University of Kota
KOTA

FACULTY OF EDUCATION

SYLLABUS

Integrated Programme of

B.Sc.-B.Ed.

Examination Part- I (2017)

(Part- II (2018), III (2019) & IV (2020) Awaited)

NOTICE

1. Change in syllabus/ordinance/rules/regulations/ syllabi and books may from time to time, be made by amendment or remaking and a candidate shall, accept in so far as the university determines otherwise comply with any change that applies to years he/she has not completed at time of change.
2. All court cases shall be subject to the jurisdiction of Univeristy of Kota headquarter Kota only and not any other place.

Ordinance and Regulations related to the Integrated B.Sc.-B.Ed. Degree

01. The Objective and the Learning outcomes of the Integrated B.Sc.-B.Ed. Degree are-

Objectives:

- To promote capabilities for inculcating national values and goals as mentioned in the constitution of India.
- To act as agents of modernization and social change.
- To promote social cohesion, international understanding and protection of human rights and right of the child.
- To acquire competencies and skills needed for teacher.
- To use competencies and skills needed for becoming an effective teacher.
- To become competent and committed teacher.
- To be sensitive about emerging issues such as environment, population general equality, legal literacy etc.
- To inculcate logical, rational thinking and scientific temper among the students.
- To develop critical awareness about the social issues & realities among the students.
- To use managerial organizational and information & technological skills.

Learning outcomes:

1. Competence to teach effectively two school subjects at the Elementary & secondary levels.
2. Ability to translate objectives of secondary education in terms of specific Programmes and activities in relation to the curriculum.

3. Ability to understand children's needs, motives, growth pattern and the process of learning to stimulate learning and creative thinking to faster growth and development.
4. Ability to use-
5. Individualized instruction
6. Dynamic methods in large classes.
7. Ability to examine pupil's progress and effectiveness of their own teaching through the use of proper evaluation techniques.
8. Equipment for diagnosing pupil progress and effectiveness of their own teachings through the use of proper evaluation techniques.
9. Readiness to spot talented and gifted children and capacity to meet their needs.
10. Ability to organize various school programmes, activities for pupil.
11. Developing guidance point of view in educational, personal and vocational matters.
12. Ability to access the all round development of pupils and to maintain a cumulative record.
13. Developing certain practical skill such as:
    a. Black board work
    b. Preparing improvised apparatus
    c. Preparing teaching aids and ICT.
14. Interest and competence in the development of the teaching profession and education. Readiness to participate in activities of professional organizations.

Integrated Programme of B.Sc.-B.Ed. Degree Shall Consist of

i) First Year B.Sc.-B.Ed. 2017
ii) Second Year B.Sc.-B.Ed. 2018

iii) Third Year B.Sc.-B.Ed. 2019
iv) Final Year B.Sc.-B.Ed. 2020

Duration of the Course - Four Years

Examination after each session in theory papers

Terminal 80 marks or 20 marks = Total 100

Some of the papers are fully Sessional of having according to their practical marks as the case may be Chemistry, Botany, Zoology, Physics & Mathematics.

1. Compulsory Papers :

Year	Paper
Its Year	Gen. English
II Year	Gen. Hindi
III Year	Elementary Computer Application
IV Year	Environmental Studies

*ELIGIBILITY CRITERIAN ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

Group – A :- Subject Speciliasation :

Year	Paper
I Year	Instructional System & Educational Evaluation
II Year	. Peace Education
III Year	Guidance and Counseling in School
IV Year	Physical Education & Yoga

Group-B : Content of Science Subject:- A Student has to opt any three paper form group B.

Chemistry	I, II & III
Botany	I, II & III
Zoology	I, II & III
Physics	I, II & III
Mathematics	I, II & III

Group C: Pedagogy of School Subject A/B : Pedagogy of a School Subject III Year and IV Year(candidate shall be required to offer any two papers from the following, for part-III & part-IV).

Pedagogy of Chemistry
Pedagogy of Botany
Pedagogy of Zoology
Pedagogy of Physics
Pedagogy of Mathematics

- In all the subjects the student has to study a minimum of 12 papers in I year, 12 Paper in II Year. 12Paper in III Year and 7 Paper in IV Year (Total 43Papers).
- Each theory paper will carry 100 marks and content base paper 5(a,b). 6(a,b),
  7 (a,b) will carry 150 marks.(with practical part).

Scheme of Instruction for B.Sc. - B.Ed Courses

Details of courses and scheme of study, titles of the papers, duration etc. for B.Sc-.B.Ed Courses are provided in Tables given below :-

Four Years Integrated Course
Scheme of B.Sc.-B.Ed. I Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.- B.Ed. 01	Gen. English(Compulsory)*	100	-	-	100
II	B.Sc.-B.Ed. 02	Childhood and Growing Up	80	20	-	100
III	B.Sc.-B.Ed. 03	Contemporary India and Education	80	20	-	100
VIII	B.Sc.-B.Ed. 04 (G-A)	Instructional System & Educational Evaluation	80	20	-	100
V VI & VII	B.Sc.-B.Ed 05, 06 & 07 (G-B)	**Content (PCB & PCM Group) (Select any Three)**				
		1. Chemistry(I,II,III)	50+50+50	-	50	200
		2. Botany (I,II,III)	50+50+50	-	50	200
		3. Zoology(I,II,III)	50+50+50	-	50	200
		4. Physics (I,II,III)	50+50+50	-	50	200
		5. Mathematics(I,II,III)	44+66_68	-	22	200
						900

*ELIGIBILITY CRITERIAN ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

Four Years Integrated Course
Scheme of B.Sc.-B.Ed. II Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.-B.Ed. 01	Gen. Hindi(Compulsory)*	100	-	-	100
II	B.Sc.-B.Ed. 02	Knowledge and curriculum	80	20	-	100
III	B.Sc.-B.Ed. 03	Learning and Teaching	80	20	-	100
IV	B.Sc.-B.Ed 04 (G-A)	Peace Education	80	20	-	100
V VI & VII	B.Sc.-B.Ed 05, 06 & 07 (G-B)	**Content (PCB & PCM Group) (Select any Three)** 1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	 50+50+50 50+50+50 50+50+50 50+50+50 66+44+68	 - - - - -	 50 50 50 50 22	 200 200 200 200 200
VIII	B.Sc. - B.Ed	**OPEN AIR / SUPW CAMP** 1. Community Service 2. Survey (Based on social and educational events) 3. Co-Curricular Activities 4. Health and Social awareness programme (DISASTER MANAGEMENT AND CLEANINESS)		25 25 25 25		100
						900+100

*ELIGIBILITY CRITERIAN ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

Four Years Integrated Course
Scheme of B.Sc.-B.Ed. III Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.- B.Ed. 01	Elementary Computer Application (Compulsory)*	100	-	-	100
II	B.Sc.-B.Ed. 02	Language Across the Curriculum	80	20	-	100
IV	B.Sc.-B.Ed-04 (G-A)	Guidance and Counseling in School	80	20	-	100
V VI & VII	B.Sc.-B.Ed 05, 06 & 07 (G-B)	**Content (PCB & PCM Group) (Select any Three)** 1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	 50+50+50 50+50+50 50+50+50 50+50+50 66+66+46	 - - - - -	 50 50 50 50 22	 200 200 200 200 200
VIII	08(a,b)	Pedagogy of a School Subject (part-1) , Ist & IInd Year(candidate shall be required to offer any two papers from the following for part-1 & other for part-2). 1.Mathematics 2. Physics 3. Chemistry 4. Biology	80	20		100

		5. General Science				
Practicum		Special Training Programme • Micro Teaching • Practice Lesson • Observation Lesson • Technology Based Lesson • Criticism Lesson • Attendance /Seminar/ Workshop			10 50 05 05 20 10	100
		Final Lesson	**100**			100
						900+100 +100

*ELIGIBILITY CRITERIAN ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

Four Years Integrated Course
Scheme of B.Sc.-B.Ed. IV Year

Theory Paper	**Course Code**	**Title of the Paper**	**Evaluation**			
			External	**Internal**	**Practical**	**Total**
I	B.Sc .-B.Ed. 01	Environmental Studies (Compulsory)*	100	-	-	100
II	B.Sc - B.Ed. 02	Creating and inclusive school	80	20	-	100
III	B.Sc B.Ed. 03	Understanding Disciplines and Subject	80	20	-	100
IV	B.Sc .-B.Ed. 04(G-A)	Physical Education & Yoga	80	20	-	100

V	B.Sc -B.Ed. 05	Gender, School and Society	80	20	-	100
VI	B.Sc -B.Ed. 06	Assessment for Learning	80	20	-	100
VIII	B.Sc- B.Ed. 08(a,b)	Pedagogy of a School Subject (part-2) , Ist & IInd Year(candidate shall be required to offer any two papers from the following for part-1 & other for part-2). 1.Mathematics 2. Physics 3. Chemistry 4. Biology 5. General Science	80	20	-	100
Practicum		1. Practice teaching 2. Block Teaching (Participation in School Activities Social Participation in Group) 3. Report of any feature of school / case study/action research 4. Criticism Lesson		50 20 10 20		100
		Final Lesson	**100**			**100**
						600+100 +100

*ELIGIBILITY CRITERIAN ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

Four Years Integrated Course
Scheme of B.Sc.-B.Ed.

Compulsory Papers

Year	Paper
Ist Year	Gen. English
II Year	Gen. Hindi
III Year	Elementary Computer Application
IV Year	Environmental Studies

Group – A	Group – B (PCB & PCM Group) (Select any Three)
1. Instructional System & Educational Evaluation 2. Peace Education 3.Guidance and Counseling in School 4. Physical Education & Yoga	1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Mathematics(I,II,III) 5. Physics(I,II,III)

Group C: Pedagogy of School Subject A/B : Pedagogy of a School Subject III Year and IV Year(candidate shall be required to offer any two papers from the following, for part-III & part-IV).

