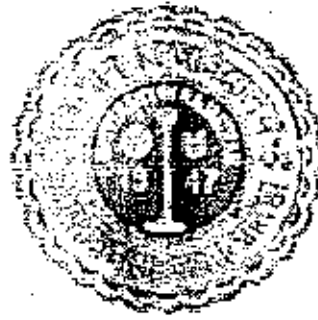# राजस्थान विश्वविद्यालय जयपुर
University of Rajasthan

FACULTY OF EDUCATION

SYLLABUS

Integrated Programme of

B.Sc.B.Ed. Degree (Four Year)

Annual Scheme

Academic Session 2019-20

Examination B.Sc B.Ed Part - I (2020)

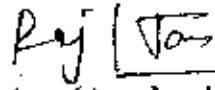Dy. Registrar(Academic-I)
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NOTICE

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 Rajasthan Univeristy head quarter Jaipur only and not any other place.

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B.Sc B.Ed PART - I
CONTENTS

SCHEME OF EXAMINATION

SYLLABUS

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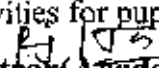
01. The Objective and the Learning outcomes of the Integrated B.Sc.B.Ed. Degree are-

Objectives:

1. To promote capabilities for inculcating national values and goals as mentioned in the constitution of India.
2. To act as agents of modernization and social change.
3. To promote social cohesion, international understanding and protection of human rights and right of the child.
4. To acquire competencies and skills needed for teacher.
5. To use competencies and skills needed for becoming an effective teacher.
6. To become competent and committed teacher.
7. To be sensitive about emerging issues such as environment, population general equality, legal literacy etc.
8. To inculcate logical, rational thinking and scientific temper among the students.
9. To develop critical awareness about the social issues & realities among the students.
10. 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.

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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.
ii) Second Year B.Sc.B.Ed.
iii) Third Year B.Sc.B.Ed.
iv) Final Year B.Sc.B.Ed.

Duration of the Course - Four Years

Examinination after each session in theory papers

Scheme of Examination against each subject separately.

Compulsory Papers :
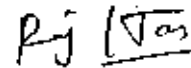
Year	Paper
Ist Year	Gen. English
IInd Year	Gen. Hindi
IIIrd Year	Computer Application (ICT)
IVth Year	Environmental Education

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

Group – A: - Subject Specialisation :

Year	Paper
Ist Year	Instructional System & Educational
IInd Year	Peace Education
IIIrd Year	Guidance and Counselling in School
IVth Year	Physical Education & Yoga

Group-B: Content of Science Subject: - A Student has to opt PCB & PCM Group select any three optional subject (papers) from group B which two must be the school teaching subjects.

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

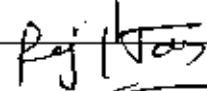| Pedagogy of Chemistry |
|-----------------------|
| Pedagogy of Biology |
| Pedagogy of Physics |
| Pedagogy of Mathematics |
| Pedagogy of General Science |

- ❖ In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IInd Year. 12Paper in IIIrd Year and 7 Paper in IVth Year (Total 43Papers).
- ❖ Each theory paper will carry 100 marks and content base paper 05, 06, 07 (G-B) will carry 150 marks. (With practical part). Distribution of marks in mathematics is according to their marking scheme in page no.7.

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

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

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

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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.Ed0 5, 06 & 07 (G-B)	Content (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)	33+33+34 33+33+34 33+33+34 33+33+34 40+40+40		50 50 50 50 30	150 150 150 150 150
						750

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

Four Years Integrated Course
Scheme of B.Sc.B.Ed. IInd 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.Ed0 4 (G-A)	Peace Education	80	20	-	100
V VI & VII	B.Sc.B.Ed0 5, 06 & 07 (G-B)	Content (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)	33+33+34 33+33+34 33+33+34 33+33+34 40+40+40		50 50 50 50 30	150 150 150 150 150

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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
						850

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

Four Years Integrated Course
Scheme of B.Sc.B.Ed. IIIrd Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.- B.Ed. 01	Information & Communication Technology(ICT) (Compulsory)*	60	-	40 (30+10)	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.Ed05 , 06 & 07 (G-B)	Content (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)	 33+33+34 33+33+34 33+33+34 33+33+34 40+40+40		 50 50 50 50 30	 150 150 150 150 150
VIII	08(a,b)	Pedagogy of a School Subject (part-3), Ist & IInd Year (candidate shall be required to offer any two papers from the following for part-3 & other for	80	20		100

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		part-4). 1. Chemistry 2. Biology 3. Physics 4. Mathematics 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
							950

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

Four Years Integrated Course
Scheme of B.Sc.B.Ed. IVth Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.-B.Ed. 01	Environmental Education(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

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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-4), Ist & IInd Year (candidate shall be required to offer any two papers from the following for part-3 & other for part-4). 1. Chemistry 2. Biology 3. Physics 4. Mathematics 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
						800

*ELIGIBILITY CRITERION 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	Computer Application (ICT)
IV Year	Environmental Education

Compulsory Paper

Year	Paper
Ist Year	1. Childhood and Growing Up 2. Contemporary India and Education

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IInd Year	3. Knowledge and curriculum
	4. Learning and Teaching
IIIrd Year	5. Language Across the Curriculum
IVth Year	6. Creating and inclusive school
	7. Understanding Disciplines and Subject
	8. Gender, School and Society
	9. Assessment for Learning

Group – A: - Subject Specialisation :

Year	Paper
I^st Year	Instructional System & Educational
IInd Year	Peace Education
IIIrd Year	Guidance and Counselling in School
IVth Year	Physical Education & Yoga

Group B: (PCB and PCM Group) (Select any three)

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

Pedagogy of Chemistry
Pedagogy of Biology
Pedagogy of Physics
Pedagogy of Mathematics
Pedagogy of General Science

❖ In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IInd Year. 12Paper in IIIrd Year and 7 Paper in IVth Year (Total 43Papers).

❖ Each theory paper will carry 100 marks and content base paper 05, 06, 07 (G-B) will carry 150 marks. (With practical part). Distribution of marks in mathematics is according to their marking scheme in page no.7.

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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	600 +150= 750
II Year	12Paper +Practical +Practicum	600 +150+100= 850
III Year	12Paper +Practical + Practicum +Final Lesson	600 +150+ 100 +100 = 950
IV Year	7 Paper +Practical + Practicum +Final Lesson	600+ 100 +100= 800
Total	43Papers	2400 +550+200 +200= 3350

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.
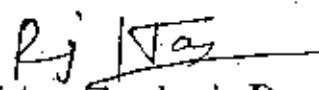11. Use the appropriate teaching methods and techniques.

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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.

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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, 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 General Science for the B.Sc B.Ed Examination who had studied Chemistry and 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)
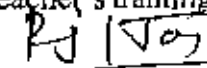
O.324 The examination for Integrated B.Sc.-B.Ed. for Four Year shall be in two parts- part 1st comprising theory papers & part 2 practice of teaching in accordance with the scheme of examination laid down from time to time.

O.325 Candidates who fail in Integrated B.Sc-B.Ed examination in part 1 or/ 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

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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 :-
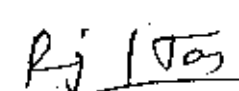
Scheme of Integrated B.ScB.Ed Four Year Examination

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 Paper nos. are 02, 03 & 04 in each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Compulsory paper* 01 of 100 marks and optional Paper 05, 06, 07 (G-B). in each session are three hours carrying 150 marks (100 marks theory + 50 marks practical). Distribution of marks in mathematics is according to their marking scheme in page no.7.

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, 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.
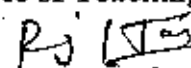
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6. At Integrated B.Sc-B.Ed III Year each candidate should be prepared to teach one lessons at the final practical examination. At the Integrated B.Sc-B.Ed IV Year exam candidate should be prepared to teach two lessons (one in each subject).The external examiners may select at-least 10% of the candidates to deliver two lessons in Integrated B.ScB.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 Rajasthan.
   (c) An external examiner from outside the University of Rajasthan 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.

