Maharaja Surajmal Brij University

Bharatpur (Raj.)

SYLLABUS

Faculty of Education

B.Ed. Integrated Programme (Four Year)

1st Year B.Sc. - B.Ed.

Session 2020-21

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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 Maharaja Surajmal Brij University head quarter Bharatpur only and not any other place.

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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:

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

Learning outcomes:

1. Competence to teach effectively two school subjects at the Elementary & secondary levels.
2. Ability to translate objectives of secondary education in terms of specific Programmes and activities in relation to the curriculum.
3. Ability to understand children's needs, motives, growth pattern and the process of learning to stimulate learning and creative thinking to faster growth and development.
4. Ability to use-
5. Individualized instruction
6. Dynamic method 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.

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10. Ability to organize various school programmes, activities for pupil.
11. Developing guidance point of view in educational, personal and vocational matters.
12. Ability to access the all round development of pupils and to maintain a cumulative record.
13. Developing certain practical skill such as:
    a. Black board work
    b. Preparing improvised apparatus
    c. Preparing teaching aids and ICT.
14. Interest and competence in the development of the teaching profession and education. Readiness to participate in activities of professional organizations.

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

i) First YearB.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

Examination 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	Elementary Computer Application (ICT)
IVth Year	Environmental Studies

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

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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 any three optional subject (papers) from group B which two must be the school teaching subjects.

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 BOTANY
Pedagogy of Physics
Pedagogy of Mathematics
Pedagogy of ZOOLOGY

- 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 :-

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

Subject	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
01	B.Sc.- B.Ed. 01	Gen. English(Compulsory)*	100	-	-	100
02	B.Sc.-B.Ed. 02	Childhood and Growing Up	80	20	-	100
03	B.Sc.-B.Ed. 3	Contemporary India and Education	80	20	-	100
04	B.Sc.-B.Ed. 04	Instructional System & Educational Evaluation	80	20	-	100
05(i,ii,iii),06(i,ii,iii),,07(i,ii,iii),	B.Sc.-B.Ed 05, 06 & 07	**Content (PCB & PCM Group) (Select any Three)** 1. Chemistry (I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	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 CRITERIAN N PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

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

Subject	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
O8	B.Sc.-B.Ed. 08	Gen. Hindi(Compulsory)*	100	-	-	100
09	B.Sc.-B.Ed. 09	Knowledge and curriculum	80	20	-	100
10	B.Sc.-B.Ed. 10	Learning and Teaching	80	20	-	100
11	B.Sc.-B.Ed 11	Peace Education	80	20	-	100
12(i,ii,iii), 13(i,ii,iii), 14(i,ii,iii),	B.Sc.-B.Ed 12,13,14	**Content** **(PCB & PCM Group)** **(Select any Three)**				
		1. Chemistry(I,II,III)	33+33+34		50	150
		2. Botany (I,II,III)	33+33+34		50	150
		3. Zoology(I,II,III)	33 +33+34		50	150
		4. Physics (I,II,III)	33+33+34		50	150
		5. Mathematics(I,II,III)	40+40+40		30	150
15 **Practicum**	B.Sc. - B.Ed ((Practicum)	**OPEN AIR / SUPW CAMP**				
		i. Community Service		25		100
		ii. Survey (Based on social and educational events)		25		
		iii. Co-Curricular Activities		25		
		iv. Health and Social awareness programme (DISASTER MANAGEMENT AND CLEANINESS)		25		
						750+100

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

Subject	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
16	B.Sc.- B.Ed. 16	Information & Communication (ICT)(Compulsory)*	100	-	-	100
17	B.Sc.- B.Ed.17	Language Across the Curriculum	80	20	-	100
18	B.Sc.-B.Ed 18	Guidance and Counseling in School	80	20	-	100
19(i,ii,iii), 20(i,ii,iii),, 21(i,ii,iii),	B.Sc.-B.Ed 19,20,21	**Content** **(PCB & PCM Group)** **(Select any Three)** 1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	 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
22	B.Sc.-B.Ed 22	Pedagogy of a School Subject (candidate shall be required to offer any one papers from the following) 1.Mathematics 2. Physics 3. Chemistry 4. Biology 5. General Science	80	20		100
Practicum 23	B.Sc.-B.Ed 23	**Special Training Programme** • Micro Teaching • Practice Lesson • Observation Lesson • Technology Based Lesson • Criticism Lesson • Attendance /Seminar/ Workshop			 10 50 05 05 20 10	 100
24	B.Sc.-B.Ed 24	**Final Lesson**	**100**			100
						750+100+100

