processing n jobs through m machines.

Recommended Book:

1. Sharma S.D., Operations Research - Theory Methods and Applications”Kedarnath, Ramnath Meerut, Delhi Reprint 2015.

Reference Books:

1. Mohan, C. and Deep, Kusum, Optimization Techniques, New Age, 2009.
2. Mittal, K. V. and Mohan, C., Optimization Methods in Operations, Research and Systems Analysis, New Age, 2003.
3. Taha, H.A. :Operations Research – An Introduction, Prentice Hall, (7th Edition), 2002.
4. Ravindran, A. , Phillips, D. T and Solberg, J. J., Operations Research: Principles and Practice, John Wiley and Sons, 2nd Edition, 2009.
5. J.K. Sharma : Operation Research: Theory and Applications, Laxmi Publications, 2017.
6. Kanti Swarup, P.K. Gupta and Manmohan, Operation Research, S.Chand & Co.
7. G. Hadley: Linear programming , Oxford and IBH Publishing Co.

B.Sc. (Mathematics) (Part-III) (Semester-V)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: DSE – E12

Theory: 32 Hrs. (40 Lectures of 48 minutes)

Course Objective : Students be able to

1. understand concept of Laplace Transform.
2. apply properties of Laplace Transform to solve differential equations.
3. understand relation between Laplace and Fourier Transform.
4. understand infinite and finite Fourier Transform.
5. apply Fourier transform to solve real life problems.

Title of Course: Integral Transforms

Marks – 40 (Credits: 02)

Unit: 1 Laplace and Inverse Laplace Transform.

16 Hours

Laplace Transform : Definitions; Piecewise continuity, Function of exponential order, Function of class A, Existence theorem of Laplace transform. Laplace transform of standard functions. First shifting theorem and Second shifting theorem and examples, Change of scale property and examples, Laplace transform of derivatives and examples, Laplace transform of integrals and examples. Multiplication by power of t and examples. Division by t and examples. Laplace transform of periodic functions and examples. Laplace transform of Heaviside's unit step function. Inverse Laplace Transform: Definition Standard results of inverse Laplace transform, Examples, First shifting theorem and Second shifting theorem and examples. Change of scale property and Inverse Laplace of derivatives, examples. The Convolution theorem and Multiplication by S , examples. Division by S , inverse Laplace by partial fractions, examples, Solving linear differential equations with constant coefficients by Laplace transform.

Unit 2 Fourier Transform

16 Hours

The infinite Fourier transform and inverse: Definition examples Infinite Fourier sine and cosine transform and examples. Definition: Infinite inverse Fourier sine and cosine transform and examples. Relationship between Fourier transform and Laplace transform. Change of Scale Property and examples. Modulation theorem. The Derivative theorem. Extension theorem.

Convolution theorem and examples. Finite Fourier Transform and Inverse, Fourier Integrals :

Finite Fourier sine and cosine transform with examples. Finite inverse Fourier sine and cosine transform with examples. Fourier integral theorem. Fourier sine and cosine integral (without proof) and examples.

Recommended Book:

1. J.K.Goyal, K.P.Gupta, Laplace and Fourier Transforms, A Pragati Edition (2016).

Reference Books:

1. Dr.S.Shrenadh, Integral Transform, S.ChandPrakashan.
2. B.Davies, Integral Transforms and Their Applications, Springer Science Business Media LLC(2002)
3. Murray R. Spiegel, Laplace Transforms, Schaum's outlines.

B.Sc. (Mathematics) (Part-III) (Semester–VI)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: DSE – F9

Theory: 32 Hrs. (40 Lectures of 48 minutes)

Title of Course: Metric Spaces

Marks – 40 (Credits: 02)

Course objectives : Upon successful completion of this course, the student will be able to:

1. acquire the knowledge of notion of metric space, open sets and closed sets.
2. demonstrate the properties of continuous functions on metric spaces,
3. apply the notion of metric space to continuous functions on metric spaces.
4. understand the basic concepts of connectedness, completeness and compactness of metric spaces,
5. appreciate a process of abstraction of limits and continuity to metric spaces,

Unit –1 Limits and Continuous Functions on Metric Spaces 16 hours

Limit of a function on the real line, Metric Spaces, Limits in Metric Spaces, Functions continuous at a point on the real line, Reformulation, Functions continuous on a metric space, Open Sets, Closed Sets, More about open sets.

Unit 2: Connectedness, Completeness and Compactness 16 hours

Connected Sets, Bounded sets and totally bounded sets, Complete metric spaces, Compact metric spaces, Continuous functions on compact metric spaces.

Recommended Book:

1. R. R. Goldberg, Methods of Real Analysis, Oxford and IBH Publishing House. (2017).

Reference Books:

1. T. M. Apostol, Mathematical Analysis, Narosa Publishing House. (2002)
2. Satish Shirali, H. L. Vasudeva, Mathematical Analysis, Narosa Publishing House. (2013)
3. D. Somasundaram, B. Choudhary, First Course in Mathematical Analysis, Narosa Publishing House, (2018).
4. W. Rudin, Principles of Mathematical Analysis, McGraw Hill Book Company (1976).
5. Shantinarayan, Mittal, A Course of Mathematical Analysis, S. Chand and Company (2013).
6. J.N. Sharma, Mathematical Analysis-I, Krishna Prakashan Mandir, Meerut. (2014)
7. S.C. Malik, Savita Arora, Mathematical Analysis, New age International Ltd (2005).

B.Sc. (Mathematics) (Part-III) (Semester-VI)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: DSE – F10

Title of Course: Linear Algebra

Theory: 32 Hrs. (40 Lectures of 48 minutes)

Marks – 40 (Credits: 02)

Course Objectives: Upon successful completion of this course, the student will be able to:

1. understand notion of vector space, subspace, basis.
2. understand concept of linear transformation and its application to real life situation.
3. work out algebra of linear transformations.
4. appreciate connection between linear transformation and matrices.
5. work out eigen values, eigen vectors and its connection with real life situation.

Unit 1: Vector Spaces and Linear Transformations

(16 hours)

Vector space: Subspace, Sum of subspaces, direct sum, Quotient space, Homomorphism or Linear transformation, Kernel and Range of homomorphism, Fundamental Theorem of homomorphism, Isomorphism theorems, Linear Span, Finite dimensional vector space, Linear dependence and independence, basis, dimension of vector space and subspaces.

Linear Transformation: Rank and nullity of a linear transformation, Sylvester's Law, Algebra of Linear Transformations, Sum and scalar multiple of Linear Transformations. The vector space of Homomorphisms, Product (composition) of Linear Transformations, Linear operator, Linear functional, Invertible and non-singular Linear Transformation, Matrix of Linear Transformations and its examples.

Unit 2: Inner Product Spaces, Eigen values and Eigen vectors

(16 hours)

Inner product spaces: Norm of a vector, Cauchy-Schwarz inequality, Orthogonality, Generalized Pythagoras Theorem, orthonormal set, Gram-Schmidt orthogonalization process, Bessel's inequality, Eigen values and Eigen vectors: Eigen space, Characteristic Polynomial of a matrix and remarks on it, similar matrices, Characteristic Polynomial of a Linear operator, Examples and real life (Predatory – Prey problem), examples on eigen values and eigen vectors.

Recommended Book:

1. Khanna V. K. and Bhambri S. K., **A Course in Abstract Algebra**, Vikas Publishing House PVT Ltd., New Delhi, 2016, 5th edition,

Reference Books:

1. H. Anton & C. Rorres, **Elementary Linear Algebra** (with Supplemental Applications), Wiley India Pvt. Ltd (Wiley Student Edition), New Delhi, 2016, 11th Edition.
2. S. Friedberg, A. Insel and L. Spence, **Linear Algebra**, Prentice Hall of India, 2014, 4th Edition.
3. Holfman K. and Kunze R., **Linear Algebra**, Prentice Hall of India, 1978.
4. Lipschutz S., **Linear Algebra**, Schaum's Outline Series, McGraw Hill, Singapore, 1981.
5. David Lay, Steven Lay, Judi McDonald, **Linear Algebra and its Applications**, Pearson Education Asia, Indian Reprint, 2016, 5th Edition.

B.Sc. (Mathematics) (Part-III) (Semester–VI)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: DSE – F11

Title of Course: Complex Analysis

Theory: 32 Hrs. (40 Lectures of 48 minutes)

Marks – 40 (Credits: 02)

Course objectives: Upon successful completion of this course, Students will

1. learn basic concepts of functions of complex variable.
2. be introduced to concept of analytic functions.
3. learn concept of complex integration and basic results thereof.
4. be introduced to concept of sequence and series of complex variable.
5. learn to apply concept of residues to evaluate certain real integrals.

Unit 1 : Analytic functions and Complex Integration

16 hours

Basic algebraic and geometric properties of complex numbers, Function of complex variable, Limits, continuity and differentiation, Cauchy Riemann equations, Analytic functions and examples of analytic functions, Exponential function, Logarithmic function, Trigonometric function, Definite integrals of functions, Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals, Cauchy-Goursat theorem and examples, Cauchy integral formula and examples, Liouville's theorem and the fundamental theorem of algebra.

Unit 2 : Sequences, Series and Residue Calculus

16 hours

Convergence of sequences and series of complex variables, Taylor series and its examples, Laurent series and its examples, absolute and uniform convergence of power series, Isolated singular points, Residues, Cauchy's residue theorem, Residue at infinity, The three types of isolated singularities, Residues at poles and examples, Zeros of analytic functions, Zeros and poles, Application of residue theorem to evaluate real integrals.

Recommended book:

1. James Ward Brown and Ruel V. Churchill, *Complex Variables and Applications*, 8th Ed., McGraw – Hill Education (India) Edition, 2014. Eleventh reprint 2018.

Reference books:

1. S.Ponnusamy, *Foundations of Complex Analysis*, Narosa Publishing House, Second Edition , 2005, Ninth reprint 2013.
2. Lars V Ahlfors, *Complex Analysis*, McGraw-Hill Education; 3 edition (January 1, 1979).
3. S.B.Joshi, T.Bulboaca and P.Goswamy, *Complex Analysis, Theory and Applications*, DeGruyter, Germany(2019).

B.Sc. (Mathematics) (Part-III) (Semester-VI)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: DSE – F12

Title of Course: Discrete Mathematics

Theory: 32 Hrs. (40 Lectures of 48 minutes)

Marks – 40 (Credits: 02)

Course Objectives: Upon successful completion of this course, Students will be able to

1. use classical notions of logic: implications, equivalence, negation, proof by contradiction, proof by induction, and quantifiers.
2. apply notions in logic in other branches of Mathematics.
3. know elementary algorithms : searching algorithms, sorting, greedy algorithms, and their complexity.
4. apply concepts of graph and trees to tackle real situations.
5. appreciate applications of shortest path algorithms in computer science.

Unit 1 : Mathematical Logic

[16 hours]

The logic of compound statements: Statements, compound statements, truth values, logical equivalence, tautologies and contradictions, Conditional statements: Logical equivalences involving implication, negation. The contrapositive of a conditional statements, converse, inverse of a conditional statements, biconditional statements. Valid and invalid arguments: Modus Ponens and modus Tollens, Additional valid argument forms, rules of inferences, contradictions and valid arguments, Number system: Addition and subtraction of Binary, decimal, quinary, octal, hexadecimal number systems and their conversions.