Working out the result and awarding the division:

(1) A candidate in order to be declared successful at the Integrated B.ScB.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.EdFour 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

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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. I YEAR-2019
GENERAL ENGLISH

Duration : 3hrs.   **Max. Marks: 100**

Minimum Pass Marks: 36

The syllabus aims at achieving the following objectives:

1. Introducing students to phonetics and enabling them to consult dictionaries for correct pronunciation. (sounds and word stress)
2. Reinforcing selected components of grammar and usage.
3. Strengthening comprehension of poetry, prose and short-stories.
4. Strengthening compositional skills in English for paragraph writing. CVs and job applications.;

The Pattern of the Question Paper will be as follows:

Unit A: Phonetics Symbols and Translation   **(20 marks)**

(10 periods)

I.	Phonetic Symbols and Transcription of Words	(05)
II.	Translation of 5 Simple sentences from Hindi to English	(05)
	from English to Hindi	(05)
III.	Translation of (05) Words from Hindi to English	$(2\frac{1}{2})$
	From English to Hindi	$(2\frac{1}{2})$

Unit B: Grammar and Usage   **(25marks)**

(10 priods)

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I. Elements of a Sentence   (05)

II. Transformation of Sentence   (05)

  a. Direct and Indirect Narration

  b. Active and Passive Voice

II Modals   (05)

III Tense   (05)

IV Punctuation of a Short Passage with 10 Punctuation Marks (05)

  (As discussed in Quirk and Greenbaum)

Unit C: Comprehension   (25 marks)

Following Essays and Stories in Essential *Language Skills* revised edition.compiled by Macmillan for University of Rajasthan General English B.A/ B.com / B.Sc.

Candidates will be required to answer 5 questions of two lines each to be answered out of 10 questions. There would be two questions from the prescribed text.   (10)

Sujata Bhatt   Voice of the Unwanted Girl

Ruskin Bond   Night Train for Deoli

M.K.Gandhi   The Birth of Khadi

J.L.Nehru   A Tryst with Destiny
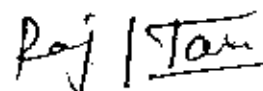
A.P.J. Abdul Kalam Vision for 2020

The candidates will be required to answer 5 questions from the given unseen passage.   (10)

One vocabulary question of 10 words from the given passage. (5)

Unit D: Compositional Skills   (30 marks)

(15 periods)

 I. Letters-Formal and informal   (10)

 II. CV's Resume and job Applications and Report (10)

 III. Paragraph Writing   (10)

Recommended Reading

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B.Sc.B.Ed PART - I - 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

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- 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) Gessel's maturation theory
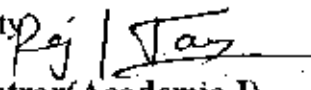
Unit 3: Child Growing up

- 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 with special referance to (Garden Allport, Psycho analytical theory, Jungs Theory) assessment of personality
- Individual differences: concept, areas (With Special Educational needs-Concept) and educational implication.
- Stress: meaning, types consequences of stress and stress managment.

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, Types of learning by Gagne.
- Motivation:-Concept and Maslow's Hierarchy need theory, Creating and maintaining a productive Classroom Environment-Dealing with misbehaviour

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
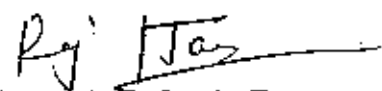
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- Socialization - Process of Socialization - Group dynamics - Theory of Kurt lewin's. Leadership and its styles (Kimble young), social prejudice

- 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

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

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

3. Write the adminstration, scoring, interpretation and conclusion of any one test by psychological experiment onlearning/span of attention/memory/intelligence test.

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B.Sc. B.Ed PART - I - 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

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- Education: Meaning, concept and nature, Ancient to present education as an organized and institutionalized form, formal and state sponsored active
- ities.
- Aims of Education: Historicity of aims of Education, changing aims of education in the context of globalization, sources of aims of Education, influence of aims of education on the curriculum and transactional strategies. Idea of educational thinkers such as Aurobindo, 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

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- 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, Edu-set Smart Class Room

- 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.

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3. Altekar, A. S.(1992) Education in Ancient India, Varanasi: Manohar Prakashan

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9. Ghosh, S.C. (1995) The History of Education in Modern India (1757- 1986), New Delhi : Orient Longman Ltd.

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22. Rusk, R. R. (Scotland, J. Revised) (1979) Doctrines of the Great Educators, Delhi, Dublin, New York: The Mac Milan Press Ltd.,

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26. अल्तेकर, अ.स. : प्राचीन भारतीय शिक्षा पद्धति।

27. ओड, एल. के. : शिक्षा के नूतन आयाम, राजस्थान हिन्दी ग्रंथ अकादमी, जयपुर।

28. गुप्ता, एस. पी एवं अलका गुप्ता : भारत में शिक्षा प्रणाली का विकास, शारदा पुस्तक प्रकाशन, इलाहाबाद।

29. रावत, प्यारे लाल : भारतीय शिक्षा का इतिहास, आगरा।

30. जोशी, सुषमा : भारत में शिक्षा प्रणाली का विकास एवं समस्याएं, शारदा पुस्तक भवन, इलाहाबाद।

31. लाल रमन बिहारी : भारतीय शिक्षा और उसकी समस्याएं, रस्तोगी पब्लिकेशन्स, मेरठ।

32. साधिन संदर्भ सामग्री पुस्तिका : महिला एवं बाल विकास विभाग, राज, सरकार, जयपुर।

B.Sc.B.EdPART-I -04
INSTRUCTIONAL SYSTEM AND EDUCATIONAL EVALUATION

Objectives: **Marks : 100**

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

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ɔ   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 Purpose 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 -   20 marks
One class Test - 10 marks

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Practical (any one)   10 marks

1.   Develop a portfolio for assessment of 2 school students

2.   Prepare an advanced tool for evaluation

3.   Develop a tool for self-assessment.

4.   Develop an achievement test and its blue print.

References:

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CHEMISTRY

Scheme:
Max Marks: 150

	Duration (hrs.)	Max. Marks	Min. Pass Marks
Paper I	3	33	
Paper-II	3	33	36
Paper-III	3	34	
Practical	5	50	18

Note: Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to answer any 5 questions selecting at least one question from each unit.

CH-101 Paper I : Inorganic Chemistry
(2 hrs or 3 periods/ week)

Unit-I

Ionic Solids: Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule.

Metallic bond: free electron, valence bond and band theories.

Weak Interactions: Hydrogen bonding, vander Waals forces.

Unit-II

Covalent Bond: Valence bond theory and its limitations, directional 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, H_2O.

Molecular Orbital 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

s-Block Elements: Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls.

Periodicity of p-block elements: Periodicity in properties of p-block elements with reference to atomic and ionic radii, ionization energy, electron affinity, electronegativity, diagonal relationship, catenation.

UNIT-IV

Some Important Compounds of p-block Elements: Hydrides of boron, diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

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Chemistry of Noble Gases: Chemical properties of the noble gases, chemistry of Xenon, structure and bonding in Xenon compounds.

Unit-V

Nuclear Chemistry: Fundamental particles of nucleus (nucleons); Concept of nuclides and its representation; Isotopes, Isobars and Isotones (with specific examples); Forces operating between nucleons (n-n, p-p, & n-p); Qualitative idea of stability of nucleus (n/p ratio).

Radiochemistry: Natural and artificial radioactivity; Radioactive disintegration series; Radioactive displacement law; Radioactivity decay rates; Half life and average life; Nuclear binding energy, mass defect and calculation of defect and binding energy; Nuclear reactions, Spallation, Nuclear fission and fusion.

CH-102 Paper II : Organic Chemistry
(2 hrs or 3 periods / week)

Unit-I

Mechanism of Organic Reactions: Homolytic and heterolytic bond cleavage. Types of reagents, electrophiles and nucleophiles. Reactive intermediates - carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Types of organic reactions by considerations. 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, Difference between configuration and conformation. Flying wedge and Fischer projection formulae.