Chemistry
Botany
Zoology
Physics
Mathematics

- In all the subjects the student has to study a minimum of 12 papers in I year, 12 Paper in II Year. 12Paper in III Year and 7 Paper in IV Year (Total 43Papers).
- Each theory paper will carry 100 marks and content base paper 5(a,b). 6(a,b),
  7 (a,b) will carry 150 marks.(with practical part).

Scheme of Instruction for B.Sc. - B.Ed Courses

Details of courses and scheme of study, titles of the papers, duration etc. for B.Sc-.B.Ed Courses are provided in Tables given below :-

Years	Papers	Marks
I Year	12Paper +Practical	750 +150= 900
II Year	12Paper +Practical	750 +150+100= 1000
III Year	12Paper +Practical + Practicum +Final Lesson	750 +150+ 100 +100= 1100
IV Year	7 Paper +Practical + Practicum +Final Lesson	600+100 + 100 = 800
Total	43Papers	2850 +550+200 +200= 3800

O. 321 The objectives of the practical work prescribed for the Integrated Programme of B.Sc.-B.Ed. Degree (Four Year) are follows:

PART II

Practical Work

Objectives:

To develop the ability and self-confidence of pupil teachers:

1. To be conscious of sense of values and need for their inculcation in children through all available means including one's own personal life.
2. Possess a high sense of professional responsibility.
3. Develop resourcefulness, so as to make the best use of the situation available.
4. Appreciate and respect each child's individuality and treat him as independent and integrated personality.
5. Arouse the curiosity and interest of the pupils and secure their active participation in the educative process.
6. Develop in the pupil's capacity for thinking and working independently and guide the pupils to that end.
7. Organize and manage the class for teaching learning.

8. Appreciate the dynamic nature of the class situation and teaching techniques.
9. Define objectives of particular lessons and plan for their achievements.
10. Organize the prescribed subject- matter in relation to the needs, interest and abilities of the pupils.
11. Use the appropriate teaching methods and techniques.
12. Prepare and use appropriate teaching aids, use of the black board and other apparatus and material properly.
13. Convey ideas in clear and concise language and in a logical manner for effective learning.
14. Undertake action research.
15. Give proper opportunity to gifted pupils and take proper care of the back-ward pupils.
16. Co-relate knowledge of the subject being taught with other subjects and with real life situations as and when possible.
17. Prepare and use assignments.
18. Evaluate pupil's progress.
19. Plan and organize co curricular activities and participate in them.
20. Co-operates with school teachers and administrators and learns to maintain school records and registers.

Practical skill to teach the two school subjects offered under Theory papers VIII A/B and the following:

1. Observation of lesson delivered by experienced teachers and staff of the college.
2. Planning units and lessons.
3. Discussion of lesson plans, unit plans and lessons given (including criticism lesson)
4. Organization and participation in co- curricular activities.
5. Setting follows up assignment.

6. Evaluation in terms of educational objectives use of teachers made tests & administration of standardized tests.
7. Black-board work.
8. Practical work connected with school subjects.
9. Preparation and use of audio visual aids related to methods of teaching.
10. Experimental and laboratory work in chemistry, botany, zoology, physics, and mathematics subjects of experimental and practical nature.
11. Study of the organization of work and activities in the school.
12. Observation and assistance in the health education programme.
13. Observation and assistance in the guidance programme.
14. Maintenance of cumulative records.
15. Techniques of teaching in large classes.

O. 322 A candidate has to deliver at least 40 lessons (20 Lessons of one teaching subject in 3rd year & 20 Lessons of other teaching subject in 4th year) in a recognized school under the supervision of the staff of the college shall be eligible for admission to the examination for the degree of B.Sc.-B.Ed.

Notes :-

i. Teaching subject means a subject offered by the candidate at his/her running B.Sc- B.Ed. course either as a compulsory subject or as an optional subject provided that the candidate studied it for at least two years. Thus the qualifying subjects like General English, General Hindi, General Education, and Environment Education. Prescribed for running B.Sc- B.Ed. course of the University or a subject dropped by candidates at the part I stage of the degree course shall not be treated as teaching subjects.

ii. Only such candidate shall be allowed to offer Social Studies for the B.Sc-B.Ed. Examination as have taken their running B.Sc- B.Ed. course with any two subjects out of Chemistry, Biology, Gen. Science, Physics & Maths.

iii. A candidate having Bachelor's Degree in Agriculture will be allowed to offer General Science and Biology for the B.Ed. Examination. General Science may also be allowed to be offered by a candidate possessing the degree of B.Sc. (home Science) or passing the B.Sc. Examination with (i) Chemistry and (ii) Any one subject of life Science, i.e. Biology or Botany or Zoology, General Science may also be allowed to be offered by a candidate possessing the degree of B.sc. Exam in any one subject of life science i.e. Biology, Botany, or Zoology.

O.323 No candidate shall be allowed to appear in the Integrated B.Sc/B.Ed examination I,II,III & IV Year unless he/she has attended (80% for all course work & practicum, and 90% for school internship)

O.324 The examination for Integrated B.Sc.-B.Ed. for Four Year shall be in two parts- part 1st comprising theory papers & part 2 practice of teaching in accordance with the scheme of examination laid down from time to time.

O.325 Candidates who fail in Integrated B.Sc-B.Ed examination in part 1or/ part 2 the theory of education may present themselves for re-examination there in at a subsequent examination without attending a further course at an affiliated training college.

Provided that a candidate who fails in any one of the theory papers and secures at least 48% marks in the aggregate of the remaining theory papers may be allowed to reappear in the examination in the immediately following year in the paper in which he/she fails only. He/she shall be declared to have passed if he secures minimum passing marks prescribed for the paper in which he appeared and shall be deemed to have secured minimum passing marks only prescribed for the paper (irrespective of the marks actually obtained by him) for the purpose of determining his division in accordance with the scheme of examination. The candidate shall have to repeat the whole examination in subsequent year in case he fails to clear the paper in which he failed.

O.326 Candidates who fail in the Integrated B.Sc-B.Ed. examination part 1 and part 2 only in the practice of teaching may appear in the practical examination in the subsequent year provided that they keep regular terms for four calendar months per year and give at-least 40 lessons(20 in part 1& 20 in part 2) supervised lessons.

O.326 A: A candidate who complete a regular course of study in accordance with the provision laid down in the ordinance, at an affiliated teacher's training college for four academic year but for good reasons fails to appear at the Integrated B.Sc-B.Ed. examination may be admitted to a subsequent examination as an Ex-student as defined in O.325 or O.326 Above.

O.326 B: No candidate shall be permitted to appear as an Ex-student at more than one subsequent examination. The Integrated B.Sc-B.Ed programme shall be of duration of four academic years, which can be completed in a maximum of five years from the date of admission to the Integrated B.Sc.-B.Ed. Degree.

Regulation 42 :-

Scheme of Integrated B.Sc-B.Ed Four Year Examination

The Integrated B.Sc-B.Ed. (Four years) will consist of the following components;

Part I- Main theory papers at B.Sc-B.Ed. I, In Integrated B.Sc.-B.Ed I & IV Year Paper nos. are 01, 02, 03 & 04 in each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Paper 05 A/B, 06 A/B , 07 A/B. in each session are three hours carrying 150 marks (100 marks theory 25 sessional + 25 practical and (08* A/B only in III & IV Year) in each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each.

II, II, IV Year.

Part II- Practice Teaching - Micro Teaching, Internship, Practice Teaching of 20 weeks (10 at B.Sc.-B.Ed Year III & 10 at B.Sc.-B.Ed Year IV) Block Teaching and Criticism and Final Lesson in III & IV Year per teaching subject.

Organization evaluation of practice teaching:

1. Every candidate will teach at-least 40 lessons (20 in III Year & 20 in IV Year) during practice teaching session. At least ten lessons in each subject should be supervised.
2. 40(20+20) lessons as desired in the syllabus should be completed as full period class room lesson. Micro teaching lesson to be used in addition to those 40 lessons for developing certain teaching skills.
3. A minimum of ten lessons in each subject will be supervised evaluated by the subject specialist or a team of specialists of the subjects.
4. By and large, the evaluation of the performance in the practical teaching will be based on the last ten lessons in the subject when the student has acquired some competence and skills of teaching.
5. The internal assessment in practice of teaching will be finalized by the principal with the help of members of the teaching staff and the same will be communicated to the university before the commencement of the practical each year.
6. At Integrated B.Sc-B.Ed III Year each candidate should be prepared to teach one lessons at the final practice examination. At the Integrated B.Sc-B.Ed IV Yaer exam candidate should be prepared to teach two lessons (one in each subject).The external examiners may select at-least

10% of the candidates to deliver two lessons in Integrated B.Sc-B.Ed IV Year.

7. There will be a board of Examiners for the external examination for each college which will examine each candidate in at-least one lesson and a minimum of 15% in two lessons (one in each of the two subjects).
8. The board of Examination will consist of:
   (a) The principal of the college concerned.
   (b) A principal or a senior and experienced member of the teaching staff of another training college, affiliated to University of Kota.
   (c) An external examiner from outside the University of Kota or a senior member of the teaching staff of an affiliated training college.
   (d) The board as far as possible will represent Social science, language and science.
9. Approximately 50 lessons will be examined by the board each day.

Some of the papers are fully Sessional of having according to their practical marks as the case may be Psychology, Drawing, Painting, Geography, Home Science, and Music.

Working out the result and awarding the division:

(1) A candidate in order to be declared successful at the Integrated B.Sc-B.Ed. I, II, III & IV Year Examination shall be required to pass separately in Part I (Theory) and Part II (Practice of Teaching).