Unit 2: Graphs and trees

[16 hours]

Graphs :Definitions, basic properties, examples, special graphs, directed and undirected graphs, concept of degree, Trails, Paths and Circuits: connectedness, Euler circuits, Hamiltonian circuits, Matrix representation of graphs, Isomorphism of graphs, isomorphic invariants, graph isomorphism for simple graphs.

Trees: Definitions and examples of trees, rooted trees, binary trees and their properties. spanning trees , minimal spanning trees, Kruskal's algorithm , Prim's algorithm, Dijkstra's shortest path algorithm.

Recommended Book:

1. Susanna S. Epp, Discrete Mathematics with Applications, PWS Publishing Company, 1995. (Brooks/Cole, Cengage learning, 2011)

References Books :

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, McGraw Hill, 2002.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure with Applications, McGraw– Hill.
3. V. Krishnamurthy, Combinatorics: Theory and Applications”, East-West Press.
4. Kolman, Busby Ross, Discrete Mathematical Structures, Prentice Hall International.
5. R M Somasundaram, Discrete Mathematical Structures, (PHI) EEE Edition 7.
6. A.B.P. Rao and R.V. Inamdar, A Graduate Text in Computer Mathematics, SUMS [1991]
7. Seymour Lipschutz and Marc Lipson, Discrete Mathematics, Schaum's Outlines Series, Tata McGraw - Hill.
8. Mathematical Foundations of Computer Science: professional publications, JNTU Hyderabad.
11. Liu C. L, Elements of Discrete Mathematics, McGraw – Hill.

===***===

B.Sc. (Mathematics) (Part-III) (Semester–V & VI)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: CCPM IV

Title of Course: Operation Research

Sr.No.	Title of the experiment	Sessions
1	Graphical method for linear programming problems	1
2	Transportation Problems[North west corner rule]	1
3	Transportation Problems[Lowest Cost Entry Method]	1
4	Transportation Problems[Vogel Approximation Method]	1
5	Transportation Problems[Test for Optimality MODI method]	1
6	Assignment Problems [Hungarian Method]	1
7	Assignment Problems [Maximization Case]	1
8	Assignment Problems[Travelling Salesman Problem]	1
9	Assignment Problems[Unbalanced Problem]	1
10	Two by two (2 X 2) games without saddle point.	1
11	Algebraic method of Two by two (2 X 2) games.	1
12	Arithmetic method of Two by two (2 X 2) games.	1
13	Graphical method for 2 x n games and m x 2 games.	1
14	Processing n jobs through 2 machines.	1
15	Processing n jobs through 3 machines.	1
16.	Processing 2 jobs through m machines. Processing n jobs through m machines.	1
	Total	16

B.Sc. (Mathematics) (Part-III) (Semester–V & VI)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: CCPM V

Title of Course: Laplace and Fourier Transform

Sr.No.	Title of the experiment	Sessions
1	Laplace transform of elementary functions	1
2	Evaluation of integrals using properties of Laplace transform	1
3	Effect of multiplication	1
4	Effect of division	1
5	Laplace transform of integrals	1
6	Laplace transform of periodic functions	1
7	Inverse Laplace by using standard results	1
8	Inverse Laplace by Convolution theorem	1
9	Inverse Laplace by partial fractions	2
10	Infinite Fourier sine transform and inverse	1
11	Infinite Fourier cosine transform and inverse	1
12	Change of scale property of Fourier transform	1
13	Convolution theorem of Fourier transform	1
14	Finite Fourier sine transform and inverse	1
15	Finite Fourier cosine transform and inverse	1
	Total	16

B.Sc. (Mathematics) (Part-III) (Semester–V & VI)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: CCPM VI

Title of Course: **Mathematical Computation Using Python**

Sr. No.	Topic	No. Of Practicals
1	Introduction to Python: Python, Anaconda, Spyder IDE, Python Identifiers and Keywords , data types, simple mathematical operation, Indentation and Comments., Input and Output, First Python program.	1
2	Expression and operators: Expression, Boolean expression, logical operations: comparison operator, membership operator, identity operator, bitwise operator. Order of evaluation. File Handling : open, read, write, append modes of file.	1
3	Conditional Statements: if-else, nested if-else, if-elif-else, try-except block.	1
4	Looping Statements, Control statements: Looping Statements: for loop, while loop , Nested loops Control Statements: break, continue and pass.	1
5	Functions: Built-in functions, User-defined functions, Arguments, recursive function, Python Anonymous/Lambda Function, Global, Local and Nonlocal variables and return statement.	1
6	Modules and packages in Python : Modules, import, import with renaming, from-import statement, math module ,cmath module , random module, packages.	1
7	Python Data structure: Strings, list, tuples, dictionary, set and array.	1
8	Operations on set and array: Set operations, Intersection, union, difference, symmetric difference, searching and sorting.	1
9	Systems of linear algebraic equations: Gauss Elimination Method, LU Decomposition Methods	1
10	Roots of Equations: Bisection, Newton-Raphson Method	1
11	Initial Value Problems: Euler's Method, Runge-Kutta Methods.	1
12	Magic square and Area calculation without measurement.	1
13	Graph Theory : Networkx Graph, nodes, edges, directed graph, multigraph, drawing graph, Google page rank by random walk method	1
14	Collatz conjecture and Monte Hall problem	1
15	Data compression using Numpy	1
16	Data visualization in Python: 2D and 3D plot in python : line plot, bar plot, histogram plot, scatter plot, pie plot, area plot, Mandelbrot fractal set visualization.	1
	Total	16

Recommended Book:

1. JaanKiusalaas, *Numerical Methods in Engineering with Python3*, Cambridge University Press.
2. Amit Saha, *Doing Math with Python*, No Starch Press, 2015.
3. YashwantKanetkar and Aditya Kanetkar, *Let Us Python*, BPB Publication, 2019.

B.Sc. (Mathematics) (Part-III) (Semester–V & VI)
(Choice Based Credit System)
(Introduced from June 2020)

Course Code: CCPM VII

Title of Course: Project, Study- Tour, Viva – Voce

A :PROJECT [30 Marks]

Each student of B.Sc. III is expected to read, collect, understand the culture of Mathematics, its historic development. He is expected to get acquainted with Mathematical concepts, innovations, relevance of Mathematics. Report of the projectwork should be submitted through the respective Department of Mathematics. Evaluation of the project report will be done by the external examiners at the time of annual examination.

B. STUDY TOUR [05 Marks] :

It is expected that the tour should contain at least renown academic institution so that the visiting students will be inspired to go for higher studies in Mathematics.

C. SEMINARS: [05 Marks]

Students should present a seminar before the B.Sc.III class on some topic in Mathematics.

D. VIVA-VOCE (on the project report). [10 Marks]

Nature of Question papers (Theory)

Common nature of question for theory paper mentioned separately:

There will be practical at the end of second term that is annual pattern,

Nature of Practical Question Paper

(1) Core Course Mathematics Practicals - IV

This carries 50 marks.

Examination : 40 Marks

Journal : 10 Marks

(2) Core Course Mathematics Practicals - V

This carries 50 marks.

Examination : 40 Marks

Journal : 10 Marks

(3) Core Course Mathematics Practicals - VI

This carries 50 marks.

Examination : 40 Marks

Journal : 10 Marks

(4) Core Course Mathematics Practicals - VII

This carries 50 marks.

Project : 30 Marks (External Examiner)

Study Tour : 05 Marks (External Examiner)

Seminar : 05 Marks (External Examiner)

Viva Voce : 10 Marks (External Examiner)

Note : Each student of a class will select separate topic for project work. He/ She should submit the reports of his / her project work , Study tour report to the department and get the same certified.

Teaching Periods :

(i) Total teaching periods for Paper –DSE E-9, E-10,E-11,E-12, F-9,F-10, F-11,F-12 are 12 (Twelve) per week. 3 (Three) periods per paper per week.

(ii) Total teaching periods for CCPM-IV, V,VI,VII for the whole class are 20 (Twenty) per week. 5 (Five) periods per Lab. Perweek.

Shivaji University, Kolhapur

B.O.S. in Chemistry

B.Sc. Part – III

Semester CBCS Syllabus

To be implemented from June - 2020

Draft Syllabus

INTRODUCTION

This syllabus is prepared to give the sound knowledge and understanding of chemistry to undergraduate students at last year of the B.Sc. degree course. The goal of the syllabus is to make the study of chemistry as stimulating, interesting and relevant as possible. The syllabus is prepared by keeping in mind the aim to make students capable of studying chemistry in academic and industrial courses and to expose the students, to develop interest in them in various fields of chemistry. The new and updated syllabus is based on disciplinary approach with vigour and depth taking care the syllabus is not heavy at the same time it is comparable to the syllabi of other universities at the same level. The syllabus is prepared after discussions of number of faculty members of the subject and by considering the existing syllabi of B.Sc. Part-I, II & III, new syllabi of XIth & XIIth standards, syllabi of NET and SET exams. U.G.C. model curriculum, syllabi of different entrance examination and syllabi of other Universities.

The units of the syllabus are well defined and the scope is given in detail. The periods required for units are given. The lists of reference books are given in detail.

OBJECTIVES

1. To promote understanding of basic facts and concepts in Chemistry while retaining the excitement of Chemistry
2. To make students capable of studying Chemistry in academic and Industrial courses and to expose the students to different processes used in Industries and their applications.
3. To expose the students to various emerging new areas of Chemistry and apprise them with their prevalent in their future studies and their applications in various spheres of chemical sciences.
4. To develop problem solving skills in students.
5. To developed ability and to acquire the knowledge of terms, facts, concepts, processes, techniques and principles of subjects.
6. To develop ability to apply the knowledge of contents of principles of chemistry.
7. To inquire of new knowledge of chemistry and developments therein.
8. To expose and to develop interest in the fields of chemistry
9. To develop proper aptitude towards the subjects
10. To develop the power of appreciations, the achievements in Chemistry and role in nature and society.
11. To develop skills required in chemistry such as the proper handling of apparatus and chemicals

Shivaji University, Kolhapur
B.O.S. in Chemistry
B.Sc. Part – III
Semester CBCS Syllabus
To be implemented from June – 2020

Equivalence

Sr. No.	Title of old paper (Syllabus implemented from June-2015)	Title of new paper (To be implemented from June-2020)
1	Paper – IX & XIII Physical Chemistry	Paper IX DSE-E5 and XIII DSE-F5 Inorganic Chemistry
2	Paper – X & XIV: Inorganic Chemistry	Paper- X DSE-E6 and XIV DSE-F6 Organic Chemistry
3	Paper-XI & XV: Organic Chemistry	Paper XI DSE-E7 and XV- DSE-F7 Physical Chemistry
4	Paper-XII & XVI: Analytical & Industrial Chemistry	Paper XII-DSE-E8 and XVI DSE-F8: Analytical & Industrial Chemistry

A repeater candidate, if any, will be allowed to appear for practical examination as per old course up to March / April 2021 examination.