Optical Isomerism: Elements of symmetry, molecular chirality, enantiomers, stereogeniccentre, optical activity. Properties of enantiomers, chiral and achiral molecules with two stereogenic centres. Diastereomers, threo and erythro isomers, meso compounds. Resolution of enantiomers. Inversion, retention and racemization (with examples).

Relative and absolute configuration, sequence rules, D / L and R / S systems of nomenclature.
Geometric Isomerism: Determination of configuration of geometric isomers - cis / trans and E / Z systems of nomenclature. Geometric isomerism in oximes and alicyclic compounds.
Conformational Isomerism: Newman projection and Sawhorse formulae, Conformational analysis of ethane, n-butane, cyclohexane.

Unit-III

Alkanes and Cycloalkanes: IUPAC nomenclature of branched and unbranched alkyl group, classification of carbon atoms in alkanes. Methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids). Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation, orientation, reactivity and selectivity. Cycloalkanes - nomenclature, methods of formation, chemical reactions. Baeyer's strain theory and its limitations. Theory of strainless rings.

Alkenes, Cycloalkenes, Dienes and Alkynes: Methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides. Regioselectivity in alcohol dehydration - the Saytzeff rule, Hoffmann elimination. Physical properties and relative stabilities

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alkenes. Chemical reactions of alkenes - mechanisms involved in hydrogenation electrophilic and free radical additions. Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$. Polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes.

Classification and Nomenclature of isolated, conjugated and cumulated dienes. Structure of allenes and butadiene. Methods of formation, properties. Chemical reactions - 1,2- and 1,4-additions. Diels-Alder reaction and polymerization.

Structure and bonding in alkynes. Methods of formation. Chemical reactions - acidity of alkynes; mechanism of electrophilic and nucleophilic addition reactions; hydroboration-oxidation; metal-ammonia reduction, oxidation and polymerization.

Unit-IV

Arenes and Aromaticity: Nomenclature of benzene derivatives. The aryl group, aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO diagram.
Aromaticity: the Huckel rule, aromatic ions – three to eight membered.

Aromatic electrophilic substitution: General pattern of the mechanism, role of σ complexes. Mechanism of nitration, halogenation, sulphonation, mercuration Friedel Crafts reactions and chloromethylation. Energy profile diagrams. Activating and deactivating substituents. Directive influence - orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.

Unit-V

Alkyl and Aryl Halides: Methods of formation of alkyl halides, chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides S_N2 and S_N1 reactions with energy profile diagrams.
Polyhalogen compounds: Chloroform, carbon tetrachloride.

Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions.
Relative reactivities of alkyl, allyl, vinyl and aryl halides.

CH-103 Paper III: Physical Chemistry
(2 hrs. or 3 Periods/week)

UNIT-I

Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like k_x, e^x, x^n, sinx and log x; maxima and minima, partial differentiation and reciprocity relations, integration of some useful/relevant functions; permutations and combinations, factorials, probability.

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.

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UNIT- II

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

Critical Phenomenon: 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 discussion 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

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.

Basic concept of X-ray diffraction by crystals. Derivation of Bragg's equation. Determination of Crystal structure of NaCl and CsCl (Laue's method and powder method), band theory of solids. Defects in solids

UNIT IV

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 solids (gels): classification, preparation and properties, inhibition, general applications of colloids.

Liquids in liquids (emulsions): types of emulsions, preparation. Emulsifier

UNIT V

Chemical Kinetics: 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. Determination of the order of reactions - 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 equation, 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.

Practical: CH -104: Laboratory Course -I
(4 hrs or 6 periods / week)

INORGANIC CHEMISTRY

Separation and identification of six radicals (3 cations and 3 anions) in the given inorganic mixture including special combinations.

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ORGANIC CHEMISTRY
Laboratory Techniques
(a) Determination of melting point (naphthalene, benzoic acid, urea, etc.); boiling point (methanol, ethanol, cyclohexane, etc.); mixed melting point (urea-cinnamic acid, etc.).

(b) Crystallization of phthalic acid and benzoic acid from hot water, acetanilide from boiling water, naphthalene from ethanol etc.; Sublimation of naphthalene, camphor, etc.

Qualitative Analysis
Element Detection (N, S and halogens). Functional group determination (unsaturation, phenolic, alcoholic, carboxylic, carbonyl, ester, carbohydrate, amine, amide, nitro) in simple organic solids and liquids.

PHYSICAL CHEMISTRY
(One of the following experiments should be given in the examination)

(i) Chemical Kinetics:
(a) To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.

(b) To study the effect of acid strength on the hydrolysis of an ester.

(c) To compare the strengths of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.

(d) To study kinetically the reaction rate of decomposition of iodide by H_2O_2.

(ii) Viscosity, Surface Tension:
(a) To determine the viscosity/surface tension of a pure liquid (alcohol etc.) at room temperature. (using the Ostwald viscometer/stalagmometer).

(b) To determine the percentage composition of a given binary mixture by surface tension method (acetone & ethyl methyl ketone).

(c) To determine the percentage composition of a given mixture (non-interacting systems) by viscosity method.

(d) To determine the viscosity of amyl alcohol in water at different concentration and calculate the excess viscosity of these solutions.

(Instructions to the Examiners)
CHY 104: Chemistry Practical (Pass course)

Max. Marks: 50	Duration of Exam: 5 hrs.	Minimum Pass Marks: 18

Inorganic Chemistry

Ex.1   Separation and identification of 3 cations and 3 anions in the mixture

Organic Chemistry

Ex.2   Laboratory Techniques

Ex. 3   Qualitative Analysis

Detection of element and detection of functional group 10

Physical Chemistry

Ex. 4   Perform one of the experiments mentioned in the syllabus. 12

Ex. 5   Viva-voce 5

Ex. 6   Record 5

Total 50

BOTANY

Scheme

Min. Pass Marks: 36   Max Marks: 100

Paper I   3 hrs. Duration   Max. Marks 33

Paper II   3 hrs. Duration.   Max. Marks 33

Paper III   3 hrs. Duration   Max. Marks 34

Practical Min. Marks: 18 .   4 hrs, duration   Max. Marks 50

                                                     3 hours

Duration of examination of each theory paper-   4 hours

Duration of examination of practical's-

Note:

1. There will be 5 questions in each paper. All questions are compulsory. Candidate has to answer all questions in the main answer book only.

2. Q. No. 1 will have 18 very short answer type Questions (not more than 20 words) of half marks each covering entire syllabus.

3. Each paper is divided into four units. There will be one question from each unit. These Q. No. 2 to 5 will have internal choice.

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Paper-I
Cell Biology, Genetics and Plant Breeding
(2 hrs /week)
Unit-1

Cell organelles and Nuclear material: Ultrastructures and functions of different cell organelles (cell wall, plasma membrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, Lysosome, Golgi bodies and Endoplasmic Reticulum). Chromatin structure & Chromosome organization: eukaryotic and prokaryotic. Chromosome morphology; specialized types of chromosomes (Sex chromosomes, lampbrush Chromosome, Polytene chromosome); transposons.

Unit-2

Cell divisions: Cell cycle, mitosis: stages, structure and functions of spindle apparatus, anaphasic chromosome movement, Meiosis: its different stages- Meiosis I, Meiosis II, synaptonemal complex, chiasmata formation and crossing over.

Basis of genetic material: Griffith's transformation experiment and The Hershey and Chase blender experiment to demonstrate DNA as the genetic material. Concept of Gene: *Neurospora* genetics: one gene one enzyme hypothesis;
An idea about Prokaryotic and eukaryotic structure of gene – operon concept, exons and introns.

Extra nuclear genome: mitochondrial and Chloroplast genome, plasmids;
Chromosomal aberrations: Deletion, duplication, translocation, inversion, Aneuploidy and polyploidy.