(2) For a passing in Part I (Theory) a candidate shall be required to obtain at-least (a) 30 percent marks in each theory paper and sessionals (24 marks

out of 80 and 6 marks out of 20); (b) 30% marks in each theory paper and sessional (11 marks out of 35 & 4 marks out of 15) (c) 36 percent marks in the aggregate of all the theory papers.

(3) For passing in Part II (school internship Practice of Teaching) a candidate shall be required to obtain separately at-least-

- ❖ 40 percent marks in the external examination.
- ❖ 40 percent marks in internal assessment.

(4) The successful candidates at Integrated B.Sc.-B.Ed Four Year Examination obtaining total marks will be classified in three divisions and shall be assigned separately in theory and school internship Practice of teaching as follows:

Division	**Theory**	**Practice of Teaching**
I	60%	60%
II	48%	48%
Pass	36%	40%

The practical work record shall be properly maintained by the college and may be made available for work satisfaction of external examiner in school internship (practice teaching), those are expected to submit a report regarding this separately.

B.Sc-B.Ed – 01

General English Compulsory

Duration: 2 hrs **Min. Pass Marks: 36**
Max.Marks:100

Objectives

An essentially language based course that aims at making students study English Prose with a view to enlarge their comprehension of the language and develop all the four skills. It also aims at giving them basic skills in grammar, widening their vocabulary and teaching them to write simple and correct English.

The question paper will have 100 multiple choice questions.

1) Comprehension and vocabulary

Prose: Indian Voices: A course in English literature and language; ed. By Kshamta Chaudhary and Sanjay Chawla. Published by Orient Blackswan, Hyderabad. The following chapters from the text have been prescribed:

1.	The Child	:	Premchand
2.	The mark of Vishnu	:	Khushwant Singh
3.	Brain Bhownik's Ailment	:	Satyajit Ray
4.	Drought	:	Sarat Chand Chatterjee
5.	A vision for 2020	:	A.P.J. Abdul Kalam
6.	Elixir of Life	:	C.V. Raman
7.	Photographs	:	Shama Futehally
8.	The death of a Hero	:	Jai Nimbkar

40 Questions based on the content from the

prescribed text. 2). 20 Questions based on one unseen

passage

3). 40 Questions on Basic Language Skills : Parts of speech, Determiners, Voice, Reported-Speech, Correct Verbs, form of Modals, Phrasal Verbs, Prepositions and Question Tags.

RECOMMENDED BOOKS

1. A Practical English Grammar *by* A.J. Thomson & A.V. Martinet
2. Oxford English Grammar Course *by* Michael Swan & Catherine Walter
3. Fundamentals of English Grammar *by* Betty Azar
4. Advanced English Grammar *by* Martin Hewings
5. Practical English Writing Skills *by* Mona Scheraga

6. CVs and Job Applications *by* Judith Leigh
7. How to Write a CV that Works *by* Paul Mcgee
8. Writing Effective Email *by* Nancy Flynn & Tom Flynn

B.Sc-B.Ed – 02

Childhood and Growing up

Marks -100

Objectives:

After completing the course the students will be able:-

1. To develop an understanding of the basic concepts, methods and principles of psychology.
2. To develop an understanding of the nature and process of development.
3. To understand the different periods of life with Psycho-Social Perspective.
4. To develop an understanding of the nature and process of learning in the context of various learning theories and factors.
5. To understand the critical role of learning Environment.
6. To acquaint them with various Psychological attribute of an individual.
7. To reflect on the changing roles of children in contemporary society.

Unit I: Role of psychology to understand the child

- Psychology: Meaning, nature & branches of psychology,
- Methods of psychology: case study and experimental, Edu. Psychology;
- Meaning, nature, scope, educational implication of psychology in new Era,
- Child psychology; meaning, concept

Unit II: Multi dimensional development

- Growth and development- concept, stages principles, dimensions, Factors in influencing development- genetic, biological, environmental and physical
- Theories of development :

a) Piaget's vgotsky cognitive development
b) Freud's psycho- sexual development
c) Erikson's psycho social development
d) Linguistic development
e) Kohlberys' gilligan's moral development
f) Bandura's social developments
g) Gessel's maturation theory

Unit 3: Child Growing up

- Childhood: Meaning, concept and characteristics, effects of family, schools, neighbourhood and community on development of a child
- Adolescence: meaning, concept, characteristics, effects of family, school, pear group, social climate and social media.
- Personality: concept and nature, theories of personality, assessment of personality
- Individual differences: concept, areas (With Special Educational needs-Concept) and educational implication.
- Stress: meaning, types and coping strategies with special reference to personality of adolescent.

Unit 4: Learning to Learn

- Concept and beliefs about learning:-Defining misconception, Brain's role in learning
- Memory and forget, Behaviouristic learning theories (Thorndike, Skinner, Pavlov),Gestalt, Cognitive and Field theory, Information processing theory, Social Constructive approach ,Types of learning by Gagne.
- Motivation:-Concept and Maslow's Hierarchy need theory, Creating and maintaining a productive Classroom Environment:-Dealing with misbehaviour, Multi-Culturalism, Changing roles and responsibilities in contemporary Indian society with regarding educational psychology.

Unit 5: Psychological Attributes of an individual

- Intelligence - Meaning, Types of intelligence - Social, Emotional and Spiritual Intelligence, theory of intelligence, Gardner's Multi intelligence theory, Measurement of intelligence, Creativity - Meaning, Components, ways of enhancing creativity, relation with intelligence and other factors, Measurement of creativity, Higher Level thinking skills - critical thinking, reasoning, problem solving, Decision making.
- Socialization and Mental health: Process of Socialization - Group dynamics - Theory of Kurt lewin's, Leadership and its styles (Kimble young), social prejudice,Mental Health - Common problems related to child - Attention deficit hyperactivity disorder (ADHD), depression, Learning disabilities, dealing with a problematic child.

Test and Assignment:-

- Class Test 10 Marks
- Project (Any one of the following) 10 Marks

Comparative study of developing pattern's of children with reference to different in SES.

Collecting and analyzing statistics on the girl child with reference to gender ratio.

Administration of an experiment on learning, span of attention, memory Administration and interpretation of an individual group test of intelligence.

References:

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3. Arora, Dr. Saroj, Bhargava, Rajshri (2014). Bal Manovigyan, Rakhi Prakashan, Agra

4. Bigge, M.L. (1982). Learning Theories for Teachers. New York: Harper and Row
5. B.P. (2000). Personality theories, Bosten: Allyn and Bacon House.
6. Chauhan, S.S. (2001). Adanaced educational psychology, New Delhi: Vikas Publishing House.
7. Diane E. Papalia, Sally Wendkos olds, Ruth Durkin Feldman, Ninth Edition, Human Development, Tata Mcgraw Hill Publishing company Limited, New Delhi.
8. Helen Bee Denise Boyd, First Indian Reprint 2004. The Developing Child, Published by Pearson Education Pre. Ltd. Indian Branch Delhi, India
9. Jack Snooman, Robert Biehler Ninth Edition. Psychology Applied to Teaching, Houghton Miflin Company, Bosten New York (http://www.coursewise.com)
10. Ormrod Ellis Jenne, Third Edition, Educational Psychology Developing Learners Multimedia Edition (http://www.prenhall.com/ormrod)
11. Sarswat Kuldeep (2015). Bal Vikas evam Bachpan, Published by Rakhi Prakashan, Agra
12. Woolfolk, A. (2004). Educational Psychology published by Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in South Asia.

B.Sc-B.Ed – 03

Contemporary India and Education

MARKS-100

Objectives:-

After completing the course the students will be able to :

1. To promote reflective thinking among students about issues of education related to contemporary India.

2. To develop an understanding of the trends, issues and challenges faced by contemporary education in India.
3. To appreciate the developments in Indian education in the post independence era.
4. To understand the Commissions and committees on education constituted from time to time.
5. To understand issues and challenges of education and concern for the underprivileged section of the society.
6. To develop awareness about various innovation practices in education.
7. To develop and understanding of self teaching technical devices.
8. To understand the constitutional values and provisions for education.

Course Content

Unit I Education as an Evolving Concept

- Education**:** Meaning, concept and nature, Ancient to present education as an organized and institutionalized form, formal and state sponsored activities.
- Aims of Education**:** Historicity of aims of Education, changing aims of education in the context of globalization, sources of aims of Education: Educational aims as derived from the constitution of India influence of aims of education on the curriculum and transactional strategies. Idea of educational thinkers such as Gandhi, Tagore, Aurobindo, Dewey Krishnamurthy, Friere and Illich.

Unit – II: Issues and Challenges

- Diversity, Inequality, Marginalization:- Meaning, Concept, Levels with special reference to Individual, Region, Language, Caste, Gender.
- Role of education in multicultural and multilingual society for Equalization and Improvement of Marginalization groups.
- Hindrances of Education in India: Quality, Facilities, Access, Cost, Political unwillingness, Youth unsatisfaction, Moral Crisis.

Unit – III: Constitution and Education

- Study of the Preamble, fundamental rights and duties of citizens, Directive Principles for state and constitutional values of Indian Constitution.
- Constitutional provisions for education and role of education in fulfillment of the constitutional promise of Freedom, Equality Justice, Fraternity.
- Education and politics, Constitutional vision related to aims of education, Peace Education, Role of Education, School and Teachers as agents for Imparting Culture, Education and Development. Education and Industrialization.

Unit – IV: Programme and Policies

- Overview the development of education system in India from 1948 to 2010 University Education Commission-1946-48, Secondary Education Commission–1952-53, Indian Education Commission– 1964-66, National Education Policy– 1986
- Rammurthy Committee (1990), Yashpal Committee Report (1993) Revised National Education Policy (1992) NCF–2005, NKC–2006, NCFTE– 2009, RTE–2010.
- SSA, MLL, RMSA, CCE, Navodaya Vidyalaya, Kasturba Gandhi Balika Vidyalaya, Model School.