List of Laboratory Equipments

Apparatus & Equipments

1. Digital balance with 1 mg accuracy
2. Conductometer
3. Potentiometer
4. pH Meter
5. Polarimeter
6. Colorimeter
7. Thermostat
8. Electric Oven
9. Suction Pump
10. Crucible Heater
11. IR Lamp
12. Magnetic stirrer
13. Buckner funnel
14. Water bath / Thermostat.
15. Platinum electrode
16. Glass electrode
17. Silver, Zinc, Copper electrodes
18. Conductivity cell
19. Distilled water plant.
20. Refractometer
21. Freeze
22. Deep Freeze
23. H₂S Apparatus
24. Muffle Furnace
25. Magnetic Stirrer

Glassware & Porcelain ware:

1. Burette (25/50 ml)

2. Micro burette (10 ml)
3. Pipette (5 ml, 10 ml, 25 ml)
4. Graduated Pipette (1/2/5/10 ml)
5. Conical flask (100 ml, 250 ml)
6. Beakers (100 ml, 250 ml, 500 ml)
7. Volumetric flask (25 ml, 50 ml, 100 ml, 250 ml)
8. Gooch Crucible / Sintered glass Crucible
9. Silica Crucible
10. Watch glass
11. Glass tubing
12. Glass Funnel (3")
13. Gas jar
14. Glass rod
15. Test Tubes (12 x 100, 5 x 5 x 8)
16. Evaporating dish
17. TLC Unit
18. Measuring cylinder
19. Thiele's tubes
20. Fusion Tube
21. Capillary tube
22. Stopper bottle
23. Thermometer (1/10°, 360°)
24. Water condenser
25. Distillation flask (100 ml/ 250 ml)
26. Titration tiles.
27. Asbestos sheet.
28. Desiccators
29. Clay pipe triangle

Iron & Wooden ware:

1. Burners
2. Tripod stand

3. Iron stand
4. wire gauze
5. Burette stand
6. Test tube stand
7. Pair of tongs
8. Test tube holder
9. Spatula
10. Copper foil

Chemicals: All the chemicals required for experiments are mentioned in the syllabus.

Others:

1. Filter papers (Kalpi)
2. Whatman Filter paper No. 1, 40, 41 and 42.

Lab Safety Precautions / Measures in Chemistry Laboratory:

Part-I: Personal Precautions

1. All personnel must wear safety Goggles at all times.
2. Must wear the Lab. Aprons / Lab jacket and proper shoes.
3. Except in emergency, an over-hurried activity is forbidden.
4. Fume cupboard must be used whenever necessary.
5. Eating, Drinking and Smoking in the laboratories strictly forbidden.

Part-II: Use of safety and Emergency Equipments –

1. First aid kits.
2. Sand Bucket.
3. Fire extinguishers (dry chemical and carbon dioxide extinguisher).
4. Chemical storage cabinet with proper ventilation.
5. Material safety data sheets
6. Management of local exhaust system and fume hoods.
7. Sign in register if using instruments.

Nature of Theory Question Papers

N.B. The question paper should cover the entire syllabus. Marks allotted to questions should be in proportion to the lectures allotted to respective units.

Papers Semester V: IX-DSE-E5, X-DSE-E6, XI- DSE-E7, XII- DSE-E8,

Semester VI: XIII- DSE-F5, XIV-DSE-F6, XV-DSE-F7 and XVI- DSE-F8

Total Marks 40

Question No.	Details	Marks	Marks of Options
1.	Answer in one sentence (One mark for each question).	4	-
	Multiple choice questions (One mark for each question)	4	-
2.	Long answer type questions (2 out of 3)	20	10
3.	Short answer type questions (3out of 5)	12	08
	Total	40	18

SHIVAJI UNIVERSITY, KOLHAPUR
B.O.S. in Chemistry
B.Sc. Part – III
Semester CBCS Syllabus
To be implemented from June – 2020

General Structure

Theory Examination:

There will be four theory papers of 40 marks each for each semester. Their titles and distribution of marks are as follows.

Semester V : Papers IX-DSE-E5, X-DSE-E6, XI- DSE-E7, XII- DSE-E8,

Semester VI: Papers XIII- DSE-F5, XIV-DSE-F6, XV-DSE-F7 and XVI- DSE-F8

Paper – **IX** DSE-E5, & **XIII** DSE-F5: Inorganic Chemistry – 40 marks

Paper – **X** DSE-E6 & **XIV** DSE-F6: Organic Chemistry – 40 marks

Paper – **XI** DSE-E7 & **XV** DSE-F7: Physical Chemistry – 40 marks

Paper – **XII** DSE-E8 & **XVI** DSE-F8: Analytical and Industrial Chemistry – 40 marks

The duration of each theory paper for examination will be of 2 hours

Internal examination (Oral/Seminar/test/home assignment) will be conducted for 10 marks for each paper.

Practical Examination:

Practical examination will be of 200 marks. The distribution of marks will be as follows:

1. Physical Section : 60 marks
2. Inorganic Section : 65 marks
3. Organic Section : 60 marks
4. Project : 15 marks

Total: 200 marks

The duration of practical examination will be of three days – six and half hours per day.

CHEMISTRY
Semester Syllabus for B.Sc.-III

Theory

1. N. B. Figures shown in bracket indicate the total lectures required for the respective topics.
 2. The question paper should cover the entire syllabus. Marks allotted to questions should be in proportion to the lectures allotted to respective topics.
 3. All topics should be dealt with S.I. units.
 4. Study tour/industrial visit/visit to national institute or research laboratory is prescribed.
 5. Use of recent editions of reference books is essential.
 6. Use of scientific calculator is allowed.
 7. **Values required for spectral problems should be provided in the question paper.**
-

B.Sc. Part III (CBCS) SEMESTER-V
Paper No. DSE-E5, Chemistry Paper No. –IX
(Inorganic Chemistry)
(Theory Credits: 02, 30 hours, 37 lectures)

Expected Learning Outcomes:

Name of the topic	Expected Learning Outcome
1. Acids bases and Non-aqueous solvents	Useful for the study of role of acids and bases in Chemistry. The study of non –aqueous solvents is important to learn all chemical properties of solutes and from the research point of view.
2. Metal ligand bonding in transition metal complexes	Useful to understand geometry, stability and nature of bonding between metal ion and ligand in complexes.
3. Metals, semiconductors and Superconductors	The topic deals with the synthesis and the applications of the semiconductors and Superconductors in electrical and electronic devices.
4. Organometallic compounds	The structure, method of preparation and the applications of organo metallic compound in various fields are explained.
5. Catalysis	The classification, types, mechanism and applications of catalyst in industrial fields is explained.

Unit 1. Acids, Bases and Non aqueous Solvents

[8]

1.1 Introduction to theories of Acids and Bases-Arrhenius concept, Bronsted-Lowry concept, Lewis Concept, Lux-Flood Concept (definition and examples)

1.2 Hard and Soft Acids and Bases. (HSAB Concept)

1.2.1 Classification of acids and bases as hard, soft and borderline.

1.2.2 Pearson's HSAB concept.

1.2.3 Acid–Base strength and hardness-softness.

1.2.4 Applications and limitations of HSAB principle.

1.3 Chemistry of Non aqueous Solvents.

1.3.1 Introduction, definition and characteristics of solvents.

1.3.2 Classification of solvents.

1.3.3 Physical properties and Acid-Base reactions in Liquid Ammonia (NH₃) and Liquid Sulphur Dioxide (SO₂).

Unit 2. Metal Ligand bonding in Transition Metal Complexes

[10]

2.1 Crystal field theory (CFT)

2.1.1 Introduction: Shapes of d-orbitals, Basic assumptions of CFT.

2.1.2 Crystal field splitting of d-orbitals of metal ion in octahedral, tetrahedral, square planar complexes and John-Teller distortion.

2.1.3 Factors affecting the Crystal field splitting.

2.1.4 High spin and low spin octahedral complexes w.r.t. Co (II).

2.1.5 Crystal Field stabilization energy (CFSE), Calculation with respect to octahedral complexes only.

2.1.6 Limitations of CFT.

2.2 Molecular orbital theory (MOT).

2.2.1 Introduction.

2.2.2 MOT of octahedral complexes with sigma bonding such as $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$, $[\text{CoF}_6]^{3-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$.

2.2.3 Merits and demerits of MOT.

Unit 3. Metals, Semiconductors and Superconductors.

[9]

3.1 Introduction.

3.2 Properties of metallic solids.

3.3 Theories of bonding in metal.

i. Free electron theory.

ii. Molecular orbital theory (Band theory).

3.4 Classification of solids as conductor, insulators and semiconductors on the basis of band theory.

3.5 Semiconductors- Types - intrinsic and extrinsic and applications of semiconductors.

3.6 Superconductors: Ceramic superconductors - Preparation and structures of mixed oxide $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$.

3.7 Applications of superconductors.

Unit.4. Organometallic Chemistry.**[4]**

- 4.1 Definition, Nomenclature of organometallic compounds.
- 4.2 Synthesis and structural study of alkyl and aryl compounds of Be and Al.
- 4.3 Mononuclear carbonyls -Nature of bonding in simple mononuclear carbonyls.: $[\text{Ni}(\text{CO})_4]$, $[\text{Fe}(\text{CO})_5]$, $[\text{Cr}(\text{CO})_6]$.

Unit 5. Catalysis**[5]**

- 5.1 Introduction
- 5.2 Classification of catalytic reaction- Homogenous and Heterogeneous
- 5.3 Types of Catalysis.
- 5.4 Characteristics of catalytic reactions.
- 5.5 Mechanism of catalysis.
 - i. Intermediate compound formation theory.
 - ii. Adsorption theory.
- 5.6 Industrial applications of catalysis.

Reference Books:

1. Concise Inorganic Chemistry (ELBS, 5th Edition) – J. D. Lee.
2. Inorganic Chemistry (ELBS, 3rd Edition) D. F. Shriver, P. W. Atkins, C. H. Langford, Oxford University Press, 2nd Edition.
3. Basic Inorganic Chemistry : Cotton and Wilkinson.
4. Advanced Inorganic Chemistry (4th Edn.) Cotton and Wilkinson.
5. Concepts and Models of Inorganic Chemistry : Douglas and Mc. Daniel. 3rd Edition. John Wiley publication.
6. Structural principles in inorganic compounds. W. E. Addison.
7. Theoretical principles of Inorganic Chemistry – G. S. Manku.
8. Theoretical Inorganic Chemistry by Day and Selbina.
9. Co-ordination compounds. SFA Kettle.
10. Essentials of Nuclear Chemistry by H. J. Amikar.
11. Nuclear Chemistry by M. N. Sastri.
12. Organometallic Chemistry by R. C. Mahrotra, A. Sing, Wiley Eastern Ltd. New Delhi.
13. Inorganic Chemistry by A. G. Sharpe, Addison – Wesley Longman – Inc.