Unit-3

Genetic inheritance: Mendel's laws of inheritance and their exceptions; allelic (in complete and co-dominance, lethality) and non-allelic interactions (complementary genes and duplicate genes): Quantitative inheritance : grain color in wheat, corolla length *and tabacum*.

Cytoplasmic inheritance-maternal influence, shell coiling in snails, Kappa particles in *Paramaecium*, Multiple allelism : ABO blood groups in men

Unit-4

Plant Breeding : Introduction and objectives of plant breeding; general methods of plant breeding- in self-pollinated, cross-pollinated and vegetatively propagated crop plants :Introduction and acclimatization, selections, hybridizations, hybrid vigour and inbreeding depression. Role of mutation and polyploidy in plant breeding. Famous Indian and international plant breeders and their contribution. National and International agricultural research institutes.

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Plant breeding work done on wheat and rice in India, Green revolution

Suggested Laboratory Exercises.

- Study of cell structure from Onion, *Hydrilla* and *Spirogyra*.
- Study of cyclosis in *Tradescantia* spp.
- Study of plastid for pigment distribution in Lycopersicom, Cassia and Capsicum
- Study of electron microphotographs of eukaryotic cells for various cell organelles
- Study of electron microphotographs of virus, bacteria and eukaryotic cells for comparative study of cellular organization.
- Study of different stages of mitosis and meiosis in root-tip cells and flower buds respectively of onion.
- To solve genetic problems based upon Mendel's laws of inheritance: Monohybrid, Dihybrid, Back cross and test cross.
- Permanent slides/photographs of different stages of mitosis and meiosis, sex chromosomes, polytene chromosome and salivary gland chromosomes.
- Emasculation, bagging & tagging techniques
- Cross pollination techniques

Suggested Readings:

- Choudhary, H.K. (1989). Elementary Principles of Plant Breeding. Oxford and IBM Publishing Co., New Delhi.
- Gupta, P.K. (2009). Cytology. Genetics. Evolution, and Plant Breeding, Rastogi Publications, Meerut.
- Miglani, G.S. (2000). Advanced Genetics, Narosa Publishing House, New Delhi.
- Russel, P.J. (1998). Genetics. The Benjamins/Cummings Publishing Co., Inc. U.S.A.
- Shukla, R:S and Chandel; P.S. (2000). Cytogenetics. Evolution and Plant Breeding, S. Chand & Co Ltd, New Delhi
- Singh, R.B. (1999). Text Book of Plant Breeding, Kalyani Publishers, Ludhiana.
- Dnyansagar. VR (1986) Cytology and Genetics, Tata McGraw-Hill Pub. Co. Ltd. New Delhi.
- Roy SC. and De. KK (1999): Cell Biology. New Central Book Agency (P) Ltd. Calcutta.
- Verma, PS. and Agarwal. VK (2012). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand and Co. Ltd. New Delhi.

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Paper II

Microbiology, Mycology and Plant Pathology

(2 hrs /week)

Unit-1

Microbiology: Meaning and Scope, history and development in the field of microbiology. Concept of quorum sensing and biofilm

Eubacteria: general account, occurrence, morphology (structure, shapes), flagella, nutritional types, endospore, reproduction (binary fission, transformation, conjugation, transduction), economic and biological importance.

Mycoplasma: occurrence, morphology, reproduction and importance.

Unit-2

Virus: General characteristics and importance Structure of TMV and Pox virus; Structure and multiplication of Bacteriophage.

Fungi: General characters, occurrence, thallus organization, reproduction, economic importance. Classification of fungi (Alexopoulos and Ainsworth's).

Plant diseases: Biotic and abiotic diseases, important symptoms caused by fungi, bacteria, viruses and MLOs (blights, mildews- downy and powdery, rusts, smuts, canker, mosaic, little leaf, galls etc.).

Unit-3

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Albugo and white rust; Sclerospora and Downy mildew/Green ear disease of Bajra; Aspergillus; Claviceps and Ergot; Peziza.

Unit-4

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Puccinia and Black rust of wheat ; Ustilago and loose smut of wheat and covered smut of barley; Agaricus, Alternaria and early blight of potato

Suggested Laboratory Exercises:

1. Study of bacteria using curd or any other suitable material, Gram's staining of bacteria.

2   Study of Mycoplasma, TMV, Poxvirus, bacteriophage (photographs/ 3-D models)

3   Study of symptoms of plant diseases Downy mildew of Bajra, Green ear of bajra, Powdery mildew, mosaic of bhindi

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4. Study of specimen, permanent slides and by making suitable temporary slides: *Albugo*-white rust; *Sclerospora*- downy mildew, green ear; *Aspergillus*; *Claviceps*- ergot; *Ustilago*- loose smut of wheat, covered smut of barley. *Puccinia*- Black rust of wheat; *Agaricus*; *Peziza* and *Alternaria*- early blight of potato. *Visit a local Botanical Garden /ARL*

5. Media preparation: potato dextrose agar, Nutrient agar *& study of Plant in Farmer field /Agricultural Stations.*

6. Culture techniques of fungi and bacteria.

Suggested Books:

Alexopoulos, C.J. and Mims, C.W.: Introductory Mycology, John Wiley and Sons, New York. 2000

Dube, H.C. :Fungi, Rastogi Publication, Meerut, 1989.

Sarabhai, R.C. and Saxena, R.C.: A text book of Botany, Rastogi Publication, Meerut, 1990.

Sharma, O.P.: Fungi, Today and Tomorrow Printers and Publishers, New Delhi, 2000.

Vashihsta, B.R. Botany for Degree Students –Fungi, S. Chand & Co.. New Delhi, 2001.

Bilgrami, K.S. and Dube, H.C.: A text book of Modern Plant Pathology, Vikas Publications, New Delhi 2000.

Biswas, S.B. and Biswas, A.: An Introduction to Viruses, Vikas Publications, New Delhi. 2000.

Clifton, A.: Introduction of Bacteria, McGraw Hill Co. Ltd., New York; 1985.

Madahar, C.L.: Introduction of Plants Virus, S. Chand and Co.; New Delhi, 1978.

Palzar M.J Jr. Chan, E.C.S. and Krieg, N.R. : Microbiology, McGraw Hill Edu. London 2001.

Purohit, S.S.: Microbiology, Agro. Bot. Publication, Jodhpur 2002.

Sharma, P. D.: Microbiology and Pathology, Rastogi Publication. Meerut, 2003.

Singh, V. and Srivastava V. : Introduction of Bacteria, Vikas Publication, 1998.

Cappuccino, J. and Sherman, N.: Microbiology: A Laboratory Manual (10thEd.). Benjamin Cummings, 2013.

Aneja, K.R.. Experiments in Microbiology, Plant Pathology and Biotechnology New Age International (P) Ltd., Publishers, New Delhi 2003.

Mehrotra, R.S. and Aggarwal, Ashok: Plant pathology, Tata McGraw-Hill Education, 2003.

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Paper III
Algae, Lichens and Bryophyta
(2 hrs/week)

Unit-1

General characters, Classifications (Smith). Diverse Habitat. Range of thallus structure, photosynthetic pigments and food reserves. Reproduction (Vegetative, Asexual, Sexual). Types of the life cycle: Economic importance.

Unit-2

Type Studies
Cyanophyceae – *Oscillatoria, Nostoc*
Chlorophyceae - *Volvox, Chara*.
Xanthophyceae - *Vaucheria*.
Phaeophyceae - *Ectocarpus*
Rhodophyceae - *Polysiphonia*.

Unit-3

General characters, Origin, and evolution of Bryophyta. Classification (Eichler); Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generations; Economic importance.

Type Studies: Hepaticopsida - *Riccia, Marchantia*

Unit-4

Type Studies: Anthocerotopsida- *Anthoceros*; Bryopsida- *Funaria*
Lichens- General characters, habitat, Structure, reproduction and economic and Ecological importance of lichens.