Unit – V: Innovative Practices

- Concept, Need of innovation in view of technological and social change, Obstacles in innovation, Role of Education in bringing innovations,
- Education through interactive mode of teaching: Computer, Internet, Tally and Video-Conferencing, Eduset, Smart Class Room, Role of E- learning, E- content, E- magazines and E-journals, E- library.
- Yoga Education, Life Skill Education, Education and Competence in life regarding Social inclusion.

Test and Assignments :-

1. Class Test 10 marks

2 .Any one of the following: - 10 marks

- Debate or Organize a one day discussion on the topic related to the subject and submit a report.
- Critical appraisal on the report or recommendations of any commission and committee.
- Organize collage, Poster Making activity in your respective institution.
- Collection of at least three handouts of related topics of the subject.

REFERENCES :-

1. Agnihotri, R. (1994) Adhunik Bhartiya Shiksha Samasyaye Aur Samadhan, Jaipur: Rajasthan Hindi Granth Academy
2. Agrawal, J.C: Land Marks in the History of Modern Indian Education, New Delhi 2. Brubecher, John.S: A History of the Problems of Education
3. Altekar, A. S.(1992) Education in Ancient India, Varanasi: Manohar Prakashan
4. Dev, A.,Dev, T.A.,Das,S. (1996) Human Rights a Source Book, New Delhi, NCERT, Pp. 233.
5. Dubey, S.C. (1994) Indian Society, New Delhi, NBT, Pp.
6. Education and National Development: Report of the Kothari Commission on Education, New Delhi, 1966.
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9. Ghosh, S.C. (1995) The History of Education in Modern India (1757-1986), New Delhi : Orient Longman Ltd.
10. J.F. Brown: Educational Sociology

11. Kabir, H. (1982) Education in New India, London: George Allen an Unwin.
12. Kashyap Subhash C., Our constitution: An Introduction to India's constitution and constitutional laws, National Book Trust India, 2011.
13. Keay,F.E: Indian Education in Ancient and later Times
14. M.N. Srinivas: Social Change in Modern India
15. Mookerji, R. K. (1947) Ancient Indian Education (Brahmanical and Buddhist), London: Mac Milan and Co. Ltd.
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17. Naik, J. P., Nurullah, S.(1974) A Student's History of Education in India, (1800-1973), New Delhi : Orient Longman Ltd.
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19. National Curriculum Framework. (2005).
20. National curriculum Framework for teacher education (2004).
21. Rama Jois, M. (1998) Human Rights and Indian Values, New Delhi: N.C.T.E.
22. Rusk, R. R. (Scotland, J. Revised) (1979) Doctrines of the Great Educators, Delhi, Dublin, New York: The Mac Milan Press Ltd.,
23. Saiyidain. K.G. (1966) The Humanist Tradition in Indian Education Thought, New Delhi: Aria Publishing House
24. Shukla, R.P. (2005). Value Education and Human Rights, New Delhi: Samp & Sons.
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B.Sc.- B.Ed. 04

Instructional System and Educational Evaluation

MARKS-100

Objectives:

This course will enable the student teacher to:

- Explain the need, importance and characteristics of educational evaluation.
- Describe the approaches to educational evaluation.
- Discuss the role of educational evaluation in Teaching - Learning Process.
- Explain the nature of tools and techniques of educational evaluation.
- Describe the need and importance of psychological testing,
- Explain the nature of learners' evaluation and need for continuous comprehensive educational evaluation in schools.

Unit I: Instructional System

- Educational Objectives and instructional objectives.
- Relationship between educational objectives and instructional objectives

- Classification of educational objectives (Cognitive, affective and psycho motor)
- Functioning of educational objectives
- Usefulness of the taxonomical classification.

Unit II: Need, importance and characteristics

- Teaching Learning process and role of evaluation
- Need and importance of Evaluation
- Definition of Evaluation
- Evaluation, Assessment and Measurement.
- Characteristics of good evaluation.

Unit III: Approaches to Evaluation

- Formative evaluation and summative evaluation
- Difference between summative and formative evaluation
- External evaluation and internal evaluation, advantages and disadvantages,
- Norm referenced evaluation
- Criterion referenced evaluation.

Unit IV: Role of Evaluation in Teaching-Learning Process.

- The relationship between instructional objectives, entering behavior, learning experiences and Performance assessment.
- Diagnosis to over come deficiency in learning.
- Importance of results of evaluation to students, teachers, institutions with special reference to help in determining the effectiveness of a course, programme and functioning of a school.

Unit V: Nature of tools and techniques of evaluation

- Nature of test and Purposes of testing with reference to:
  - Instructional purpose b) Guidance purpose c) Administrative purpose
- Administration of Test and Interpreting test result.
- Meaning of Norms, types of Norms, age, Grade, Percentile and standard score. 4. Norms and interpretation of test scores.

- Concept of grade system. Absolute grading, comparative grading and its advantages and disadvantages.

Test and Assignments :-

1. Class Test	10 marks
2 .Any one of the following: -	10 marks

- Develop a portfolio for assessment of 2 school students
- Prepare an advanced tool for evaluation.
- Develop a tool for self-assessment.
- Develop an achievement test and its blue print.

References:

1. Anastasi, Anne, (1976), Psychological Testing, 4m ed., New York; Macmiflan Publishing Co. Inc.
2. Bertrand, Arthur and Cebula, Joseph P., (1980) : Tests, Measurement and Evaluation, A Developmental Approach, Addision-Wesley, U.S.A.
3. Bloom, Benjamin S., Et.al., (1971): Handbook on formative and Summatice Evaluation in Student Learning, McGraw Hill, USA.
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7. Guilford, J.P.(1965), Fundamental Statistics in Psychology and Education, Me Graw Hill Book Company, New York.
8. Khan, Mohd, Arif, (1995): School Evaluation, Ashish Publishing House, New Delhi.
9. Noll, V .C (1957). Introduction to Educational Measurement, Houghton Miffline Company, Boston.
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B.Sc.- B.Ed. 05, 06, 07

1. CHEMISTRY

Paper-I : Inorganic Chemistry

Duration: 3 Hrs. **Max. Marks: 50**

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : 05 **Section-B** : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 25 **Section-C :** 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words,

2 questions to be attempted.

Total marks : 20

Unit-I Atomic Structure:

Idea of De Broglie matter waves, Heisenberg's uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of ψ and ψ^2, quantum numbers, radial and angular wave function and probability distribution curves, shapes of s, p, d, orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements, Effective nuclear charge.

Periodic Properties: Atomic and ionic radii, ionization energy, electron affinity and electronegativity-definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behaviour.

Unit-II Chemical Bonding:

Covalent Bond: Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridizations and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, ICl_2 and H_2O.

MO Theory: Homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Unit-III Ionic Solids:

Ionic Structures: Radius ratio effect and coordination number, limitations of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability of ions. Fajan's rule. Metallic bond-free electron, valence bond and bond theories. Weak Interactions-Hydrogen bonding, van der Waals forces.

Unit-IV s-Block Elements:

Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to

alkyls and aryls.

Chemistry of Noble Gases: Chemistry of Noble gases. Chemistry of xenon. Structure and bonding in xenon compounds.

p-Block Elements: Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16.

Unit-V Chemistry of Compounds:

Hydrides of boron: diborane and higher boranes, borazines, borazoles; fullerenes, carbides, fluorocarbons, silicates, structure principles, tetra sulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

Books suggested:

1. Concise Inorganic Chemistry : J. D. Lee

2. General Inorganic Chemistry: J. A. Duffy, Longman (2nd Ed.) 3. Principles of Inorganic Chemistry : B. R. Puri and L. R. Sharma

4. Basic Inorganic Chemistry : F. A. Cotton and G. Wilkinson, Wiley Eastern 5. Molecular Geometry : R. J. Gillespie, Van Nostrand Reinhold

Paper-II : Organic Chemistry

Duration: 3 Hrs. **Max. Marks: 50**

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : 05 **Section-B** : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 25 **Section-C :** 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words,

2 questions to be attempted.

Total marks : 20

Unit-I Structure and Bonding:

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bonds, van der Waals interactions, inclusion compounds, clatherates, charge transfer complexes, resonance, hyperconjugation, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions: Curved arrow notation, drawing electron movements with arrows, half headed and double headed arrow, homolytic and heterolytic bond breaking. Types of reagents, electrophiles and nucleophiles. Types of organic reactions, Energy considerations.

Reactive Intermediates: Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples).

Assigning formal charges on intermediates and other ionic species. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects. Kinetic and stereochemical studies.)

Unit-II Stereochemistry of Organic Compounds:

Concept of isomerism, types of isomerism. Optical isomerism: Elements of symmetry, molecular chirality enantiomers. stereogenic centre, optical activity,

properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers. Meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration: Sequence rules, D&L and R&S systems of nomenclature. Geometric isomerism: Determination of configuration of geometric isomers, E&Z systems of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformationl isomerism: Conformational analysis of ethane and n-butane. conformations of cyclohexane, axial and equatorial bond, conformation of mono substituted cyclohexane derivatives. Newmann projection and sawhorse formulae, Difference between configuration and conformation.

Unit-III Alkanes and Cycloalkanes:

Alkanes: Nomenclature of branched and unbranched alkanes, alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of preparation (with special reference to Wurtz reaction, Kolbe reactions, Corey-House reaction and decarboxylation of carboxylic acids), Physical properties and chemical reaction of alkanes. Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.

Cycloalkanes: Nomenclature, methods of preparation, chemical reactions, Baeyer's strain theory and its limitations, Ring strains in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring: banana bonds.