14. Principles of Inorganic Chemistry by Puri, Sharma and Kalia, Vallabh Publication. Pitampur Delhi.
15. Text book of Inorganic Chemistry by K. N. Upadhyaya Vikas Publishing House – New Delhi.
16. Inorganic Chemistry 3rd Edn G. L. Miessler and D.A. Tarr, pearson publication.
17. Co-ordination compounds by Baselo and Pearson.
18. UGC Inorganic chemistry by H.C. Khera, Pragati prakashan
19. UGC Advanced Inorganic Chemistry by Agarwal and Keemtilal, Pragati Prakashan

B.Sc. Part III (CBCS) SEMESTER-V
Paper No. DSE-E6 Chemistry Paper No. X
(Organic Chemistry)
(Theory Credits: 02, 30 hours, 38 lectures)

Expected learning Outcomes:

Name of the topic	Expected Learning Outcome
1. Introduction to Spectroscopy	Understanding of energy associated with electromagnetic radiation and its use in analytical technique.
2. UV-Vis Spectroscopy	Knowledge of chromophore, auxochrome and calculation of λ_{\max} .
3. IR Spectroscopy	Knowledge of vibrational transitions, regions of IR spectrum, functional group recognition.
4. NMR Spectroscopy	Understanding of magnetic-non magnetic nuclei, shielding-deshielding, chemical shift, splitting pattern
5. Mass spectroscopy.	Knowledge of molecular ion, fragmentation pattern and different types of ions produced.
6. Combined Problems based on UV-Vis, IR, NMR and Mass Spectral data	Student will predict the structure of organic compound with the help of provided spectral data.

Unit 1. Introduction to Spectroscopy

[03]

- 1.1 Meaning of spectroscopy.
- 1.2 Nature of electromagnetic radiation: wavelength, frequency, energy, amplitude, wave number and their relationship.
- 1.3 Different units of measurement of wavelength and frequency.
- 1.4 Different regions of electromagnetic radiations.
- 1.5 Interaction of radiation with matter: absorption, emission, fluorescence and scattering.
- 1.6 Types of spectroscopy and advantages of spectroscopic methods.
- 1.7 Energy types and energy levels of atoms and molecules.

Unit 2. UV-Vis Spectroscopy

[05]

- 2.1 Introduction.
- 2.2 Beer-Lambert's law, absorption of UV radiation by organic molecules leading to different excitations.
- 2.3 Terms used in UV Spectroscopy: Chromophore, Auxochrome, Bathochromic shift, hypsochromic shift, hyperchromic and hypochromic effect.
- 2.4 Modes of electromagnetic transitions.
- 2.5 Effect of conjugation on position of UV band.
- 2.6 Calculation of λ_{\max} by Woodward and Fischer rules for dienes and enones.
- 2.7 Colour and visible spectrum.
- 2.8 Applications of UV Spectroscopy.

Unit 3. IR Spectroscopy

[06]

- 3.1 Introduction.
- 3.2 Principles of IR Spectroscopy.
- 3.3 Instrumentation, schematic diagram.
- 3.4 Fundamental modes of vibrations, types and calculation.
- 3.5 Conditions for absorption of IR radiations.
- 3.6 Regions of IR spectrum, fundamental group region, finger print region.
- 3.7 Hook's Law for Calculation of vibrational frequency.
- 3.8 Factors affecting IR absorption frequency.

3.9 Characteristic of IR absorption of following functional groups a) alkanes, alkenes, alkynes b) alcohol and phenols c) ethers d) carbonyl compounds e) amines f) nitro compounds and g) aromatic compounds.

Unit 4. NMR Spectroscopy

[09]

- 4.1 Introduction.
- 4.2 Principles of PMR Spectroscopy.
- 4.3 NMR- Instrumentation, Schematic diagram.
- 4.4 Magnetic and nonmagnetic nuclei.
- 4.5 Chemical shift: definition, measurement, calculation, Factors affecting Chemical shift.
- 4.6 Shielding & deshielding.
- 4.7 Peak Integration.
- 4.8 Merits of TMS as PMR reference compound.
- 4.9 Coupling Constant.
- 4.10 Types of Coupling Constant.
- 4.11 Spin-spin splitting (n+1 rule).
- 4.12 Applications.

Unit 5. Mass Spectroscopy.

[08]

- 5.1 Introduction.
- 5.2 Principles of mass spectroscopy.
- 5.3 Mass spectrometer - schematic diagram.
- 5.4 Types of ions produced during fragmentation.
- 5.5 Nitrogen rule
- 5.6 Fragmentation patterns of: alkanes, alkenes, aromatic hydrocarbons, alcohols, phenols, amines and carbonyl compounds.
- 5.7 McLafferty rearrangement.
- 5.8 Applications.

Unit 6. Combined Problems based on UV, IR, NMR and Mass Spectral data.

[07]

Reference Books: (Use recent editions)

1. Absorption Spectroscopy of Organic Molecules by V.M.Parikh.
2. Spectroscopy of Organic compounds by P. S. Kalsi.
3. Elementary Organic Absorption Spectroscopy by Y. R. Sharma.
4. Instrumental Methods of Analysis (7th edition) by Willard, Merritt, Dean, Settle.
5. Spectroscopy by G. R. Chatwal and S. K. Anand
6. Spectroscopy by Pavia, Lampman, Kriz, Vyvyan
7. Organic Spectroscopy (2nd edition) by Jag Mohan
8. Organic Spectroscopy (3rd edition) by William Kemp
9. Instrumental Methods of Chemical Analysis by H. Kaur

B.Sc.-III (CBCS) SEMESTER V
Paper No. DSE- E7 Chemistry Paper No. XI
(Physical Chemistry)
(Theory Credits: 02, 30 hours, 38 lectures)

Expected learning Outcomes:

Name of the Topics	Expected Learning Outcome
1. Elementary quantum mechanics	Learning and understanding quantum Chemistry, Heisenberg's uncertainty principle, concept of energy operators (Hamiltonian), learning of Schrodinger wave equation. Physical interpretation of the ψ and ψ^2 . Particle in a one dimensional box
2. Spectroscopy	Knowledge about spectroscopy, Electromagnetic spectrum, Energy level diagram, Study of rotational spectra of diatomic molecules: Rigid rotor model, Microwave oven, vibrational spectra of diatomic molecules, simple Harmonic oscillator model, Raman spectra: Concept of polarizability, pure rotational and pure Vibrational Raman spectra of diatomic molecules, related knowledge will be gained by the students.
3. Photochemistry	Learning and understanding photochemical laws, reactions and various photochemical phenomena.
4. Solution	Learning the various types of solutions, relations vapour pressure, temperature relations.
5. Electromotive force	Learning and understanding the knowledge of emf measurements, types of electrodes, different types of cells, various applications of emf measurements.

Unit 1. Elementary quantum mechanics

[08]

- 1.1 Introduction.
- 1.2 Drawbacks of classical mechanics, Black body radiation, Photoelectric effect, Compton effect, Dual nature of matter and energy: De Broglie hypothesis.
- 1.3 The Heisenberg's uncertainty principle.
- 1.4 Concept of energy operators (Hamiltonian).
- 1.5 Derivation of Schrodinger wave equation, well behaved function.
- 1.6 Physical interpretation of the ψ and ψ^2 .
- 1.7 Particle in a one dimensional box.
- 1.8 Numerical problems.

Unit 2. Spectroscopy

[08]

- 2.1 Introduction.
- 2.2 Electromagnetic radiation.
- 2.3 Interaction of radiation with matter, Electromagnetic spectrum, Energy level diagram.
- 2.4 Rotational spectra of diatomic molecules: Rigid rotor model, moment of inertia, energy levels of rigid rotor, selection rules, Intensity of spectral lines, determination of bond length, isotope effect, Microwave oven
- 2.5 Vibrational spectra of diatomic molecules: Simple Harmonic oscillator model, Vibrational energies of diatomic molecules, Determination of force constant, overtones.
- 2.6 Raman spectra: Concept of polarizability, pure rotational and pure Vibrational Raman spectra of diatomic molecules, selection rules.
- 2.7 Comparative study of IR and Raman spectra, rule of mutual exclusion- CO_2 molecule.
- 2.8 Numerical problems.

Unit 3. Photochemistry

[06]

- 3.1 Introduction, Difference between thermal and photochemical processes.
- 3.2 Laws of photochemistry: i) Grotthus - Draper law ii) Lambert law iii) Lambert – Beer's law (with derivation) iv) Stark-Einstein law.

- 3.3 Quantum yield, Reasons for high and low quantum yield.
- 3.4 Factors affecting Quantum yield.
- 3.5 Photosensitized reactions – Dissociation of H_2 , Photosynthesis.
- 3.6 Photodimerisation of anthracene, decomposition of HI and HBr.
- 3.7 Jablonski diagram depicting various processes occurring in the excited state:
Qualitative description of fluorescence and phosphorescence.
- 3.8 Chemiluminescence, Electroluminescence and Bioluminescence.
- 3.9 Numerical problems.

Unit 4. Solutions

[06]

- 4.1 Introduction.
- 4.2 Ideal solutions, Raoult's law, Vapour pressure of ideal and non ideal solutions of miscible liquids.
- 4.3 Composition of liquid and vapour, vapour pressure and boiling point diagrams of miscible liquids. Distillation of miscible liquid pairs.
Type I : Systems with intermediate total vapour pressure (i.e. System in which b.p. increases regularly – Zeotropic).
Type II : Systems with a maximum in the total vapour pressure (i.e. System with a b.p. minimum – Azeotropic).
Type III : Systems with a minimum in the total vapour pressure (i.e. System with a b.p. Maximum – Azeotropic).
- 4.4 Solubility of partially miscible liquids.
 - i. Maximum solution temperature type: Phenol – water system.
 - ii. Minimum solution temperature type: Triethyl amine – water system.
 - iii. Maximum and minimum solution temperature type: Nicotine – water system.Distillation of partially miscible liquid pairs.
- 4.5 Vapour pressure and distillation of immiscible liquids, steam distillation.

Unit 5. Electromotive force

[10]

(Convention: Reduction potentials to be used)

- 5.1 Introduction
- 5.2 Thermodynamics of electrode potentials, Nernst equation for electrode and cell potentials in terms of activities.
- 5.3 E.M.F. series.
- 5.4 Types of electrodes: Description in terms of construction, representation, half cell reaction and emf equation for
 - i) Metal – metal ion electrode.
 - ii) Amalgam electrode.
 - iii) Metal – insoluble salt electrode.
 - iv) Gas – electrode.
 - v) Oxidation – Reduction electrode.
- 5.5 Reversible and Irreversible cells.
 - i. Chemical cells without transference.
 - ii. Concentration cells with and without transference.
 - iii. Liquid – Liquid junction potential: Origin, elimination and determination.
- 5.6 Equilibrium constant from cell emf, Determination of the thermodynamic parameters such as ΔG , ΔH and ΔS .
- 5.7 Applications of emf measurements :
 - i. Determination of pH of solution using Hydrogen electrode.
 - ii. Solubility and solubility product of sparingly soluble salts (based on concentration cells).
- 5.8 Numerical problems.