Suggested Laboratory Exercises

1. Study of class work material by making suitable temporary slides and study of permanent slides of Oscillatoria, Nostoc, Volvox, Chara Vaucheria, Ectocarpus, Polysiphonia.

2. Study of external morphology and preparation of suitable sections of vegetative/reproductive parts of Riccia, Marchantia, Anthoceros, Funaria.

3. Study of lichens

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Suggested Readings
Boid, H.C. Alexopoulous. C.J. and Delevoryas, T. Morphology of Plant and Fungi (4th Ed.) Harper & Foil Co., New Work, 1980.
Ghemawal, M.S., Kapoor, I.N. and Narayan, H.S. A text book of Algae, Ramesh Book Depot, Jaipur, 1976.
Gilbart, M.Smith: Crypogamic Botany, Vol. I & II (2nd Ed.) Tata McGraw Hill, Publishing Co. Ltd. New Delhi, 1985.
Kumar, H.D.: Introductory Phycology, Affiliated East—West Press, Ltd. New York, 1983
Puri, P.: Bryophytes, Atmaram & Sons. Delhi, Lucknow, 1985.
Sarabhai. R.C. and Saxena, R.C.: A text book of Botany. Vol I & II, Ratan Prakashan Mandir, Meerut. 1980.
Singh, V., Pande, P.C. and Jain, D.K.: A text book of Botany, Rastogi, & Co., Meerut, 2001.
Vashista, B.R.: Botany for Degree Students (Algae, Bryophytes) S. Chand & Co., New Delhi, 2002.

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BOTANY PRACTICAL EXAMINATION B. Sc PART-I

SKELETON PAPER

M.M. 50   TIME:

S.No.	Practical	Regular	Ex./NC
1(a)	Prepare the acetocarmine stained slide of the material "A" provided to you. Draw a well labelled diagram of any one stage of nuclear division. Identify it giving reasons.	5	5
1(b)	Comment and solve the problem on Genetics allotted to you along with reasons.	5	5
2	Make suitably stained glycerine-preparation of any one alga from the given mixture "B". Draw its labelled diagrams; assign it to its systematic position giving reasons.	5	5
3	Make suitable preparation of the reproductive structure of material "C"(Fungi). Draw labelled diagrams. Identify giving reasons.	5	5
4	Make suitable stained preparation of material "D" (Bryophyta (vegetative/ reproductive). Draw labelled diagrams. Identify giving reasons	5	5
5	One Microbiology experiment for comments. Or Gram's staining.	5	5
6	Comment upon spots (1-5)	10	
7	Viva-Voce	5	
8	Practical record	5	
	TOTAL	50	50

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ZOOLOGY

B.Sc.-B.Ed.(Part-I) 2020

Scheme:

Max. Marks: 100   Min. Pass Marks: 36

Paper I	: 3 Hrs duration	33 Marks
Paper II	: 3 Hrs duration	33 Marks
Paper III	: 3 Hrs duration	34 Marks
Practicals	: 4 Hrs. duration	50 Marks

NOTE:

1. There will be two parts of every theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 (Paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering the entire syllabus.

   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.

2. The candidate has to answer all questions in the main answer book only.

PAPER – I: Z-101
DIVERSITY OF ANIMALS
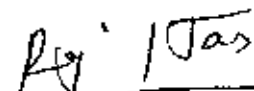### Section – A

Biosystematics and Taxonomy

1. General principles of taxonomy, concept of five kingdom scheme, international code of nomenclature, cladistics, molecular taxonomy.
2. Concept of Protozoa and Metazoa, and levels of organization.
3. Taxonomy and basis of classification of non-chordata and chordata: symmetry, coelom, segmentation and embryogeny.
4. Detailed classification of Non- chordata and Chordata (up to suborders with examples).

Section – B

Habitat,Habit,Morphology,Structure,   *Locomotion,   Organs   and   Systems (Digestive,Excretory,Respiratory,*Osmoregulation,Nervous & Reproductive),Life Cycle,*Affinities and *Adaptations.

Note : * indicates wherever required

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2. **Nucleic Acids:**
   (i) DNA structure, polymorphism (A, B and Z types) and replication (semi conservative mechanism) experiments of Messelson and Stahl: elementary idea about polymerases, topoisomerases, single strand binding proteins, replicating forks (both unidirectional and bidirectional), leading and lagging strands, RNA primers and Okazaki fragments, elementary idea about DNA repair.
   (ii) RNA structure and types (mRNA, rRNA and tRNA) and transcription.

3. **Genetic code and translation:** Triplet code, characteristics of triplet code, protein synthesis (translation).

4. **Cell in reproduction:**
   (i) Interphase nucleus and cell cycle: S, G-1, G-2 and M phase.
   (ii) Mitosis: Different stages, structure and function of spindle apparatus; anaphasic movement.
   (iii) Meiosis: Different stages, synapses and synaptonemal complex, formation of chiasmata and significance of crossing over.

Section – C

Genetics

1. Mendelism: Brief history of genetics and Mendel's work; Mendelian laws, their significance and current status, chromosomal theory of inheritance.
2. Chromosomal mutations: Classification, translocation, inversion, deletion and duplication; Variations in chromosome numbers; haploidy diploidy, polyploidy, aneuploidy, euploidy and polysomy.
3. Linkage and crossing over, elementary idea of chromosome mapping.
4. Genetic interaction: Supplementary genes, complementary genes, duplicate genes, epistasis, inhibitory and polymorphic genes.
5. Multiple gene inheritance: ABO blood groups and Rh factor and their significance.
6. Cytoplasmic inheritance.
7. Sex determination in *Drosophila* and man, pedigree analysis.
8. Genetic disorders: Down's, Turner's and Klinefelter's syndromes, color blindness, Hemophilia, Phenylketonuria.
9. Concept of gene: Recon, muton and cistron.

PAPER – III: Z-103

GAMETE AND DEVELOPMENTAL BIOLOGY

Section – A

Developmental Biology: Scope and Early Events

1. Historical review, types and scope of embryology.
2. Gametogenesis:
   (i) Formation of ova and sperm.
   (ii) Vitellogenesis.
3. Fertilization: Activation of ovum, essence of activation: Changes in the organization of the egg cytoplasm.
4. Parthenogenesis.

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Section – B

Developmental Biology: Pattern and Processes

1. Cleavage: Definition, planes and patterns of cleavage among non chordates and chordates, significance of cleavage, blastulation and morulation.
2. Fate maps, morphogenetic cell movements, significance of gastrulation.
3. Embryonic induction, primary organizer, differentiation and competence.
4. Development of chick up to 96 hours stage.

5. Embryonic adaptations:
   (i) Extra embryonic membranes in chick, their development and functions.
   (ii) Placentation in Mammals: Definition, types, classification on the basis of morphology and histology, functions of placenta.
   (iii) Paedogenesis and neoteny.

Section – C

Dimensions in Developmental Biology

1. Regeneration.
2. Various types of stem cells and their applications.
3. Cloning of animals:
   (i) Nuclear transfer technique.
   (ii) Embryo transfer technique.
4. Teratogenesis (Genetic and Induced).
5. Biology of aging.
6. Cell death.

B.Sc.-B.Ed.(Part-I) 2020

Practical – Zoology

Min. Marks: 18   **4 Hrs. / Week**   **Max. Marks: 50**

I. **Microscopic Techniques:**
   1. Organization and working of Optical Microscope: Dissecting and compound microscopes.
   2. General methods of microscopic slide preparations:Narcotization; fixing and preservation; washing; staining; destaining; dehydration; clearing and mounting.
   3. General idea of composition, preparation and use of:
      (i) Fixatives: Formalin, Bouin's fluid.
      (ii) Stains: Aceto-carmine, Aceto-orcein, Haematoxylin, Eosin.
      (iii) Common reagents: Normal saline, Acid water, Acid alcohol and Mayer's albumin.
   4. Collection and Culture Methods:
      (i) Collection of animals from their natural habitat during field trips such as *Amoeba, Paramecium, Euglena, Daphnia, Cyclops*, etc.