Unit-IV Alkenes, Cycloalkenes, Dienes and Alkynes:

Alkenes, Cycloalkenes and Dienes: Nomenclature of alkenes, methods of preparation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halide, regioselectivity in alcohol dehydration, The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes: mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikof's rule, hydroboration-oxidation, oxymercutation-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$, Polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes. Industrial applications of ethylene and propene. Methods of formation, conformation and chemical reactions of cycloalkenes. Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of preparation, polymerization. Chemical reactions-1,2- and 1,4-additions, Diels-Alder reaction.

Alkynes: Nomenclature, structure and bonding in alkynes. Methods of preparation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal ammonia reductions, oxidation and polymerizations.

Unit-V Arenes, Aromaticity, Alkyl and Aryl Halides:

Arenes and Aromaticity: Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain structure of benzene: molecular formula and Kekule structure, stability. Aromaticity: the Huckle's rule, aromatic ions. Aromatic electrophilic substitution: General pattern of the mechanism, role of π- and σ-complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel Crafts reaction, energy profile diagrams. Activating & deactivating substituents, orientation and otho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.

Alkyl and Aryl Halides: Nomenclature and classes of alkyl halides, methods of preparation, chemical reactions. Mechanism of nucleophilic substitution reactions of alky halides, S_N2 and S_N1 reactions with energy profile diagrams. Polyhalogen

compounds: chloroform, carbon tetrachloride. Methods of preparation of aryl halides, nuclear and side chain reactions. The addition, elimination and the elimination-addition mechanism of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl *vs* allyl, vinyl and aryl halides. Synthesis and use of D.D.T. and B.H.C

Books Suggested :

9. *A Text Book of Organic Chemistry : K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi*
10. *Modern Principles of Organic Chemistry : M. K. Jain and S. C. Sharma*
11. *A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal*
12. *A Text Book of Organic Chemistry : B. S. Bahl and Arun Bahl*
13. *A Text Book of Organic Chemistry : P. L. Soni*
14. *Organic Chemistry : (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd.*
15. *Organic Chemistry : Morrison & Boyd, Prentice Hall*

Paper-III : Physical Chemistry

Duration: 3 Hrs. **Max. Marks: 50**

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks :

05 **Section-B** : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 25 **Section-C :** 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words,

2 questions to be attempted.

Total marks : 20

Unit-I Mathematical Concept and Computers:

Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs and calculations of slopes differentiation of functions like k_x, e^x, x^n, sin x, log x; maxima and minima, partial differentiation and reciprocity relations, integrations of some useful / relevant functions: Permutations and combinations. Factorials. Probability.

Computers: General introduction to computers, different components of a computer, hardware and software input output devices; binary numbers and arithmetic; introduction to computer languages. Programming, operating systems.

Unit II Gaseous States:

Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of state.

Critical Phenomena: PV isotherms of real gases, continuity of states, the isotherms of van der Waals equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular Velocities: Root mean square, average and most probable velocities. Qualitative discussions of the Maxwell's distribution of molecular velocities, collision

number, mean free path and collision diameter. Liquification of gases (based on Joule-Thomson effect.)

Unit III Liquid state:

Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases.

Liquid Crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.

Colloidal State: Definition of colloids, classification of colloids. Solids in liquids (sols): Properties, kinetic, optical and electrical, stability of colloids. Protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions): types of emulsions, preparation, emulsifier. Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids.

Unit IV Solid State:

Definition of space lattice, unit cell. Laws of crystallography (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry elements in crystals. X-ray diffraction by crystals. Derivation of Bragg's equation Determination of crystal structure of NaCl and CsCl (Laue's method and powder method.)

Unit V Chemical Kinetics and Catalysis:

Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction: concentration, temperature,pressure, solvent, light, catalyst, Concentration dependence of rates, mathematical characteristics of simple chemical reactions zero-order, first order, second order, pseudo order, half life and mean life period. Determination of the order of reaction: differential method; method of integration, method of half life period and isolation method. Radioactive decay as a first order phenomenon. Experimental methods of chemical kinetics: conductometric, Potentiometric, optical methods, polarimetry and spectrophotometry.

Theories of chemical kinetics: effect of temperature on rate of reaction, Arrhenius concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects. Catalysis, characteristics of catalysed reactions, classification of catalysis, miscellaneous examples.

Books Suggested :

1. *Principles of Physical Chemistry : B. R. Puri and L. R. Sharma*
2. *A Text Book of Physical Chemistry : A. S. Negi and S. C. Anand*
3. *Physical Chemistry, Pt. I & II : C. M. Gupta, J. K. Saxena and M. C. Purohit*
4. *Computers and Applications to Chemistry: Ramesh Kumari, Narosa Publishing House P. Ltd.*

Paper-IV : Chemistry Practical

Inorganic Chemistry:

Semi-micro / macro Analysis:

Cation analysis, separation and identification of ions from groups I, II, III, IV, V and VI. Anion analysis (6 radicals).

Organic Chemistry: Laboratory

Techniques:

Two experiments:- one from section-A and one from section-B carry each 10 marks

Section-A

- Determination of melting point
  - Naphthalene 80-82^{o}C, Benzoic acid 121.5-122 ^{o}C, Urea 132.5-133^{o}C,Succinic Acid 184.5-185^{o}C, Cinnamic acid 132.5-133^{o}C , *m*-Dinitrobenzene 90^{o}C, *p*-Dichlorobenzene 52^{o}C , Aspirin 135^{o}C
- Determination of boiling points
  - Ethanol 78^{o}C, Cyclohexane 81.4^{o}C, Toluene 110.6^{o}C, Benzene 80^{o}C
- Determination of mixed melting point

- Urea-Cinnamic acid mixture of various compositions (1:4,1:1, 4:1)

- Distillation
  - Simple distillation of ethanol-water, using water condenser
  - Distillation of nitrobenzene and aniline using air condenser
- Crystallization
  - Concept of induction of crystallization
  - Phthalic acid from hot water (using fluted filter paper and stemless funnel)
  - Acetanilide from boiling water.
  - Napthelene from Ethanol Benzoic acid from water.
- Decolorisation and crystallization using charcoal
  - Decolorisation of brown sugar (sucrose) with animal charcoal using gravity filtration.
  - Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixed with 0.3g. of Congo Red using l.0g decolorising carbon) from ethanol.
- Sublimation (Simple and vacuum)
  - Camphor, Naphthalene, phthalic acid and Succinic acid.

Section-B

- Qualitative Analysis:

  Detection of extra elements (N, S and halogens) and functional groups (phenolic, caboxylic, carbonyl, ester, carbohydrates, amine, amide, nitro and anilide) in simple organic compounds.

Physical Chemistry:

Any one experiment from following:

Chemical Kinetics

- To determine the specific reaction rate of the hydrolysis of methyl acetate / ethyl acetate catalyzed by hydrogen ions at room temperature.
- To study the effect of acid strength on the hydrolysis of an ester. To compare the strengths of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ethyl-acetate.
- To study kinetically the reaction of decomposition of iodide by H_2O_2

Distribution Law

- To study the distribution of iodine between water and CCl_4
- To study the distribution of benzoic acid between benzene and water.

Colloids

- To prepare arsenious sulphide sol and compare the precipitating power of mono-, bi- and trivalent anions.

Viscosity, Surface Tension

- To determine the percentage composition of a given, mixture (non interacting systems) by viscosity method.
- To determine the viscosity of Amyl alcohol in water at different concentrations and calculate the viscosity of these solutions.
- To determine the percentage composition of a given binary mixture by surface tension method (acetone & ethyl-ketone).

Books suggested :

1. *Practical Chemistry: Giri Bajpai and Pandey, S. Chand & Co. Ltd., New Delhi*

B.Sc. – B.Ed. -05, 06, 07

BOTANY

Scheme:

Paper		Duration	Max. Marks	Min.Marks
Paper-I-	Diversity of Microbes and Cryptogams (Thallophyta)	3 Hrs.	50	
Paper-II	Diversity of Cryptogams (Bryophyta, Pteridophyta & Paleobotany)	3 Hrs.	50	54
Paper-III	Cell Biology, Genetics & Plant breeding	3 Hrs.	50	
Practical (One)		5 Hrs.	50	18

Paper I -Diversity of Microbes and Cryptogams (Thallophyta)

Duration 3 hrs. *Max. Marks 50*

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 05

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 25

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : 20

Unit-I

Viruses and Bacteria : General account of viruses and mycoplasma, bacteria-structure, nutrition. reproduction and economic importance, General account of Cyanobacteria, economic importance, Nostoc, Oscillatoria.

Unit-II

Algae : General Characters, classification and economic importance, important features and life history of chlorophyceae : Volvox, Oedogonium, Coleochaete, Chara.

Unit-III

Algae : General Characters, classification and economic importance, important features and life history of Xanthophyceae - Vaucheria, Phaeophyceae-Ectocarpus Sargassum,Rhodophyceae - Polysiphonia.

Unit-IV

Fungi : General characters, classification and economic importance; important features and life history of Mastigomycotina- Phytophthora Oomycotina-Albugo,Ascomycotina-Saccharomyces, Penicillium, Erysiphae, Basidiomycotina-Puccinia, Ustilago and Agaricus, Deuteromycotina-, Colletotrichum, Alternaria.

Unit-V

Plant diseases and General account of Lichens, special studies about green ear disease, white rust, Stem rust disease of Wheat, Smut disease, Citrus canker, Tobacco mosaic disease, Little leaf disease of brinjal.