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. Nuclear and Radiochemistry by Friedlander, Kennedy and Miller, John Wiley and Sons.
Wiley International edition.
7. Essentials of Nuclear Chemistry by H. J. Arnikar, 4th edition. Wiley Eastern.
8. Principles of Physical Chemistry by Puri, Sharma, Pathania, Shobhanlal Naginchand and Company, Jalandar.
9. Instrumental methods of chemical analysis by Chatwal and Anand, 5th Edition, Himalaya Publication.
10. Fundamentals of molecular spectroscopy by C. N. Banwell – Tata Mc Graw-Hill.
11. Quantum Chemistry including molecular spectroscopy by B. K. Sen, Tata Mc Graw -Hill.
12. Text Book of Physical Chemistry by S. Glasstone, Macmillan India Ltd.
13. Elements of Physical Chemistry by D. Lewis and S. Glasstone (Macmillan).
14. Principles of Physical Chemistry by Maron and Lando (Amerind).
15. Electrochemistry by S. Glasstone.
16. Physical Chemistry by W. J. Moore.
17. Basic Chemical Thermodynamics by V. V. Rao (Macmillan).
18. Essential of Physical Chemistry, Bahl and Tuli (S. Chand).
19. Text Book of Physical Chemistry, Soni and Dharmarha.
20. Advanced Physical Chemistry Gurdeep Raj GOEL Publishing House, 36th Edition

B.Sc. Part III (CBCS) SEMESTER-V
Paper No. DSE-E8 Chemistry paper No. XII
(Analytical Chemistry)
(Theory Credits: 02, 30 hours, 38 lectures)

Expected learning Outcomes:

Name of the topic	Expected Learning Outcome
1.Theory of Gravimetric Analysis	Learning and understanding the techniques of gravimetric analysis.
2.Flame Photometry	Knowledge of instrumental analysis of alkali and alkaline earth elements.
3.Colorimetry and Spectrophotometry	Understanding, working and applications of optical methods as an analytical tool.
4.Potentiometric titrations	Understanding theory and applications of potentiometric titrations.
5.Chromatographic techniques and Quality control	Understanding the basics of ion exchange and column adsorption chromatography, Quality control practices in analytical industries / laboratories.

Unit 1. Theory of Gravimetric Analysis

[08]

- 1.1 Introduction.
- 1.2 Gravimetric analysis by precipitation: nucleation, crystal growth, digestion/ageing, filtration, drying, ignition, weighing.
- 1.3 Optimum conditions for good precipitation.
- 1.4 Physical nature of precipitate.
- 1.5 Purity of precipitate: co-precipitation, post-precipitation.
- 1.6 Organic precipitants and their applications.

Unit 2. Flame Photometry

[06]

- 2.1 Introduction.
- 2.2 General principles of flame photometry.
- 2.3 Instrumentation: Block diagram, Burners (Premix and Lundergraph burners), mirror, slits, filters, detector (Photomultiplier tube).
- 2.4 Effect of solvent in flame photometry.

- 2.5 Experimental procedure of analysis (Standard addition and internal standard).
- 2.6 Interferences and Factors that influence the intensity of emitted radiation in a flame photometer.
- 2.7 Applications of flame photometry in real sample analysis.
- 2.8 Limitations of flame photometry.

Unit 3. Colorimetry and Spectrophotometry

[06]

- 3.1 Theory of colorimetry and spectrophotometry.
- 3.2 Lambert Beer's law, deviation from Beer's law.
- 3.3 Terms used in colorimetry and spectrophotometry.
- 3.4 Classification of methods of 'colour' measurement or comparison.
- 3.5 Photoelectric colorimeter method–Single beam photo-electric colorimeter.
- 3.6 Spectrophotometer method–Single beam direct reading spectrophotometer.
- 3.7 Determination of unknown concentration by using concentration-absorbance plot.
- 3.8 Applications of colorimetry and spectrophotometry.

Unit 4. Potentiometric titrations

[07]

- 4.1 Introduction.
- 4.2 Determination of pH.
- 4.3 Study of Quinhydrone and Glass electrodes and their use in determination of pH.
- 4.4 Potentiometric titrations: Classical and analytical methods for locating end points.
- 4.5 Acids- Bases titration with suitable example.
- 4.6 Redox titration with suitable example.
- 4.7 Precipitation titration with suitable example.
- 4.8 Basic circuit of direct reading potentiometer.
- 4.9 Advantages of potentiometric titrations.

Unit 5. Chromatographic techniques and Quality control

[10]

- 5.1 Introduction, classification.

- 5.2 **Column chromatography:** Introduction, types, Principle of adsorption column chromatography, solvent system, stationary phases, Methodology-Column packing, applications of sample, development, detection methods, recovery of components, Applications.
- 5.3 **Ion exchange chromatography:** Introduction, Principle, Types and properties of ion exchangers, Methodology-Column packing, application of sample, elution, detection/analysis, Applications.
- 5.4 **Concepts in Quality control**
- i. Introduction and Concept of quality.
 - ii. Quality control.
 - iii. Quality assurance.
 - iv. ISO series.
 - v. Good laboratory practices.

References

1. Text Book of Quantitative inorganic analysis – A.I.Vogel.
2. Instrumental methods of chemical analysis –Willard, Merit & Dean.
3. Instrumentals methods of chemical analysis – Chatwal & Anand.
4. Vogel's textbook of qualitative inorganic analysis – Bassett, Denny etc.
5. Textbook of qualitative inorganic analysis – Kolthoff and Sandel.
6. Fundamentals of analytical chemistry – Skoog and West.
7. Basic concepts of analytical chemistry – S.M. Khopkar.
8. Text book of qualitative chemical analysis – Vogel.
9. Handbook of quality assurance for the analytical chemistry laboratory – James P.Dux, Van Nostrand Reinhold, New York 1986.
10. Instrumental methods of chemical analysis – H.Kaur.
11. A text book of Quantitative chemical analysis Vogel's by J.Mendham, R. C. Denney.
12. Quantitative Chemical Analysis – Daniel C. Harris.
13. Applying ISO 9000 Quality management system, International trade centre publishing genera, Indian edition printed by D. L. Shaha Trust.

B.Sc. Part III (CBCS) SEMESTER -VI
Paper No. DSE-F5, Chemistry Paper No. –XIII
(Inorganic Chemistry)
(Theory Credits: 02, 30 hours, 38 lectures)

Expected Learning Outcome

Name of the topic	Expected Learning Outcome
1.Coordination Chemistry	The topic focused on the mechanism of the reactions involved in inorganic complexes of transition metals. The students can understand the thermodynamic and kinetic aspects of metal complexes.
2.Nuclear Chemistry	The generation of nuclear power with the help of nuclear reactions is highlighted. Role of radio isotopes in medicinal, industrial and Archaeology fields is explained.
3.Chemistry of f-block Elements	The characteristics, properties and separation of lanthanides and Actinides are discussed. Synthesis and IUPAC Nomenclature of trans uranic elements (TU) explained.
4.Iron and Steel	The techniques involve in ore dressing and extraction of cast iron from its ore are discussed.
5.Bio –inorganic Chemistry	Role of various metals and non metals in our health are discussed.

Unit 1. Coordination Chemistry

[12]

A. Inorganic Reaction mechanism

- 1.1 Introduction.
- 1.2 Classification of Mechanism: Association, dissociation, interchange and the rate determining steps.
- 1.3 S_N^1 and S_N^2 reactions for inert and labile complexes.
- 1.4 Mechanism of substitution in cobalt (III) octahedral complexes.
- 1.5 Trans effect and its theories.
- 1.6 Applications of trans effect in synthesis of Pt (II) complexes.

B. Thermodynamic and Kinetic aspects of metal complexes.

- 1.7 Introduction.
- 1.8 Thermodynamic stability.

- 1.9 Kinetic Stability.
- 1.10 Relation between thermodynamic and kinetic stability.
- 1.11 Stepwise stability constant.
- 1.12 Factor affecting the stability of complexes.
- 1.13 Determination of Stability constant by Job variation, Mole ratio and Slope ratio method.

Unit 2. Nuclear Chemistry [05]

- 2.1 Nuclear reactions and energetic of nuclear reactions.
- 2.2 Types of nuclear reactions
 - i. Artificial transmutation.
 - ii. Artificial radioactivity.
 - iii. Nuclear fission and its application in heavy water nuclear reactor.
 - iv. Nuclear fusion.
- 2.3 Use of Thorium, Uranium and Plutonium in atomic energy
- 2.4 Applications of radio-isotopes as tracers.
 - i. Chemical investigation – Esterification.
 - ii. Structural determination – Phosphorus pentachloride.
 - iii. Analytical Chemistry – Isotopic dilution method for determination of volume of blood.
 - iv. Age determination – Dating by C^{14} .

Unit 3. Chemistry of f- Block Elements [09]

A | Lanthanides

- 3.1 Introduction.
- 3.2 Occurrence.
- 3.3 Electronic Configuration.
- 3.4 Oxidation State.
- 3.5 Lanthanide contraction.
- 3.6 Separation of Lanthanides by Ion exchange method.

B) Actinides

3.7 Position in periodic table.

3.8 Electronic configuration.

3.9 General methods of preparation of transuranic elements.

i. Neutron capture – followed by β decay.

ii. Accelerated projectile bombardment.

iii. Heavy ion bombardment.

3.10 IUPAC nomenclature of the super heavy elements with atomic number (Z) greater than 100.

Unit 4. Iron and Steel.

[07]

4.1 Occurrence and ores of iron.

4.2 Definition of the Terms- Ore, Mineral, Slag, Flux, Gangue, Matrix, Calcinations, Reduction, Roasting, Smelting and Leaching.

4.3 Extraction of iron by Blast furnace.

4.4 Steel: Definition and types.

4.5 Conversion of cast iron into steel by

i. Bessemer process.

ii. L.D. process.

4.6 Heat treatment on steel.

Unit 5. Bio-inorganic Chemistry.