      (ii) Culture of *Paramecium* in the laboratory and study of its structure, life – processes and behavior in live state.

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II. **Study of Microscopic Slides and Museum Specimens:**

Protozoa: *Amoeba, Euglena, Trypanosoma, Giardia, Entamoeba, Elphidium (Polystomella),Foraminiferous shells, Monocystis, Plasmodium, Paramecium,leishmania, Paramecium* showing binary fission and conjugation, *Opalina, Nyctotherus, Balantidium, Vorticella.*

Porifera:*Leucosolenia, Euplectella, Spongilla,* T. S. Sycon, Spicules, Spongin fibers, Gemmules.

Coelenterata:*Millepora, Physalia, Velella, Aurelia, Alcyonium, Gorgonia, Pennatula,* Sea anemone, Stone corals, *Obelia* colony and medusa.

Ctennophora: Any Ctenophore

Platyhelminthes : *Taenia, Planaria,* Fasciola (WM), T. S. body of *Fasciola,*Miracidium, Sporocyst, Redia and CercariaLarvae of *Fasciola,* Scolex, T. S. mature proglottid of Taenia, gravid proglottid, Cysticercus larva.

Aschelminthes : *Ascaris, Wuchereria, Dracunculus*

Annelida : Neries, Heteroneries, Arenicola, Aphrodite, Chaetopterus, Tubifix,Glossiphonia, Pontobdella, Polygordius.

III. **Anatomy:**

Earthworm: External features, general viscera, alimentary canal, reproductive system and nervous system.

Leech: External features, alimentary canal, reproductive and nervous system.

IV. **Study of the Following Through Permanent Slide Preparation:** *Paramecium, Euglena,* Foraminiferous shells,Sponge spicules, Spongin fibres, Gemmule, *Hydra, Obelia* colony andMedusa; ParapodiumofNereis andHeteronereis.

V. **Exercises in Cell Biology:**

1. Squash preparation for the study of mitosis in onion root tip, permanent slides of mitosis (all stages).
2. Squash preparation for the study of meiosis in grasshopper or cockroach testes, permanent slide of meiosis (all stages).
3. Study of giant chromosomes in salivary glands of *Chironomous* or *Drosophila* larva.
4. Study of cell permeability using mammalian R.B.C.

VI. **Exercises in Genetics:**

A. Study of *Drosophila*:

1. Life cycle and an idea about its culture
2. Identification of male and female
3. Identification of wild and mutants (yellow body, ebony, vestigial wing and white eye)
4. Study of permanent prepared slides: Sex comb and salivary gland chromosomes.

B. Numerical problems based on monohybrid and dihybrid cross.

C. Identification of blood groups (A, B, AB, O & Rh factor)

VII. Developmental Biology:

1. **Study of development of frog/toad with the help of Charts/Slides/Models:**
   (i) Eggs, cleavage, blastula, gastrula, neurula, tail-bud, hatching, mature tadpole larvae, metamorphic stages, toadlet / froglet.
   (ii) Histological slides: Cleavage, blastula, gastrula, neurula and tail-bud stage.

2. **Study of development of chick with the help of whole mounts/Charts/Slides/Models**
   (i) 18 hrs, 21 hrs, 24 hrs, 33 hrs, 48 hrs, 72 hrs and 96 hrs of incubation.
   (ii) Primitive streak stage in living embryo, if possible, after removal of the blastoderm from the egg.
   (iii) Study of the embryo at various stages of incubation *in vivo* by making a window in the egg-shell may also be demonstrated.
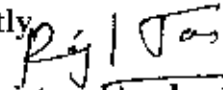   (iv) Study of various foetal membranes in a 10-12 day old chick embryo.

B.Sc.-B.Ed. Part - I
Scheme of Practical Examination and Distribution of Marks

Time: 4 Hrs.   Min Pass Marks: 18   Max. Marks: 50

		Regular	Ex. /N.C. Students
1.	Anatomy (any system)	6	5
2.	Permanent Preparation	4	7
3.	Cell Biology and Genetics	4+4	6+6
4.	Developmental Biology	6	5
5.	Identification and comments on Spots (1 to 8)	16	16
6.	Viva Voce	5	5
7.	Class Record	5	-
		50	50

Notes:

1. Anatomy: Study of systems of the prescribed types with the help of dissection.
2. With reference to microscopic slides, in case of non-availability, the exercise should **be substituted with diagrams / photographs.**
3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
6. **It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently**

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B.Sc. Part I (Pass Course)

1. PHYSICS

Scheme :   **Max. Marks: 100**

Min. Pass Marks: 36

Paper I	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper II	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper III	3 hrs. duration	Max. Marks: 34	Min. Pass marks 12
Practical	5 hrs. duration	Max. Marks: 50	Min. Pass marks 18

Paper-I : Mechanics & Oscillations

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

Unit – I:

Physical Law and frame of Reference

(a) Inertial and non-inertial frames, Transformation of displacement, velocity, acceleration between different frames of reference involving translation. Galilean transformation and invariance of Newton's laws.

(b) **Coriolis Force:** Transformation of displacement, velocity and acceleration between rotating frame, Pseudo forces, Coriolis force; Motion relative to earth, Focult's pendulum.

(c) **Conservative Forces:** Introduction about conservative and non-conservative forces, Rectilinear motion under conservative forces, discussion of potential energy curve and motion of a particle.

Unit – II:

Centre of Mass

Introduction about Centre of Mass, Centre of Mass Frame: Collision of two particles in one and two dimensions (elastic and inelastic), Slowing down of neutrons in a moderator, Motion of a system with varying mass. Angular momentum concept, conservation and charge particle scattering by a nucleus.

Rigid body

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I quation of motion of a rotating body. Inertial coefficient. Case of J not parallel to ω. Kinetic energy of rotation and idea of principal axes. Precessional motion of a spinning top.

Unit – III:

Motion under Central Forces

Introduction about Central Forces. Motion under central forces. Gravitational interaction. Inertia and gravitational mass. General solution under gravitational interaction. Keplers Laws. Discussion of trajectories. Cases of elliptical and circular orbits. Rutherford scattering.

Damped Harmonic Oscillations

Introduction about oscillations in a potential well. Damped force and motion under damping. Damped Simple Harmonic Oscillator. Power dissipation. Anharmonic oscillator and simple pendulum as an example.

Unit – IV:

Driven Harmonic Oscillations

Driven harmonic oscillator with damping. Frequency response. Phase factor. Resonance. Series and parallel of LCR circuit. Electromechanical system. Galvanometer.

Coupled Oscillations

Equation of motion of two coupled Simple Harmonic Oscillators. Normal modes motion in mixed modes. Transient behavior. Dynamics of a number of oscillators with neighbor interactions.

Text books:

- Mechanics (SIE). Charles Kittel.
- Introduction to Classical mechanics. TMH
- The Physics of Waves & Oscillations. Bajaj
- H. Goldstein. Classical mechanics.
- L.N. Hand, J.D. Finch. Analytical mechanics (Cambridge 1998).
- L. Landau, E. Lifshitz. Mechanics.

Paper – II (Electromagnetism)

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

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Unit I: Scalar and Vector Fields

Concept of Field, Scalar and Vector Fields, Gradient of scalar field, Physical significance and formalism of Gradient, Divergence and Curl of a vector field, Cartesian co-ordinates system, Problems based on Gradient, Divergence and curl operators. Concept of Solid angle, Gauss divergence and Stoke's theorem. Gauss law from inverse square law. Differential form of Gauss law.

Electric Field and Potential Energy

Invariance of Charge, Potential energy of system of (i) Discrete N-charges (ii) Continuous charge distribution. Energy required to built a uniformly charged sphere, classical radius of electron, Electric field due to a short electric dipole, Interaction of electric dipole with external uniform and non uniform electric field, potential due to a uniformly charged spherical shell.

Poisson's and Laplace equations in Cartesian co-ordinates and their applications to solve the problems of electrostatics.