Paper II - Diversity of Cryptogams (Bryophyta, Pteridophyta and Paleobotany)

Duration 3 hrs. *Max. Marks 50*

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 05

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.Total marks : 25

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : 20

Unit-I

Bryophyta : General characteristics and classification of bryophyta, economic importance and alternation of generation,

Unit-II

Structure, reproduction and economic importance of Hepaticopsida. Riccia, Marchantia and Porella, Anthoceratopsida-Anthoceros, Bryopsida-Sphagnum, Polytrichum.

Unit-III

Pteridophyta : The first vascular land plant, types of steles, important characteristies of Psilopsida, Lycopsida, Sphenopsida, and Pteropsida, classification of Pteridophyta.

Unit-IV

Structure and reproduction in Lycopodium, Selaginella, Equisetum, Adiantum and Marsilea.

Unit-V

Fossilization, Types of fossils, Techniques of fossil study, Geological time scale.
General characters of Rhynia, Lepidodendron, Calamites, Cladoxylon in brief.

Paper III - Cell Biology, Genetics and Plant breeding

Duration 3 hrs. *Max. Marks 50*

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 05

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 25

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : 20

Unit-I

The cell envelopes : Plasma membrane, bilayer lipid structure, functions of the cell wall, ultra structure of prokaryotic and eukaryotic cells.

Structure and function of other organelles. Golgi bodies, E.R. Peroxisomes, vacuoles.

Structure and function of nucleus : Ultrastructure, nuclear membrane, nucleolus.

Unit-II

Chromosome organization : Morphology, Centromere and telomere, chromosome alterations, deletion, duplication, translocation, inversion, variations in chromosome number, aneuploidy, polyploidy, sex chromosomes.

DNA the genetic material ; DNA structure, replication DNA, protein interactions, the nucleosome model, genetic code, satellite and repetitive DNA, cell division-Mitosis, Meiosis.

Unit-III

Genetic Inheritance : Mendelian laws of segregation and independent assortment Linkage analysis, allelic and non allelic interaction.

Gene expression : Structure of gene, transfer of genetic information, transcription, translation, protein synthesis : ribosomes, RNA ;regulation of gene expression in prokaryotes, Lac operon.

Unit-IV

Genetic Variations : Mutations, spontaneous and induced mutation.

Extranuclear genome : presence and function of mitochondrial and plastid DNA, Plasmids.

Unit-V

Plant Breeding : Methods of plant breeding selection (Mass, Pureline and clonal) introduction and acclimatization, Hybridization and hybrid vigour, inbreeding depression.

Note : Teachers should cover historical aspects and the basic experiments that led to major discoveries.

Books Recommended :

16. Atherly, A.G., Girton, J.R. and Mc Donald, J.F. 1999 The Science of Genetics, Saunders College Publishing, Fort Worth, U.S.A.

5. Gupta, P.K. 1999 A Text book of cell and Molecular Biology, Rastogi Publications, Meerut, India.

- Russel, P.J. 1998 Genetics, Saunders College Publishing, Fort Worth, U.S.A.
- Snustad, D.P. and Simmons, M.J.2000 Principles of Genetics, John Wiley and Sons, Inc., U.S.A.
- Gupta P.K. 1999. Genetics Rastogi Publications Meerut.
- Vashistha, B.R. 1989, Algae, S. Chand and Co. Delhi.
- Vashistha, B.R. 1989, Fungi, S. Chand and Co. Delhi.
- Pandey S.N. & others. 1995, A Text Book of Botany Vol. I, Vikas Publications Dehli
- Pandey S.N. & others. 1995, A Text Book of Botany Vol. II, Vikas Publications Dehli

PRACTICAL

Microscopic preparations and study of the following algal material : Nostoc, Oscillatoria, Chlamydomonas, Volvox, Coleochaete, Oedogonium, Vaucheria, Chara, Ectocarpus Sargassum and Polysiphonia

Staining of different types of Bacteria

Study of some locally available plant diseases caused by Viruses. Mycoplasma, Bacteria and Fungi in field/laboratory.

TMV, Little leaf of Brinjal. Citrus canker.

Green ear disease of Bajra.

Study of External morphology and microscopic preparations of following Bryophytes : Riccia, Marchantia, Anthoceros, Sphagnum and Polytrichum.

Microscopic examination of fossil slides, specimen/photograph-Rhynia, Lepidodendron Calamites and Cladoxylon.

Microscopic temporary, double stained preparations and study of stem/cone/sporocarp of Selaginella. Equisetum and Marsile

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ZOLLOGY

Scheme:

Paper	Duration	Max. Marks		Min. pass Marks
Paper I	3 hrs.	50		
Paper II	3 hrs.	50	150	54
Paper III	3 hrs.	50		
Practical	5 hrs.	50		18

Paper I- Animal Diversity Part-I (Protozoa to Annelida)

Duration : 3 Hours **Max. Marks : 50**

The question paper comprises of three sections ,'A','B' and 'C'

Section-A: The candidates will attempt all the ten parts of Q. No.1 (consisting of two questions from each unit) in about 20 words (1/2 X10 = 5 marks).

Section- B: The candidates will attempt five questions, selecting one question from each unit, answer in about 250 words (5 X 5 = 25 marks).

Section-C: The candidates will attempt any two questions out of four, answer in 500 words (10 X 2 = 20 marks).

Unit –I

Taxonomy: - Classification of Protozoa. Porifera, Coelenterata, Platyhelminthes and Nematoda up to order with examples. Fundamentals of body organization emphasizing symmetry, metamerism, coelome and levels of structural organization.

Unit –II

Protozoa: - Study of structural organization and life history of Trypanosoma and paramecium. Study of locomotion, osmoregulation, nutrition and reproduction in protozoa. Parasitism, pathogenecity and control in protozoans with special reference to Entamoeba, Giardia, Leishmania, Trichomonas and Plasmodium.

Unit-III

Porifera: - Habit, habitat, structure and function of Sycon. Types of canal system.

Coelenterata: - Habit, habitat, structure, function and life history of Aurelia.

Polymorphism in coelenterata, coral reef. **Ctenophora**

- Structural organization and affinities.

Unit IV

Platyhelminthes: - Structural organization and life history of Dugesia & Fasciola. Parasitic adaptation in Helminthes.

Nematyhelminthes: - Study of structure and life history of Dracunculus medinensis Nematode parasites and human diseases.

Unit-V

Classification of Annelida (up to subclass); metamerism and coelome in Annelida General account and types of Annelida (earthworm) structural organization, Physiology & life history of Hirudinaria, Trochophore larva.

Paper-II- Genetics and Biotechnology

Duration : 3 Hours **Max. Marks : 50**

The question paper comprises of three sections ,'A','B' and 'C'

Section-A: The candidates will attempt all the ten parts of Q. No.1 (consisting of two questions from each unit) in about 20 words (1/2 X10 = 5 marks).

Section- B: The candidates will attempt five questions, selecting one question from each unit, answer in about 250 words (5 X 5 = 25 marks).

Section-C: The candidates will attempt any two questions out of four, answer in 500 words (10 X 2 = 20 marks).

Unit-I

Mendelian Genetics: - Mendel's laws of inheritance. Monohybrid and dihybrid cross. Dominance. Incomplete dominance. Current status of Mendelism. Genetic variation: Variation in chromosome number (Euploidy and Aneuploidy).

Unit-II

Genetic disorders in Human beings (Down's, Turner's, Klinefelter's and Edward's syndrome) Types of chromosomal mutations. Molecular basis of gene mutation, mutagens, crossing over and linkage.

Unit- III

Sex-determination XX-XY. XO-XY and WZ mechanisms. Sex-linked inheritance (X-and Y-linked) Color blindness. Haemophilia.Gene interactions. Supplementary, complementary, epistasis and inhibitory. Multiple allele-ABO, Rh and MN blood groups and their inheritance, polymorphic genes.

Unit-IV

Gene structure (Recon. muton, cistron) and regulation of gene (lac operon: inducible and repressible system). Bacterial genetic transformation, Transduction and conjugation. Lytic and lysogenic cycle. Elementary idea about eugenics. Elementary idea about genetic engineering. Gene cloning and recombinant DNA technology (Vectors for gene transfers. Plasmids and phages). Restriction enzymes.

Unit V

Introduction. Historical prospective animal cell hybridoma, major areas and future prospects of biotechnology. Medicines and Biotechnology: Microbes in medicine, antibiotics, vaccine, antibodies, antigens.

Enviornmental Biotechnology: use of micro organisms in metal and petroleum recovery pest control. Waste treatment, Processing of industrial waste. Degradation of Xenophobic compounds including pesticides and surfactants. Surfactants, Surfactants and oil pollutants, Food and drink biotechnology, Ferment food dairy products. Food preservation microbial spoilage, alcoholic beverages, Vinegar. Monoclonal antibodies and their applications

Paper III- Cell Biology, Biochemistry and Microscopy

Duration : 3 Hours **Max. Marks : 50**

The question paper comprises of three sections ,'A','B' and 'C'

Section-A: The candidates will attempt all the ten parts of Q. No.1 (consisting of two questions from each unit) in about 20 words (1/2 X10 = 5 marks).

Section- B: The candidates will attempt five questions, selecting one question from each unit, answer in about 250 words (5 X 5 = 25 marks).

Section-C: The candidates will attempt any two questions out of four, answer in 500 words (10 X 2 = 20 marks).

Unit-I

17. Introduction, Discovery of cell, cell theory, golden period of cytology, prokaryotic and eukaryotic cell characteristics of animal cell.
18. Protoplasm-: History, physical characters, colloidal property, chemical composition and Biological characters of protoplasm.
19. Cell organelles: - Structure chemical composition and functions of plasma membrane, endoplasmic reticulum, Golgi apparatus, lysosome ribosome, mitochondria, nucleus and nucleolus.