[05]

5.1 Introduction.

5.2 Essential and trace elements in biological process.

5.3 Metalloporphyrins with special reference to hemoglobin and myoglobin.

5.4 Biological role of alkali and alkaline earth metal ions with special referenc to Na^+ , K^+ and Ca^{2+}

Reference Books: (Use recent editions)

1. Concise Inorganic Chemistry (ELBS, 5th Edition) – J. D. Lee.

2. Inorganic Chemistry (ELBS, 3rd Edition) D. F. Shriver, P. W. Atkins, C. H. Langford, Oxford University Press, 2nd Edition.
3. Basic Inorganic Chemistry : Cotton and Wilkinson.
4. Advanced Inorganic Chemistry (4th Edn.) Cotton and Wilkinson.
5. Concepts and Models of Inorganic Chemistry : Douglas and Mc. Daniel. 3rd Edition. John Wiley publication.
6. Structural principles in inorganic compounds. W. E. Addison.
7. Theoretical principles of Inorganic Chemistry – G. S. Manku.
8. Theoretical Inorganic Chemistry by Day and Selbine.
9. Co-ordination compounds. SFA Kettle.
10. Essentials of Nuclear Chemistry by H. J. Arnikar.
11. Nuclear Chemistry by M. N. Sastri
12. Organometallic Chemistry by R. C. Mahrotra A. Sing, Wiley Eastern Ltd. New Delhi.
13. Inorganic Chemistry by A. G. Sharpe, Addison – Wesley Longman – Inc.
14. Principles of Inorganic Chemistry by Puri, Sharma and Kalia, Vallabh Publication. Pitampur Delhi.
15. Text book of Inorganic Chemistry by K. N. Upadhyaya Vikas Publishing House – New Delhi.
16. Inorganic Chemistry 3rd edn G. L. Miessler and D.A. Tarr, Pearson publication
17. Co-ordination compounds by Baselo and Pearson.
18. UGC Inorganic chemistry by H.C. Khera, Pragati prakashan
19. UGC Advance Inorganic Chemistry by Agarwal and Keemtilal, Pragati Prakashan

B.Sc. Part III (CBCS) SEMESTER-VI
Paper No. DSE-F6 Chemistry Paper No. XIV
(Organic Chemistry)
(Theory Credits: 02, 30 hours, 38 Lectures)

Expected learning Outcomes:

Name of the topic	Expected Learning Outcome
1. Reagents and Reactions in Organic Synthesis	Knowledge of reagents used in organic transformations and various reactions used in organic synthesis.
2. Retrosynthesis	Knowing basic terms used in retrosynthetic analysis, retrosynthesis of some organic compounds.
3. Electrophilic addition to $>C=C<$ and $-C\equiv C-$ bond	Student will learn addition reaction across $>C=C<$ bond w.r.t. hydrohalogenation, hydration hydroxylation, ozonolysis and addition of halogen, halogen acid, hydrogen, water, etc. across $-C\equiv C-$ bond.
4. Natural Products	Knowledge of terpenoids and alkaloids w.r.t. occurrence, isolation, characteristics and classification. Analytical and synthetic evidences of Citral and Nicotine.
5. Pharmaceuticals	Understanding classification of drugs, Qualities of ideal drug. Synthesis and uses of some representative drugs and Drug action of sulpha drugs.

Unit 1. Reagents and Reactions in Organic Synthesis

[10]

A) Reagents

Preparation and Applications of following reagents.

1. Lithium aluminium hydride $LiAlH_4$.
2. Raney Nickel.
3. Osmium tetroxide.

4. Selenium dioxide (SeO_2).
5. Dicyclohexyl Carbodiimide (DCC).
6. Diazomethane.

B] Reactions

Statement, General Reaction, Mechanism and Synthetic applications

1. Diels -Alder reaction.
2. Meerwein –Pondorff-Verley reduction.
3. Hofmann rearrangement.
4. Wittig reaction.
5. Wagner- Meerwein rearrangement.
6. Baeyer Villiger oxidation.
7. Problem based on above reactions.

Unit 2. Retrosynthesis

[06]

- 2.1 Introduction.
- 2.2 Recapitulation of basics of reaction mechanism and reagents.
- 2.3 Terms used- Target molecule (TM), Disconnection, Synthons, Synthetic equivalence, Functional group interconversion (FGI), one group disconnection (w. r. t. suitable examples).
- 2.4 Retrosynthetic analysis and synthesis of target molecules: Cinnamaldehyde, Cyclohexene, para methoxy acetophenone, Methyl-3-phenyl propionate, α,α -dimethyl benzyl alcohol, Paracetamol.

Unit 3. Electrophilic addition to $>\text{C}=\text{C}<$ and $-\text{C}\equiv\text{C}-$ bonds [08]

A. Addition to Carbon-Carbon double ($>\text{C}=\text{C}<$) bond:

- 3.1 Introduction.
- 3.2 Examples of addition reactions.
- 3.3 Mechanism of electrophilic addition to $>\text{C}=\text{C}<$ bond, orientation & reactivity,
 - i. Hydrohalogenation.
 - ii. Anti-Markovnikoff's addition (peroxide effect).
 - iii. Rearrangements (support for formation of carbocation).

- iv. Addition of halogens.
- v. Addition of water.
- vi. Addition of hypohalous acids (HO-X).
- vii. Hydroxylation (formation of 1,2-diols).
- viii. Hydroboration-oxidation (formation of alcohol).
- ix. Hydrogenation (formation of alkane).
- x. Ozonolysis (formation of aldehydes & ketones).

B. Addition to Carbon-Carbon triple ($-C\equiv C-$) bond:

3.4 Introduction.

3.5 Examples of addition reactions.

3.6 Mechanism of electrophilic addition to $-C\equiv C-$ bond.

- i. Addition of halogens.
- ii. Addition of halogen acids.
- iii. Addition of hydrogen.
- iv. Addition of water.
- v. Formation of metal acetylides.

Reference books:

1. Organic Reactions and Their Mechanisms P. S. Kalsi 3rd Revised edition.
2. Advanced organic Chemistry by B.S. Bahl & Arun Bhal (Reprint in 1997)
3. Organic Chemistry by Morrison and Boyd 6th edition.

Unit 4. Natural Products

[08]

A] Terpenoids:

- 4.1 Introduction, Occurrence, Isolation, General Characteristic, Classification.
- 4.2 General Methods for structure determinations.
- 4.3 Isoprene rule.
- 4.4 Analytical evidences and synthesis of Citral.

B] Alkaloids:

- 4.5 Introduction, Occurrence, Isolation, Classification, Properties.
- 4.6 General Methods for structure determination.

4.7 Analytical evidences and synthesis of Nicotine.

Unit 5. Pharmaceuticals

[06]

- 5.1 Introductio.
- 5.2 Classification.
- 5.3 Qualities of ideal drug.
- 5.4 Synthesis and uses of ethambutal, phenobarbitone, isoniazide, benzocaine, Chloramphenicol, paludrine.
- 5.5 Drug action of sulpha drugs.

Reference books:1

1. Advanced Organic Chemistry : Reactions, Mechanisms and structure by – Jerry March.
2. Reagents for Organic Synthesis by Louis F. Fieser , Mary Fieser -1967.
3. A Text book of Practical Organic Chemistry including Qualitative Organic Analysis by A. I.Vogel.
4. Mechanism and Structure in Organic Chemistry. April,1963 By Edwin S.Gould.
5. A text book of Organic Chemistry by Arun Bahl, B.S.Bhal Eighteenth Revised edition 2006.
6. A guidebook to mechanism in Organic Chemistry sixth Edition by Peter Syke.
7. Organic Synthesis: The Disconnection Approach by Stuart Warren.
8. Organic Synthesis Through Disconnection Approach by P. S. Kalsi
9. Fundamentals of Organic Synthesis the Retrosynthetic Analysis by Ratan Kumar Kar
10. Organic Reactions and Their Mechanisms P. S. Kalsi 3rd Revised edition.
11. Advanced organic Chemistry by B.S. Bahl & Arun Bhal (Reprint in 1997)
12. Organic Chemistry by Morrison and Boyd 6th edition.
13. Organic Chemistry Vol II Stereochemistry and the Chemistry of Natural Products (5th ed) by I. L.Finar.
14. Organic Chemistry Natural Products Vol I, by O. P.Agrawal
15. Industrial Chemistry-B.K. Sharma, Goyal publishing house,Mirut
16. Shreeves chemical process industries 5th Edition, G.T. Oustin, McGrawHill
17. Riegel`s hand book of Industrial chemistry, 9th Edition, Jems A.Kent
18. Industrial chemistry –R.K. Das, 2nd Edition,1976.

19. Synthetic drugs by M.S.Yadav,Campus book international.

B.Sc. III (CBCS) SEMESTER-VI
Paper No. DSE-F 7 Chemistry Paper No. XV
(Physical Chemistry)
(Theory Credits: 02, 30 hours, 37 Lectures)

Expected Program Outcomes:

Name of the Topics	Expected Learning Outcome
1. Phase equilibria	Learning and understanding of phase rule, learning of One component, Two component and Three component systems phase diagrams with suitable examples.
2. Thermodynamics	Knowledge about basic concept of Thermodynamics, free energy, Gibbs-Helmholtz equation and its applications, problem related with it.
3. Solid state chemistry	Learning and understanding Space lattice, lattice sites, Lattice planes, Unit cell. Laws of crystallography, Weiss indices and Miller indices, Cubic lattices and types of cubic lattice, planes or faces of a simple cubic system, Diffraction of X-rays, Derivation of Bragg's equation. Determination of crystal structure by Bragg's method. crystal structure of NaCl and KCl on the basis of Bragg's equation.
4. Chemical kinetics	Learning of kinetics, Simultaneous reactions such as i)opposing reaction ii)side reaction iii)consecutive reactions: iv) chain reaction v) explosive reaction
5. Distribution law	Learning and understanding the knowledge of distribution law, its modifications, applications of distribution laws, process of extraction, determination of solubility, distribution indicators, molecular weights.

Unit 1. Phase Equilibria

[07]

1.1 Introduction.

1.2 Gibbs phase rule : Phase rule equation and explanation of terms involved in the equation.

1.3 Phase diagram, true and metastable equilibria.

1.4 One component systems:

- i. Water system.
- ii. Sulphur system with explanation for polymorphism.

1.5 Two component systems:

- i. Eutectic system: (Ag – Pb system); Desilverisation of lead.
- ii. Freezing mixture: (KI – H₂O system).
- iii. Formation of compound with congruent melting point (FeCl₃ – H₂O).

1.6 Three component solid-liquid system:

- i. Development of triangular phase diagram: (Acetic acid – Chloroform – water system).

Unit 2. Thermodynamics

[09]

2.1 Introduction.

2.2 Free energy: Gibbs function (G) and Helmholtz function (A), Criteria for thermodynamic equilibrium and spontaneity.

2.3 Relation between ΔG and ΔH : Gibbs-Helmholtz equation.

2.4 Phase equilibria : Clapeyron – Clausius equation and its applications.

2.5 Thermodynamic derivation of law of mass action, Van't – Hoff isotherm and isochore.

2.6 Fugacity and activity concepts.

2.7 Partial molar quantities, Partial molar volume, Concept of chemical potential, Gibbs-Duhem equation.

2.8 Numerical problems.

Unit 3. The Solid State

[09]

3.1 Introduction: Space lattice, lattice sites, lattice planes, unit cell.

3.2 Laws of crystallography:

- i. Law of constancy of interfacial angles
- ii. Law of rational indices
- iii. Law of crystal symmetry.

3.3 Weiss indices and Miller indices.

- 3.4 Cubic lattice and types of cubic lattice, planes or faces of a simple cubic system, spacing of lattice planes.
- 3.5 Diffraction of X-rays, Derivation of Bragg's equation.
- 3.6 Determination of crystal structure by Bragg's method.
- 3.7 Determination of crystal structure of NaCl and KCl on the basis of Bragg's equation.
- 3.8 Numerical problems.

Unit 4. Chemical Kinetics

[06]

- 4.1 Introduction.
- 4.2 Simultaneous reactions such as
 - i. Opposing reaction: (Derivation of rate equation for first order opposed by first order expected).
 - ii. Side reaction.
 - iii. Consecutive reactions.
 - iv. Chain reaction.
 - v. Explosive reaction (Derivation of rate equation and Numerical problems are not expected).

Unit 5. Distribution law

[06]

- 5.1 Introduction, solute, solvent and solution, miscible and immiscible liquids.
- 5.2 Nernst distribution law and its limitations.
- 5.3 Modification of distribution law with respect to change in molecular state of solute (association and dissociation of solute in one of the solvent).
- 5.4 Applications of the distribution law
 - i. Process of extraction (derivation expected).
 - ii. Determination of solubility of solute in particular solvent.
 - iii. distribution indicators.
 - iv. determination of molecular weight of solute in different solvents.
- 5.5 Numerical problems.