Electric field measured in moving frames, Electric field of a point charge moving with constant velocity.

Unit II: Electric field in matter

Multipole expansion, defination of moments of charge distribution, Dielectrics, Induced dipole moments, polar non polar molecules, Free and bound charges, Polarization, Atomic polarizabilty, electric displacement vector, electric susceptibility, dielectric constant, relation between them.

Electric potential and electric field due to a uniformly polarized sphere (i) out side the sphere (ii) at the surface of the sphere (iii) inside the sphere, Electric field due to a dielectric sphere placed in a uniform electric field (a) out side the sphere (b) inside the sphere, Electric field due to a charge placed in dielectric medium and Gauss law, Clausius-Mossotti relation in dielectrics.

Unit III: Magnetostatics and Magnetic field in matter

Lorentz force, properties of magnetic field, Ampere's law, field due to a current carrying solid conducting cylinder (a) out side (b) at the surface and (ii) inside the cylinder. Ampere's law in differential form, Introduction of Magnetic Vector potential, Poisson's equation for vector potential, Deduction of Bio-Savart law using Magnetic Vector potentials, Differential form of Ampere's law.

Atomic magnet, Gyromagnetic ratio, Bohr-magneton, Larmor frequency, induced mangnentic moment and dia-magnetism, spin magnetic moment, para and ferro magnetism, Intensity of Magnetization, Magnetic permeability and Susceptibility, free and bound current densities, Magnetic field due to a uniformly magnetized material and Non-uniformly magnetized material.

Unit IV: Maxwell's Equations and Electromagnetic waves

Displacement current, Maxwell's Equations, Electromagnetic waves, Electromagnetic waves in an Isotropic medium, Properties of electromagnetic waves, Energy density of Electromagnetic waves, Pointing vector, Radiation pressure of free space, Electromagnetic waves in Dispersive medium, Spectrum of Electromagnetic waves.

References :
1. Electricity & Magnetism ; A.S. Mahajan & Abbas A. Rangwala, Tata McGraw-Hill
2. Introduction to Electrodynamics ; David J. Griffith, Prentice Hall
3. Berkley Physics Course , Vol. II
4. Fundamental University Physics Vol II : Fields and Waves ; M. Alonso and E.J. Finn, Addison-Wesley Publishing Company.

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2. Introduction to Electrodynamics : David J. Griffith, Prentice Hall

3. Berkley Physics Course , Vol II

4. Fundamental University Physics Vol II : Fields and Waves , M. Alonso and E.J. Finn, Addison-Wesley Publishing Company.

Paper III
OPTICS

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.
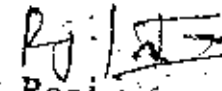
Unit – 1   Interference:

Concept of Spatial and Temporal Coherence, coherence length, coherence time, Definition and propagation of a wave front Huygen's principle of secondary wavelets, Young's Double slit experiment. Types of interference, interference by division of wavefronts: Fresnel's Biprism, Measurement of wavelength λ and thickness of a thin transparent sheet, Interference by division of amplitude: Interference in thin films of constant thickness in transmitted and reflected waves. Interference produced by a wedge shaped film, Newton's rings, Determination of wavelength λ and refractive index μ by Newton's Rings: fringes of equal inclination (Haidinger fringes) and equal thickness (Fizeau fringes), Michelson's Interferometer, shape of fringes, Measurement of wavelength, difference between two spectral lines and thickness of a thin transparent sheet.

Unit – 2   Diffraction:

Fresnel's diffraction, Half period zones, Fresnel's diffraction at a circular aperture, straight edge and a rectangular slit, Zone plate, Multiple foci of zone plate, comparison between zone plate and convex lens, Fraunhofer diffraction by single slit and a circular aperture. Fraunhofer diffraction by N parallel slits with two slits as a special case, Missing order, Plane diffraction grating and its use in determining wavelength, Dispersion by a grating, Rayleigh's criterion of resolution. Resolving power of a Telescope and a Grating.

Unit – 3 Polarization:

Polarization. (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically Polarized light. Production of Plane polarized light (i) by reflection (ii) by refraction (iii) by

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double refraction and (iv) by dichroism (Polaroid). Identification of polarized light. Huygen's theory of double refraction. Production of Circularly and Elliptically Polarized light. Quarter wave and half wave plates. Analysis of polarized light. Optical activity. Laws of optical Activity. Fresnel's explanation of optical activity. Experimental verification of Fresnel's theory. Specific rotation. Polarimeter. Types of Polarimeter: (i) Laurent's half shade polarimeter and (ii) Biquartz polarimeter.

Unit – 4: Quantum Optics & Photonics

(i) Laser: Spontaneous and stimulated emission, Einstein's A & B coefficients, Energy density of radiation as a result of stimulated emission and absorption, population inversion, Methods of optical pumping, energy level schemes, He-Ne, Ruby, co_2 lasers.

(ii) Holography: Basic concepts of Holography, principle of holography, Theory, construction and reconstruction of image, application of holography.

(iii) Fiber Optics: Introduction of Optical Fiber, Necessity of Cladding, Optical fiber system, optical fiber cable. Total internal Reflection, Explanation of Propagation of light through an optical fiber.

Reference:

1. Optics by Brij Lal & Subramanium, S. Chand.
2. Optics by D. P. Khandelwal.
3. Principles of optics by B. K. Mathur.
4. Introduction to Modern Optics by A. K. Ghatak.
5. An introduction to Modern Optics by G. R. Fowels.
6. Essentials of Lasers by Allen.

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Practical

Work Load: Four hours laboratory work per week

Examination Duration: Four hours

Minimum Experiments: Total sixteen taking eight from each section.
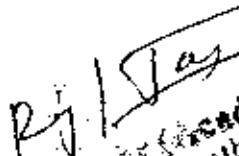
The colleges are free to set new experiments of equivalent standard. This should be intimated and approved by the Convener, Board of Studies before the start of academic session. It is binding on the college to have experimental set up of at least sixteen experiments listed below (8 from each section). In case number of experiment performed by the student is less than sixteen, his marks shall be scaled down in final examination on pro rate basis. Laboratory examination paper will be set by the external examiner by making pairs of experiments taking one from each section out of sixteen or more experiments available at the center. Different combinations shall be given for different batch.

Section A

1. To study the variation of power transfer by two different loads by a DC Source and to verify maximum power transfer theorem.
2. To study the variation of charge and current in a RC circuit with a different time constant (using a DC source).
3. To study the behavior of a RC circuit with varying resistance and capacitance using AC mains as a power source and also to determine the impedance and phase relations.
4. To study the rise and decay of current in an LR circuit with a source of constant emf.
5. To study the voltage and current behavior of an LR circuit with an AC power source. Also determine power factor, impedance and phase relations.
6. To study the characteristics of a semi- conductor junction diode and determine forward and reverse resistances.
7. To study the magnetic field along the axis of a current carrying circular coil. Plot the necessary graph and hence find radius of the circular coil.
8. To determine the specific resistance of a material and determine difference between two small resistance using Carey Fosters Bridge.
9. To convert a galvanometer into a ammeter of a given range
10. To convert a galvanometer into a voltmeter of a given range.

Section B

1. To study the random decay and determine the decay constant using the statistical board.
2. Using compound pendulum study the variation of time period with amplitude in large angle oscillations.
3. To study the damping using compound pendulum.

4. To study the excitation of normal modes and measure frequency splitting using two coupled oscillators.

5. To study the frequency of energy transfer as a function of coupling strength using coupled oscillators.

6. To study the viscous fluid damping of a compound pendulum and determining damping coefficient and Q of the oscillator.

7. To study the electromagnetic damping of a compound pendulum and to find the variation of damping coefficients with the assistance of a conducting lamina.

8. To find J by Callender and Barne's Method.

9. To determine Young's modulus by bending of beam.

10. To determine Y, σ and η by Searle's method.

11. To ensure Curie temperature of Monel alloy.

12. To determine modulus of rigidity of a wire using Maxwell's needle.

13. Study of normal modes of a coupled pendulum system. Study of oscillations in mixed modes and find the period of energy exchange between the two oscillators.