Unit- II

6. Mitosis: - cell cycle, mitotic apparatus, centriole aster, and significance.
7. Meiosis: - Introduction, meiotic cycle, synapses of chromosomes, crossing over mechanism, Initiation and control of meiosis, significance.
8. Gametogenesis: - Introduction, spermatogenesis and oogenesis significance.

Unit III

- Nucleic Acid: - Chemistry, Molecular model, Duplication, properties and functions of DNA, Types of RNA, Nucleic Acid as Genetic material.
- Nucleic Acid synthesis: - Synthesised DNA, RNA biosynthesis of DNA and RNA. Genetic code, transcription and translation.

Protein synthesis: - Genetic code, transcription, translation, Role of RNA, Mechanism of protein-synthesis, Regulation of protein synthesis.

Unit –IV

- Cell chemistry: - Nomenclature, classification, Action theory and specificity of Enzyme, enzyme activator, inhibitor, regulation and control of enzyme activity.
- Cell metabolism: - Anabolic and catabolic process, metabolism of protein, carbohydrates and fats, ketone bodies.
- Energy cycle: - Anaerobic and aerobic respiration, Energy transfer, redox, cytochrome-system.

Unit-V

(a) Microscopy & cytological techniques: - Introduction, types of microscopes.

(b) Autoradiography. (c)Isolation of cell components.

Zoology- Practical

General survey of Invertebrate (Spot & Slides)

(a) **Protozoa: -** Entamoeba, Polystomella, Monocystis, Euglena, Noctiluca Leismania, Nyctotherus, Paramecium, Vorticella.

Porifera- Sycon, Hyalonema, Euplectella, Spongilla and Euspongia.
Coelenterate- Obelia colony (polyp & medusa) Physalia, Porpita, Aurelia, Rhizostom, Alcyonium, Corallium, Gorgonia, Pennatula, Madrepora.
Platyhelminthes-: Dugesia, Fasciola, Taenia, Schistosoma.
Nematode- Filaria, Dracunculus, Wuchereria, Enterobius

Annelida: - Neries (Heroneries with parapodia) Aphrodite, Arenicola, Pontobdella, Hirudinaria, Peripatus.

(b) Study of TS/LS of organs & developmental stages.

(i) **Porifera: -** T.S. of Sycon.
(ii) **Coelenterata-** Planula larva of jelly fish.
(iii) **Platihelminthes-** T.S of Fasciola, scolex of Taenia, mature & gravid segment of Taenia, Hexacanth, bladderworm & cysticercus stage of Taenia, miracidium, sporocyst, redia, circaria larva of Fasciola.
(iv) **Annelida-** T.S through different region of leach & Nereis. Parapodia of Nereis and Heteronereis, trochophore larva.

(c) Dissection Through chart / model / Photograph / CD. – Hirudinaria – Morphology, general anatomy, digestion, nervous & excretory and reproductive system.
Earthworm – Anatomy, morphology, digestive and nervous system.

(d) Mounting- (Permanent)

Protozoa – Euglena, Paramecium,Polystomela
Porifera- Spicules, fibres, gemmule
Coelenterata- Obelia medusa

Platyhelminthes – Taenia (proglotid)
Annelida – Nereis (parapodia)

Genetics:

Drosophila – life cycle and its culture. Identification of male and female and wild and mutants (yellow. Ebony body. Vestigial wings. White-eye and vestigial wings). Prepare slides of sex combs and salivary gland chromosomes of Drosophilae. Barr body of human chromosomes. Identification of blood group (ABO and Rh factors). Simple problems based on monohybrid / dihybrid cross.

(Note- use of animals for dissection is subject to the conditions that these are not banned under the wild life protection act.)

(e) Tests: -

Biochemistry

- Protein

- Fat
- Carbohydrate

Cell Biology

- Cell permeability
- Acetocarmin preparation of mitotic activity
- Demonstration of mitochordia by using vital stain.
- Demostration of Bacteria by using Gram's stain.

(**Note**- Animals used in dissection are subject to the condition that these are not banned under the wild life protection act.)

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1. PHYSICS

Scheme:

Three Papers	Min. Pass Marks 54	Max.Marks 150
Paper-I	3hrs. Duration	50 Marks
Paper-II	3hrs. Duration	50 Marks
Paper-III	3hrs. Duration	50 Marks

Practical: 5 hrs. Duration Min. Pass Marks 18 Max. Marks 50

Paper I- MECHANICS

Duration 3 hrs. Max. Marks:50

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 05

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 25

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : 20

Unit-I- (Physical Laws and Frame of References)

Inertial frames, Galilean transformations and invariance of physical laws, non-inertial frames, fictious force, uniformly rotating frames, transformation of displacement, velocity and acceleration, Coriolis force, motion relative to earth, Focault's pendulum, effect of rotation of earth on 'g'.

Unit-II - (Conservation Laws and Dynamics of Particles)

Centre of mass of a system of particles, equation of motion, conservation of linear momentum, Relationship between Lab and center of Mass frames of reference, elastic and inelastic collision, Motion of a system with varying mass, Motion in a central force field, conservation of angular momentum, trajectory of a particle under central force, Kepler's laws, Rutherford's formula.

Rigid body dynamics, equation of motion of a rotating body, Inertial coefficient, Moments of Inertia theorems, idea of principal axes and kinetic energy of rotation. Precessional motion of spinning top,

spin precession in constant magnetic field, Larmor's frequency.

Unit III- (Properties of Matter)

Elasticity, stress and strain, Hooke's Law, Elastic constants and their relations, theory of bending of beams and torsion of a cylinder, Cantilever, cantilever supported at both ends. Experimental determination of elastic constants by bending of beam and Searle's method, modulus of rigidity by static and dynamic method, Torsional Oscillator, Poisson's ratio for rubber.

Unit IV- (Oscillations)

Qualitative idea of Oscillations in an arbitrary potential well, simple harmonic motion, oscillation of two masses connected by a spring, Coupled oscillator, normal modes, normal coordinates of two linear coupled oscillators, Damped harmonic oscillation- Ballistic galvanometer, vibration of molecules, forced harmonic oscillators, phase relations, power absorption, resonance, band width and quality factor, LCR series and parallel circuits.

Unit-V - (Waves)

General equation of one dimensional wave equation and its solution, longitudinal and transverse waves, Plane progressive harmonic wave, its energy density, energy flux and intensity, pressure waves in gas.

Equation of motion for one dimensional monatomic & diatomic lattices, acoustic and optical modes, dispersion relations, Concept of group & phase velocities.

Paper II- Electromagnetism

Duration 3 hrs. Max. Marks:50

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 05

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 25

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : 20

Unit-I - Scalar and Vector Fields

Scalar and Vector Fields, Gradient of a scalar field, relation between **conservative** field and Potential, line, surface and volume integral of vector fields, concept of flux, Divergence and Curl of a vector field and their physical significance, Gauss' divergence and Stokes curl theorem with proof, Del and Laplacian operator in Cartesian, Cylindrical and Spherical coordinates.

Unit II - Electrostatics

Electric potential and field due to arbitrary charge distribution, Multipole Expansion, potential and

field due to dipole, electrostatic energy of a uniformly charged sphere, classical radius of an electron.

Atomic and molecular dipoles, induced dipole and polarizability, dielectrics and their electrical polarization,susceptibility and displacement vector, Capacity of a capacitor with partially and completely field dielectrics, Gauss' law in integral and differential form, Lorentz local field and Clausius-Mossoti equation.

Unit-III - Electrostaic Field

Conductors is an electric field, boundary conditions for electrostatic field and potential at dielectric surface, uniqueness theorem, method of electrical images and its application for system of point charge near a grounded conducting plane. Poisson's and Laplace equation in

Cartesian, cylindrical and spherical coordinates, solution of Laplaces equation in cartesian coordinates, boundary conditions.

Unit IV

Rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, self and mutual induction, Measurement of self induction by Rayleigh's method, AC circuits and complex numbers and their application in solving AC circuit problems, complex impedance and reactance, series and parallel resonance. Quality factor, power consumed by an AC circuit, Power factor.

Amperes circuital law in differential and integral form, Magnetization vector, Magnetizing field H, relation between B, H and M. uniform magnetization and surface current. Non – uniform magnetization, orbital gyro magnetic ratio and Bohr Magnetion, Magnetic suspectibility.

Unit-V

Time Varying Fields, Faraday's law of electromagnetic induction, its integral and differential form, Maxwell's equation in differential and integral form, Maxwell's displacement current,

Wave equation for electric and magnetic field, Plane electromagnetic waves and their properties, transverse nature of EMW, energy density, Poynting Theorem, Poynting vector, propagation of EM Wave in conducting and isotropic dielectric medium

Paper III-Optics

Duration 3 hrs. Max. Marks:50

Note: The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 05

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 25

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : 20.

Unit-I
Geometrical Optics

Fermat's principle, principle of extremum path, Aplantic points of a spherical refracting surface, Cardinal points of an optical system, Newton's formula and other relations for coaxial lens system,

thick lens & lens combination, Lagrange's law, Aberration in images, spherical aberration and methods of its reduction, chromatic aberration, achromatic combination of lenses placed in cotact and placed at some distance, coma and astigmatism, Eye pieces:
Huygen's, Ramsden's and Gauss's eyepieces and their comparison.

Unit- II - Interference

Youngs double slit experiment, temporal and spatial coherence, coherence length,'effect of size of slit and purity of spectral line, Division of amplitude, Interference in thin films,colour in thin films.Wedge shaped film, Newton's rings and determination of wavelength and refractive index of liquid by Newton ring, Hadinger and Fizeau fringes, Michelson Interferometer, Measurement of wavelength, wavelength difference between two close wavelengths and thickness of thin plate. Fabry-Perot interferometer, intensity distribution, coefficient of sharpness and half width, Measurement of wavelength and resolution of two close spectral lines.