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. Nuclear and Radiochemistry by Friedlander, Kennedy and Miller, John Wiley and Sons. Wiley International edition.
7. Essentials of Nuclear Chemistry by H. J. Arnikar, 4th edition. Wiley Eastern.
8. Principles of Physical Chemistry by Puri, Sharma, Pathania, Shobhanlal Naginchand and Company, Jalandar.
9. Instrumental methods of chemical analysis by Chatwal and Anand, 5th Edition, Himalaya Publication.
10. Fundamentals of molecular spectroscopy by C. N. Banwell – Tata Mc Graw-Hill.
11. Quantum Chemistry including molecular spectroscopy by B. K. Sen, Tata Mc Graw -Hill.
12. Text Book of Physical Chemistry by S. Glasstone, Macmillan India Ltd.
13. Elements of Physical Chemistry by D. Lewis and S. Glasstone (Macmillan).
14. Principles of Physical Chemistry by Maron and Lando (Amerind).
15. Electrochemistry by S. Glasstone.
16. Physical Chemistry by W. J. Moore.
17. Basic Chemical Thermodynamics by V. V. Rao (Macmillan).
18. Essential of Physical Chemistry, Bahl and Tuli (S. Chand).
19. Text Book of Physical Chemistry, Soni and Dharmarha.
20. Advanced Physical Chemistry Gurdeep Raj GOEL Publishing House, 36th Edition

B. Sc. Part III (CBCS) SEMESTER-VI
Paper No. DSE-F8 Chemistry Paper No. XVI
(Industrial Chemistry)
(Theory Credits: 02, 30 hours, 38 lectures)

Expected learning Outcomes:

Name of the topic	Expected Learning Outcome
1.Sugar Industry	Learning and understanding the whole process of manufacture of sugar and byproducts of sugar industry.
2.Manufacture of industrial heavy chemicals	Learning and understanding of physico-chemical principles of production of ammonia, sulfuric acid, nitric acid and sodium carbonate along with its manufacturing plant.
3.Synthetic polymers	Understanding and learning the classification, synthesis and applications of various polymers.
4.Petroleum industry and eco-friendly fuels	Understanding the petroleum Industry, fuels and need of use of ecofriendly fuels.
5.Nanotechnology	Understanding and learning of nanotechnology including classification, optical properties, synthesis routes, characterization techniques and applications of nano-materials.

Unit 1. Sugar Industry

[07]

- 1.1 Introduction.
- 1.2 Manufacture of cane sugar in India: Extraction of juice, Clarification, Concentration, crystallization, centrifugation and other details of industrial process.
- 1.3 Byproducts of sugar industry.
- 1.4 Manufacture of Ethyl Alcohol from Molasses: by Fermentation.

Unit 2. Manufacture of Industrial Heavy Chemicals

[08]

- 2.1 Introduction
- 2.2 Manufacture of Ammonia (NH₃)
 - i. Physico-chemical principles.

ii. Manufacture by Haber's process.

2.3 Manufacture of Sulphuric acid (H_2SO_4)

i. Physico-chemical principles.

ii. Manufacture by Contact process.

2.4 Manufacture of Nitric acid (HNO_3)

i. Physico-chemical principles.

ii. Manufacture by Ostwald's process (Ammonia oxidation process).

2.5 Manufacture of Sodium carbonate (Na_2CO_3) (Washing soda).

i. Physico-chemical principles.

ii. Manufacture by Solvay process.

Unit 3. Synthetic Polymers

[08]

3.1 Introduction.

3.2 Classification.

i. Based on origin.

ii. Based on composition-organic, inorganic polymers.

iii. Based on method of preparation.

iv. Based on general physical properties.

v. Based on structure.

3.3 Addition Polymerization: Free radical addition and ionic addition polymerization.

3.4 Ziegler-Natta polymerization.

3.5 Methods of preparation and applications of some organic polymers: Polyethylene, polystyrene, polyvinyl chloride, Phenol-formaldehyde resin.

3.6 Conducting organic polymers: Synthesis and properties of Polyaniline, polypyrrole.

3.7 Applications of conducting organic polymers.

Unit 4. Petroleum industry and eco-friendly fuels

[07]

A] Petroleum industry

Introduction, occurrence, composition of petroleum, resources, processing of petroleum, calorific value of fuel, cracking, octane rating (octane number), cetane

number, flash point, petroleum refineries, applications of petrochemicals, synthetic petroleum, lubricating oils & additives.

B| Fuels

Fuels and eco-friendly fuels: liquid, gaseous fuel (LPG, CNG), fossil fuels, diesel, bio diesel, gasoline, aviation fuels. Use of solar energy for power generation.

Unit 5. Nanotechnology

[08]

- 5.1 Introduction of nanotechnology, history, Classification of nanoparticles based on size.
- 5.2 Optical properties of Nanomaterial's
 - i. Semiconducting NPs.
 - ii. Metallic NPs.
- 5.3 Synthetic Routes of nanomaterials: Top-down and bottom-up approaches.
- 5.4 Synthesis methods: Sol-gel, precipitation, chemical reduction, chemical vapor deposition, hydrothermal, electrodeposition.
- 5.5 Characterization of nanomaterials: X-Ray diffractometer, Scanning Electron Microscope, Transmission electron microscope.
- 5.6 Applications of nanotechnology.

References:

1. Industrial Chemistry-B.K. Sharma
2. Chemical process industries – Shrieve & Brink
3. Industrial chemistry – Kent
4. Industrial chemistry – Rogers
5. Industrial chemistry – R. K. Das
6. Mechanical chemistry – Burger
7. Nanotechnology: Principles and Practices – Sulbha Kulkarni
8. The Petroleum chemicals industry by R. F. Goldstine, e &Fn London
9. Fundamentals of petroleum chemical technology by P Below.
10. Petro Chemicals Volume 1 and 2 ; A Chauvel and Lefevrev ; Gulf Publishing company

Laboratory Course (Practicals)

N. B. (i) Use of Digital/Analytical/Chainometric/Single pan balance is allowed.

(ii) Use of Scientific calculator is allowed.

(iii) Use of Chart/Text book/Hand book of practical is allowed.

(iv) There will be a project having weightage of 15 marks.

Project should be in the following areas but focused on applications of Chemistry.

a) Society oriented

b) Daily use

c) Industry based

d) Analysis based

The project will be assessed by all the three examiners with equal weightage at the time of practical examinations.

The project may be completed individually or by a group of students not exceeding number three.

One copy of the project should be submitted at the time of examination. After assessment this copy will remain in the department.

INORGANIC CHEMISTRY

I) Gravimetric Estimations (G).

N. B. Any **two** experiments from G1 to G3 and any **two** experiment from G4 & G6.

G1. Gravimetric estimation of iron as ferric oxide (Fe_2O_3) from the given solution containing ferrous ammonium sulphate, copper sulphate and free sulphuric acid.

G2. Gravimetric estimation of zinc as zinc pyrophosphate from the given solution

containing zinc sulphate, ferrous ammonium sulphate and free sulphuric acid.

- G3.** Gravimetric estimation of barium as barium sulphate(BaSO_4) from the given solution containing barium chloride, ferric chloride and free hydrochloric acid.
- G4.** Gravimetric estimation of barium as barium chromate(BaCrO_4) from the given solution containing barium chloride, ferric chloride and free hydrochloric acid.
- G5.** Gravimetric estimation of nickel as bis (dimethylglyoximate) nickel (II) from the given solution containing nickel sulphate, ferrous ammonium sulphate and free Sulphuric acid.
- G6.** Gravimetric estimation of aluminium as aluminium oxinate potassium tris (8-hydroxy quinolato) aluminium (III) from the given solution containing potash alum ,copper sulphate and free sulphuric acid.

[For the gravimetric experiments, stock solution should be given in the range of 10 to 15 cm^3 and asked to dilute to 100 cm^3 (or the stock solution should be given in the range of 20 to 30 cm^3 and asked to dilute to 250 cm^3). Use 50 cm^3 of this diluted solution for estimation.]

II. Inorganic Preparations (P).

N. B. At least **six** preparations from the following with **percentage yield**:

- P1.** Preparation of potassium trioxalato aluminate (III).
- P2.** Preparation of Tetra ammine copper (II) chloride.
- P3.** Preparation of tris(thiourea) copper (I) sulphate.
- P4.** Preparation of potassium trioxalato ferrate (III).
- P5.** Preparation of chloropenta-ammine cobalt (III) chloride.
- P6.** Preparation of ammonium diamminetetra-thiocyanato chromate (III) (Reineck's salt).
- P7.** Preparation of Potassium hexa nitro cobaltate (III).

P8. Preparation of ammonium trioxalato chromate (III).

P9. Preparation of hexathiourea plumbus (II) nitrate.

A) Percentage Purity

N. B. : Any **two** from the following.

V1. Determination of percentage purity of ferrous ammonium sulphate.

V2. Determination of percentage purity of tetrammine copper (II) sulphate.

V3. Determination of percentage purity of potassium (trioxalato-aluminate) (III).

B) Analysis of Commercial Sample.

N. B. Any **Three** from the following:

V5. Determination of percentage of Calcium in the given sample of milk powder or lime.

V6. Determination of amount of aluminum in the given solution of potash alum.

V7. Determination of titrable acidity in the given sample of milk or lassi.

V8. Determination of percentage purity of boric acid using supplied sodium hydroxide.

(Standard succinic or oxalic acid solution to be prepared to standardise the given sodium hydroxide solution.)

V9. To determine the amount of HCl in given of commercial samples.

C) Ion exchange method.

N. B. Any **two** from the following.

V10. Determination of amount of sodium present in the given solution of common salt using cation exchange resin (By Acid Base titration).

V11. Determination of amount of magnesium in the given solution containing (Mg^{2+} and Zn^{2+}) using anion exchange resin and standard solution of EDTA.

V12. Determination of amount of zinc in the given solution containing (Mg^{2+} and Zn^{2+})
using anion exchange resin and standard solution of EDTA.

Reference Books:

1. A text book of quantitative Inorganic Analysis - A. I. Vogel.
2. Text book of Quantitative Inorganic Analysis - Kolthoff and Sandell.
3. Experimental Inorganic Chemistry - Palmer W. G.
4. Advanced Practical Inorganic Chemistry - Adams and Raynor.
5. Manual in Dairy Chemistry - I.C.A.R. Sub-Committee on Dairy Education.
6. Chemical methods for environmental analysis - R. Ramesh and M. Anbu.

ORGANIC CHEMISTRY

I) Qualitative analysis

Separation of binary mixture and Identification of **one** component. (At least 08 mixtures)

- Nature
- 1) Solid – Solid : 4 mixtures
 - 2) Solid – Liquid : 2 mixtures
 - 3) Liquid – Liquid : 2 mixtures

1) Solid – Solid Mixtures:

One mixture from each the following types should be given:

- i) Acid+Phenol
- ii) Acid + Base
- iii) Acid+Neutral
- iv) Phenol +Base
- v) Phenol+Neutral
- vi) Base +Neutral

2) Solid – Liquid Mixtures

Mixture of type Neutral + Neutral or Acid + Neutral should be given.