14. To study variation of surface tension with temperature using Jaegger's method.

15. To study the specific-rotation of sugar solution by polarimeter.

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MATHEMATICS

B.Sc.-B.Ed. Part-I Examination-2020

Teaching : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical
(20 candidates in each batch)

Examination Scheme :		Min.Pass Marks	Max. Marks
Science –		54	150
Arts –		72	200
		Duration	Max.Marks
Paper – I	Discrete Mathematics	3 hrs.	40 (Science) 53 (Arts)
Paper – II	Calculus	3 hrs.	40 (Science) 53 (Arts)
Paper – III	Analytic Geometry and Optimization Theory	3 hrs.	40 (Science) 54 (Arts)
Practical	Optimization Techniques	2 hrs.	30 (Science) 40 (Arts)

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.

2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.

3. An Internal/external examiner can conduct Practical Examination of not more than **100 (Hundred)** Candidates.

4. Each candidate has to pass in Theory and Practical examinations separately.

Paper – I: Discrete Mathematics

Teaching : 3 Hours per Week   Max. Marks: 40 (Science)

Duration of Examination : 3 Hours   53 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

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Unit 1 : Sets, Cardinality, Principal of inclusion and exclusion, Mathematical induction, Relations and Functions, Binary relations, Equivalence relations and partitions, Partial order relations and Lattices, Chains and Anti-chains. Pigeon hole principle.

Unit 2: Boolean Algebra- Lattices and Algebraic structure, Duality, Distributive and Complemented Lattices, Boolean Lattices, Boolean functions and Boolean expression.

Fundamental theorem of arithmetic, Divisibility in Z, Congruence's, Chinese reminder theorem, Euler's functions, Primitive roots.

Unit 3: Logic and propositional calculus, Simple and compound propositions, Basic logical operations, Truth tables, Tautologies and contradictions, Propositional functions, Quantifiers. Discrete numeric functions, Generating functions, Recurrence relations and Recurrence algorithms, Linear recurrence relation with constant coefficients and their solutions, Total solutions, Solution by the method of generating functions.

Unit 4: Basic concepts of graph theory, Types of graph (Connected Graphs, Regular graphs, Planar graphs), walk, Paths & Circuits, Shortest path problem. Operations on graphs (union, join, products)

Unit 5: Matrix representation of graphs, Adjacency matrices, Incidences matrices,

Tree, Spanning tree, Minimumm spanning tree, Distance between vertices, Center of tree, Binary tree, Rooted tree. Hamiltonian and Eulerian graphs

Reference Books:

1. K.H. Rosen, Discrete Mathematics and it's Applications, McGraw Hill, 1999.
2. N.L. Biggs, Discrete Mathematics, Oxford Science Publication, 1985.
3. C.L. Liu and D.P. Mohapatra, Elements of Discrete Mathematics, Tata McGraw Hill, 2008.
4. T. Koshy, Discrete Mathematics with Applications, Academic Press, 2005.
5. N. Deo, Graph Theory, Prentice Hall of India, New Delhi, 1904.

Paper- II: Calculus

Teaching : 3 Hours per Week   **Max. Marks: 40 (Science)**

Duration of Examination : 3 Hours   **53 (Arts)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Series – Infinite series and Convergent series. Tests for convergence of a series – Comparison test, D'Alembert's ratio test, Cauchy's n-th root test, Raabe's test, De-Morgan-Bertrand's test, Cauchy's condensation test, Gauss's test, (Derivation of tests is not required). Alternating series. Absolute convergence. Taylor's theorem. Maclaurin's theorem. Power series expansion of a function. Power series expansion of sinx, cosx, e^x, $\log_e(1+x)$, $(1+x)^n$.

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Unit 2: Derivative of the length of an arc. Pedal equations. Curvature – Various formulae, Centre of curvature and Chord of curvature. Partial differentiation. Euler's theorem for homogeneous functions. Chain rule of partial differentiation. Total differentiation, Differentiation of implicit functions.

Unit 3: Envelopes and evolutes, Maxima and Minima of functions of two variables. Lagrange's method of undetermined multipliers. Asymptotes. Multiple points. Curve tracing of standard curves (Cartesian and Polar curves).

Unit 4: Beta and Gamma functions, Reduction formulae (simple standard formulae), Double integrals in Cartesian and Polar Coordinates, Change of order of integration. Triple integrals. Dirichlet's integral.

Unit 5: Areas, Rectification, Volumes and Surfaces of solids of revolution.

Reference Books :

1. M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
2. H. Anton, I. Bivens and S. Davis, Calculus (7th Edition), John Wiley and sons (Asia), Pt Ltd., Singapore, 2002.
3. G.B. Thomas, R. L. Finney, M. D. Weir, Calculus and Analytic Geometry, Pearson Education Ltd, 2003.

Paper-III: Analytic Geometry and Optimization Theory

Teaching: 3 Hours per Week **Max. Marks: 40 (Science)**

Duration of Examination: 3 Hours **54 (Arts)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Polar equation of conics, Polar equation of tangent, normal and asymptotes, chord of contact, auxiliary circle, director circle of conics

Unit 2: Sphere, Cone.

Unit 3: Cylinder, Central Conicoids – Ellipsoid, Hyperboloid of one and two sheets, tangent lines and tangent planes, Direct sphere, Normals.

Unit 4: Generating lines of hyperboloid of one sheet and its properties. Reduction of a general equation of second degree in three-dimensions to standard forms.

Unit 5: The linear programming problem. Basic solution. Some basic properties and theorems on convex sets.. Fundamental theorem of L.P.P. Theory of simplex method only Duality. Fundamental theorem of duality, properties and elementary theorems on duality only.

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Reference Books :

1. Hamdy A. Taha, Operations Research, An Introduction (9th edition), Prentice-Hall, 2010.
2. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.
3. R.J.T. Bell, Elementary Treatise on Co-ordinate geometry of three dimensions, Macmillan India Ltd., 1994.

Practical

Teaching: 2 hours per week per batch not more than 20 students

Examination: **Duration: 2 Hours**

Scheme	Science	Arts
Max.Marks	30	40
Min.Pass Marks	11	15

Distribution of Marks:

Two Practicals one from each group

10 Marks each	=	20 Marks	(13 Marks each)	26
Practical Record	=	05 Marks		07
Viva-voce	=	05 Marks		07
Total Marks	=	30 Marks		40

The paper will contain TWO practicals. The candidates are required to attempt both practicals.

Group A : Modelling of industrial and engineering problems into Assignment Problems and Transportation Problems and their solutions.
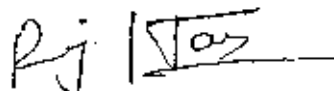
Group B : List of problems (with free and open source software tool Scilab)

(i) Plotting the graphs of the following functions : ax, $\sqrt{ax+b}$,$|ax+b|$, $c\pm|ax+b|$, $x^{\pm n}$, $x^{1/n}$ ($n \in z$), e^{ax+b}, $\log(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $|\sin(ax+b)|$, $|\cos(ax+b)|$. Observe and discuss the effects of change in the real constant a, b and c on the graphs.

(ii) Graphs of hyperbolic functions and inverse trigonometric functions.

(iii) Plotting and analyzing the graphs of polynomials and their derivatives.

(iv) Complex numbers: Operations like addition, subtraction, multiplication, division, Modulus and inbuilt functions conj, imag, imult, isreal, real.

(v) Matrix operations: Addition, Multiplication, Inverse, Transpose, Determinant, Rank and inbuilt functions eye, ones, zeros. Solving the system of linear equations.

(vi) Solution of linear programming problems by using inbuilt functions of Scilab.

Note:

1. For Group A : Problems will be solved by using Scientific Calculators (non-Programmable)
2. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
3. Each Candidate has to pass in Practical and Theory examination separately.

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