Unit-III - Diffraction

Fraunhofer diffraction at single slit, intensity distribution and width of central maxima, and determination of slit size, two slit diffraction and its intensity distribution with missing orders. Diffraction due to N slits with intensity distributions. Plane transmission grating its formation and intensity distribution, Dispersive power of grating, Angular width of principal maximum,

Absent Spectra, Rayleigh's criterion, resolving power of prism, telescope, microscope and plane transmission grating.

Fresnel class of diffraction, half period zones, zone plate, diffraction due to circular obstacle and aperture, cylindrical wavefront and its effect at an external point, Diffraction at straight edge, thin and thick wire, rectangular slit.

Unit-IV - Polarization

Polarization states of electromagnetic waves, Plane, Circularly and Elliptically Polarised Light, quarter and half wave plates, methods of production & detection of polarized light,

Huygen's theory of double refraction using Fresnal's ellipsoidal surface, Crystal Optics, Optical activity, Specific rotation, Fresnel's law of optical rotation, Biquartz and Laurent's half shade polarimeters, Reflection and refraction of plane EMW at plane dielectric surface, boundary conditions, Fresnel's relations.

Unit-V - Lasers and Holography

Stimulated and spontaneous emission, stimulated absorption, Einstein's A and B coefficients, population inversion, conditions for laser action, metastable states, Types of lasers, construction,working and energy level schemes of He-Ne and Ruby laser, Applications of Lasers, Basic concepts of holography, construction of a hologram and reconstruction of the image, important features of hologram and uses of holography

PHYSICS PRACTICAL

Duration 5 hrs. Min. Pass Marks 27 Max.Marks 75 Note-Total number of experiments to be performed by the students during the session should be 16 selecting any eight from each section.

Section –A

1.Study of bending of a beam and determination of Young's modulus.

2.Modulus of rigidity by statical method and dynamical method.
3.Elastic constant by Searle's method.

4. Study of frequency of energy transfer as a function of coupling strength using coupled oscillator.

5.Determination of dispersive power of material of a prism using spectrometer. 6.Measurement of wavelength of monochromatic source of light by Newton's rings. 7.Measurement of wavelength of monochromatic source of light by plane transmission grating.

8.Measurement of wavelength of monochromatic source of light by biprism . 9.Study of specific rotation by polarimeter.

10. Determination of resolving power of a plane transmission grating.

20. Determination of resolving power of telescope.

21. Determination of the Poisson's ratio of rubber tube.

Section-B

9. Study of temperature variation of surface tension by Jeagger's method.
   To determine the polarizing angle for the glass prism surface and to determine the refractive index of the material of prism using Brewster's law =tan (ip) .

- Low resistance by Carey-Foster' bridge.
- Variation of magnetic field along the axis of circular coil and hence determine the radius of coil.
- To study the variation of charge and current in RC circuit for different time constants (using DC source).
- To study the behaviour of RC circuit with varying resistance and capacitance using AC Mains as a power source and also determine the impedance and phase relations.

6. To study the rise and decay of current in LR circuit with a source of constant emf.

(e) To study the voltage and current behaviour of LR circuit with a AC power source also determine power factor,impedance and phase relation.

8. To study resonance in a series LCR circuit and determine Q of the circuit.

9. Conversion of Galvanometer into Ammeter/Voltmeter.

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MAHEMATICS

Scheme :

Paper	Nomenclature	Exam. Duration	Max. Marks
I	Abstract Algebra	3 Hrs.	44
	Practical		22
II	Advanced Calculus	3 Hrs.	66
III	Vector Calculus and Co-ordinate Geometry	3 Hrs.	68
	Total Max. Marks (Theory / Practical)		178 / 22
	Total Min. Pass Marks (Theory / Practical)		64 / 8

Paper I – Abstract Algebra

Time : 3 Hrs Max Marks : 44

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks :05

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 25

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : 14

Unit – I

Binary operation (Composition). Addition and multiplication modulo operations. Definition of a group with examples and simple properties (including its alternate definitions).

Permutation group, cycle, transpositions, even and odd permutations and alternating group. Order of an element of a group and its properties.

Unit – II

Subgroups of a group with its properties,Cyclic groups and their properties, Cosets decomposition. Index of a subgroup, Lagrange's theorem and its applications, Fermat's and Euler's theorems.

Unit – III

Normal subgroups with properties. Simple groups, Quotient groups.

Group homomorphism with its kernel and properties. Isomorphism, Cayle's theorem, automorphism, Fundamental theorem of homomorphism.

Unit – IV

Rings, Zero divisors, integral domains and fields. Characteristic of a ring, Subrings, subfield, prime field, ring homomorphism and isomorphism. Imbedding of an integral domain in a field, Field of quotients.

Unit – V

Ideals and their properties. Principal ideals and principal ideal ring. Prime ideal. Maximal ideal. Fundamental theorem of ring homomorphism.

Euclidean ring and its properties. Polynomial over a ring. Polynomial ring. Polynomial over an integral domain and over a field. Division algorithm.

Books Recommended for reference:-

22. I. N. Herstien, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
23. Nathan Jacohson, Lectures in abstract Algebra Vol. I, W. H. freeman, 1980 (also published by Hindustan Publishing Company).
24. Shanti Narayan, A text book of Modern Abstract Algebra, S. Chand and Co. New Delhi.

25. Surjeet Singh and Qazi Zameeruddin, Vikas Publishing House, Pvt. Ltd., Delhi
26. A, R, Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut

List of Practicals for B.Sc. (Pt.-I)
(Total Marks- 22)

Record	-	05
Practical -1	-	06
Practical -II	-	06
Viva-Voce	-	05

Name of Practicals

10. Graphs of algebraic polynomials of degree four and above.
11. Simplification of logic circuits with the help of boolean Algebra.
12. formation of truth table of Boolean functions.
13. Curve tracing of plane curves.
14. Application of fundamental theorem on morphism of gruoups.
15. Construction of composition tables for some special operations.
16. Find roots of algebraic equation by graphical method.
17. Application of Lagrange theorem.
18. Problems related to permutations and permutation groups.
19. Problems related to ring.

Paper II – Advanced Calculus

Time : 3 Hrs Max Marks: 66

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 5

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 35

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : 26

Unit – I

Polar coordinates, angle between radius vector and tangent, polar sub tangent and subnormal. Perpendicular from pole on tangent. Pedal equation of a curve. Derivative of length of an arc in cartesian and polar coordinates.

Curvature, Radius of curvature and its formula in various forms. Centre of curvature, chord of curvature.

Unit – II

Partial differential coefficients of a function of two or more variables. Total differential coefficient. Composite function, Euler's theorem on homogeneous functions of two, three and m-variables. First and second differential coefficients of an implicit function. Taylor's theorem for a function of two variables.

Jacobians with properties. Maxima, minima and saddle points of functions of two and three variables. Lagrange's method of undetermined multipliers.

Unit – III

Asymptotes, envelopes and evolutes.

Test for points of inflexion and multiple points. Test for concavity and convexity. Tracing of curves in cartesian and polar coordinates.

Unit – IV

Quadrature, Rectification, Volumes and surfaces of solids of revolution. Differentiation under the sign of integration.

Unit – V

Beta and Gamma functions. Double integrals and their evaluation by change of order and changing into polar coordinates.

Triple integrals, Dirichlet's double and triple integrals with their Liouville's extension.

Books Recommended for reference :-

- Gorakh Prasad, Differential calculus, Pothishala Private Ltd., Allahabad.
- Gorakh Prasad, Integral calculus, Pothishala Private Ltd., Allahabad

Paper III – Vector Calculus and Coordinate Geometry

Time : 3 Hrs Max Marks: 68

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 05

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 35

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : 28

Unit – I

Vector differentiation and integration, Gradient, divergence and curl. Vector identities, Line and surface integrals.

Theorems of Gauss, Green, Stokes(without proof) and problems based on these.

Unit – II

Parabola : Standard equation, parametric co-ordinates, length of chord, tangent, normal and its properties, two tangents from a point, chord of contact, polar, pole, chord with a given middle point, diameter and three normals from a point.

Ellipse : standard equation, auxiliary circle, eccentric angle, tangent, normal, two tangents from point, chord of contact, pole, polar, chord whose mid point given, diameter, conjugate diameters and four normals from a point.

Unit – III

Hyperbola : Standard equation, parametric co-ordinates, asymptotes, equation referred to asymptotes as axes, conjugate diameters and rectangular hyperbola.

Polar Equation : Standard equation, directrix, tangent, normal, polar and asymptotes.

Unit – IV

Sphere : standard equations in various forms, plane section, sphere through the circle of intersection of two spheres, power of a point, tangent plane, polar plane, polar line, angle of intersection of two spheres, length of tangent, radical plane, radical axis, co-axial system of spheres and limiting points.

Cone : Homogeneous equation in x, y, z, cone with a given vertex and given base, enveloping cone, condition for the general equation to represent a cone, tangent plane, reciprocal cone, angle between the two lines, in which a plane cuts a cone, three mutually perpendicular generators and right circular cone.

Cylinder : Right circular cylinder and enveloping cylinder.

Unit – V

Central Conicoids : Standard equation, tangent plane, condition of tangency, director sphere, polar plane, polar lines, section with a given center, enveloping cone, enveloping cylinder.

Ellipsoid : Normal, six normals from a point, cone through six normals, conjugate diameters and their properties.

Books Recommended for Reference:-

- Shanti Narain, A Test Book of vector calculus, S. Chand and Co., New Delhi.
- Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.
- J. N. Sharma & A. R. Vasishtha, Vector Calculus, Krishna Prakashan Mandir, Meerut.
- S. L. Loney, the elements of coordinate Geometry, Macmillan and Company, London.
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