3) Liquid – Liquid Mixtures

Mixture of type Neutral + Neutral or Base + Neutral should be

Given. Following compounds should be used for preparation of mixtures

- i) Acids: Benzoic acid, Phthalic acid, Salicylic acid, Cinnamic acid, Aspirin, Oxalic acid.
- ii) Phenols: α -naphthol, β -naphthol.
- iii) Bases: o-nitroaniline, m-nitroaniline, p-nitroaniline, aniline, o-toluidine and N, N-dimethylaniline.
- iv) Neutrals: Anthracene, acetanilide, m-dinitrobenzene, chloroform, carbon tetrachloride, acetone, nitrobenzene, ethyl acetate, ethyl benzoate, bromobenzene, urea and thiourea.

NB :

- 1. For Solid-Liquid and Liquid-Liquid mixtures avoid detection of type of mixture. Instead the weightage is given to detection of nature and separation of mixture.
- 2. Separation and qualitative analysis of the binary Mixtures should be carried out on microscale using microscale kits.

II) Quantitative analysis: Organic Estimations:(Any four)

- 1. Estimation of sucrose
- 2. Saponification value of oil.
- 3. To determine the amount of acid and amide present in the given mixture of acid and amide.
- 4. Determination of Molecular weight of monobasic/dibasic acid by volumetric method.
- 5. Estimation of unsaturation –to estimate the percentage purity of given olefinic compound by bromination method.

Note: Double burette method should be used for titration.

III) Organic Preparations: (Any four)

- 1. Multicomponent reaction - Preparation of Dihydropyrimidone.
- 2. Radical coupling reaction - Preparation of 1,1,2 bis-2naphthol.
- 3. Base catalyzed Aldol condensation- Preparation of Dibenzal propanone.
- 4. Diels Alder reaction- Reaction between Furan and Maleic acid
- 5. Benzil- Benzilic acid rearrangement reaction
- 6. Oxidation reaction – Preparation of Methyl phenyl sulfone.

IV) Preparation of Derivatives:

1. Picrate derivative (naphthalene and α -naphthol).
2. Iodoform (Acetone).
3. Osazone of Carbohydrates (Glucose).
4. Oxalate derivative (of Urea).
5. Nitrate derivative of Urea
6. 2,4-Dinitro phenyl hydrazone (carbonyl compounds)
7. Oxime derivatives (carbonyl compounds)

Or

Determination of structure of organic compound from given NMR spectra.

Ethanol, Ethyl acetate, Benzyl alcohol, Propanoic acid, Butaraldehyde, Ethyl benzoate, Isopropyl benzene, Propyl ether, n-pentane, Propene, Diethyl amine, 2-chloro butane.

NB: All preparations should be carried out by considering green Chemistry approach

1. Preparation of derivative should be carried out on small scale. The starting compound should not be given more than one gram.
2. Calculation of percentage practical yield in preparation is must.
3. Recrystallization of crude product and its melting point.
4. The product should be confirmed by TLC.
5. Assign reactions with mechanism.

Reference books:

1. Practical Organic Chemistry by – A.I.Vogel.
2. Practical Organic Chemistry by – O. P. Agarwal

PHYSICAL CHEMISTRY

I. Non instrumental Experiments:

A. Any one of the following

i) Partition Law.

To determine the partition coefficient of CH_3COOH between H_2O and CCl_4 .

ii) Viscosity.

To determine the viscosity average molecular weight of a polymer.

iii) Adsorption.

To investigate the adsorption of oxalic acid by activated charcoal and test the validity of Freundlich & Langmuir isotherms.

iv) Solubility.

To study the effect of addition of electrolyte (NaCl or KCl) on the solubility of Benzoic acid at room temperature.

B. Chemical kinetics. (Any four)

1. The study of energy of activation of first order reaction i.e. hydrolysis of methyl acetate in presence of $0.5 \text{ N HCl} / 0.5 \text{ N H}_2\text{SO}_4$.
2. The study of energy of activation of second order reaction i.e. reaction between $\text{K}_2\text{S}_2\text{O}_8$ and KI (Equal concentrations).
3. The study of energy of activation of second order reaction i.e. reaction between $\text{K}_2\text{S}_2\text{O}_8$ and KI (Unequal concentrations).
4. To study the hydrolysis of methyl acetate by using its two concentrations in presence of 0.5 N HCl and hence find velocity constant of the reaction.
5. To study the effect of addition of electrolyte (KCl) on the reaction between $\text{K}_2\text{S}_2\text{O}_8$ and KI (Equal concentrations).

C. Partial molar volume.

1. To determine the partial molar volume of ethyl alcohol in a mixture of ethyl alcohol and water (Any seven mixtures be given).

II. Instrumental experiments

A. Potentiometry (Any four)

1. Titration of strong acid with strong alkali.

N.B. i) 8 to 10 ml of 1N acid solution to be given by examiner in 100 ml volumetric flask & student should dilute it to 100 ml and 10ml of this solution is taken for titration.

ii) Experiment is carried out by taking pilot run from 1 to 10 ml and then final run taking 0.2 ml reading in the range of end point.

2. Preparation of buffer solution and determination of their pH (Any five buffer solutions), Theoretical calculation of pH values by using Henderson's equation.

3. Determination of standard electrode potential of Zn/Zn⁺⁺, Cu/Cu⁺⁺, Ag/Ag⁺ (Any two).

4. Estimate the amount of Cl⁻, Br⁻ and I⁻ in given unknown halide mixture by titrating it against standard AgNO₃ solution.

5. Titration of ferrous ammonium sulphate using K₂Cr₂O₇ solution and to calculate redox potential of Fe⁺⁺, Fe⁺⁺⁺ system.

B. Conductometry (Any three).

N.B. i) 8 to 10 ml of 1N acid solution to be given by examiner in 100 ml volumetric flask & student should dilute it to 100 ml and 10ml of this solution is taken for titration.

1. Titration of a mixture of weak acid and strong acid with strong alkali

2. To study the effect of substituent on dissociation constant of weak acid with respect to acetic acid and monochloroacetic acid (cell constant to be given).

N.B. Calculate K by using formula $K = \alpha^2 \cdot C / (1 - \alpha)$

3. To determine the velocity constant of hydrolysis of ethyl acetate by NaOH solution by conduct metric method.

4. To determine the normality of citric acid in lemon by titrating it against standard 0.2 N NaOH solution by conduct metric method.

5. To determine λ_{∞} of strong electrolyte (NaCl or KCl) and to verify Onsager equation.

C. Refractometry. (Any One)

1. To determine the percentage composition of unknown mixture by (i) graphical method and (ii) by composition law (Densities of pure liquids A & B be given).

2. To determine the molar refractivity of methyl acetate, ethyl acetate, n-hexane and

carbon tetrachloride and calculate the refraction equivalents of C, H and Cl atoms.

D. Colorimetry (Any Two).

1. To verify Lambert – Beer’s law using CuSO_4 solution.
2. To estimate of Fe^{+++} ions by thiocyanate method.
3. To estimate Fe^{+++} ions using salicylic acid by colorimetric titration.
4. To determine the order of reaction for the oxidation of alcohol by potassium dichromate and potassium permanganate in acidic medium colorimetrically.

E. pH – metry (Any One).

1. To determine the dissociation constant of monobasic acid (Acetic acid).
2. To determine the dissociation constant of dibasic acid (Malonic acid).
3. To determine hydrolysis constant of aniline hydrochloride.

Reference Books:

1. Findlay’s Practical Physical Chemistry (Longman)
2. Advanced Practical Physical Chemistry by J. B. Yadav, Goel publishing house.
3. Practical Physical Chemistry by B. D. Khosla, V. C. Garg (R. Chand and Co.)
4. Systematic experimental Physical Chemistry by Rajbhoj, Chandekar (Anjali Publicaiton) Aurangabad.
5. Practical Physical Chemistry: Nandkumari, Kothari and Lavande.
6. Practical Physical Chemistry by Gurtu (S. Chand).
7. Text Book of Qualitative Inorganic Analysis by A. I. Vogel (ELBS Longman).

Nature of Practical Examination

- 1) The practical examination will be of **200** marks.
- 2) The duration of practical examination will be of **three days - six and half hour per day**.
- 3) Questions related to the practical exercise/project report/industrial visit carried out by the student should be asked in viva.
- 4) Use of scientific calculator is allowed.

- 5) S.I. units should be used wherever possible.
- 6) Use of Chart / Hand book / Text book of practical is allowed.
- 7) A student is expected to submit a journal certified by the Head of the Department.
- 8) A student not be permitted to appear at the practical examination unless he/she produces a certified journal. If the journal is lost, the student should produce a certificate from the Head of the Department stating that he/she has satisfactory completed the practical work but his / her journal is lost.
- 9) Use of Digital / Analytical / Chainometric / Single pan balance is allowed.
- 10) A student should submit one copy of project at the time of examination.**
- Each examiner should asses the project work for Five marks and sign the same. If any student will not submit project work, he/she will be given Zero mark for the project.**

11) The distribution of marks for practical examination will be as follows:

A) Physical Chemistry 60 marks

- i) Non-instrumental experiment 25 marks
- ii) Instrumental experiment 25 marks
- iii) Viva 05 marks
- iv) Journal 05 marks

B) Inorganic Chemistry 65 marks

- i) Gravimetric analysis 25 marks
- ii) Preparation 15 marks
- iii) Volumetric estimation 15 marks
- iv) Viva 05 marks
- v) Journal 05 marks

C) Organic Chemistry 60 marks

i) Mixture separation and identification of compounds 25 marks

ii) Estimation/Preparation 20 marks

iii) Derivative 05 marks

iv) Viva 05 marks

v) Journal 05 marks

D) Project 15 marks

Total:- 200 marks

Draft Syllabus

B.Sc. Programme structure (CBCS Pattern)

B.Sc. I, B. Sc. II, B. Sc. III Inorganic, Organic, Physical Analytical Chemistry

/ Industrial Chemistry)

B. Sc. I

Semester	Subject	Course Code	Paper No
I	Inorganic Chemistry	DSC-3A	I
	Organic Chemistry	DSC- 4A	II
II	Physical Chemistry	DSC- 3B	III
	Analytical Chemistry	DSC – 4B	IV

B. Sc. II

Semester	Subject	Course Code	Paper No
III	Physical Chemistry	DSC-C3	V
	Industrial Chemistry	DSC- C4	VI
IV	Inorganic Chemistry	DSC- D3	VII
	Organic Chemistry	DSC – D4	VIII

B. Sc III

Semester	Subject	Course Code	Paper No
V	Inorganic Chemistry	DSC-E5	IX
	Organic Chemistry	DSC- E6	X
	Physical Chemistry	DSC- E7	XI
	Analytical Chemistry	DSC – E8	XII
VI	Inorganic Chemistry	DSC-F5	XIII
	Organic Chemistry	DSC- F6	XIV
	Physical Chemistry	DSC- F7	XV
	Industrial Chemistry	DSC – F8	XVI