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

Subject	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
25	B.Sc .-B.Ed.	Environmental Education(Compulsory)*	80	20	-	100
26	B.Sc - B.Ed. 26	Creating and inclusive school	80	20	-	100
27	B.Sc B.Ed. 27	Understanding Disciplines and Subject	80	20	-	100
28	B.Sc .-B.Ed. 28	Physical Education & Yoga	80	20	-	100
29	B.Sc -B.Ed. 29	Gender, School and Society	80	20	-	100
30	B.Sc -B.Ed. 30	Assessment for Learning	80	20	-	100
31	B.Sc- B.Ed. 31	Pedagogy of a School Subject (candidate shall be required to offer any one papers from the following) 1.Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20	-	100
Practicum 32	B.Sc- B.Ed. 32	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
33	B.Sc- B.Ed. 33	**Final Lesson**	**100**			**100**
						600+100 100

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

Compulsory subjects

Year	Subjects
Ist Year	Gen. English
II Year	Gen. Hindi
III Year	Computer Application (ICT)
IV Year	Environmental Education

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

Group C: Pedagogy of School Subject: Pedagogy of a School Subject IIIrd Year and IVth Year(candidate shall be required to offer any one papers in both year in following subjects).

Chemistry
Botany
Zoology
Physics
Mathematics

- In all the subjects the student has to study 7 subjects (1-7)in Ist year, 8 subjects(8-15) in IInd Year.9 subjects (16-24)in IIIrd Year and 9 subjects(25-32) in IVth Year.
- Each theory paper will carry 100 marks and content based paper will carry 150 marks.(including practical part).

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

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

Years	Subject	Marks
I Year	6 subjects (2-7)+Practical	600 +150= 750
II Year	6subjects(9-14)+Practical + SUPW(15)	600 +150+100= 850
III Year	6 subjects(17-22)+Practical + Practicum(23) +Final Lesson (24)	600 +150+ 100 +100= 950
IV Year	6 subjects (26-31) + Practicum (33)+Final Lesson (33)	600+ 100 +100= 800
Total	**33 subjects)**	**2400 +450+300 +200= 3350**

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

PART II

Practical Work

Objectives:

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

1. To be conscious of sense of values and need for their inculcation in children through all available means including one's own personal life.
2. Possess a high sense of professional responsibility.
3. Develop resourcefulness, so as to make the best use of the situation available.
4. Appreciate and respect each child's individuality and treat him as independent and integrated personality.
5. Arouse the curiosity and interest of the pupils and secure their active participation in the educative process.
6. Develop in the pupil's capacity for thinking and working independently and guide the pupils to that end.
7. Organize and manage the class for teaching learning.
8. Appreciate the dynamic nature of the class situation and teaching techniques.
9. Define objectives of particular lessons and plan for their achievements.
10. Organize the prescribed subject matter in relation to the needs, interest and abilities of the pupils.
11. Use the appropriate teaching methods and techniques.
12. Prepare and use appropriate teaching aids, use of the black board and other apparatus and material properly.
13. Convey ideas in clear and concise language and in a logical manner for effective learning.
14. Undertake action research.
15. Give proper opportunity to gifted pupils and take proper care of the back-ward pupils.
16. Co-relate knowledge of the subject being taught with other subjects and with real life situations as and when possible.
17. Prepare and use assignments.
18. Evaluate pupil's progress.

19. Plan and organize co curricular activities and participate in them.
20. Co-operates with school teachers and administrators and learns to maintain school records and registers.

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

1. Observation of lesson delivered by experienced teachers and staff of the college.
2. Planning units and lessons.
3. Discussion of lesson plans, unit plans and lessons given (including criticism lesson)
4. Organization and participation in co-curricular activities.
5. Setting follows up assignment.
6. Evaluation in terms of educational objectives use of teachers made tests & administration of standardized tests.
7. Black-board work.
8. Practical work connected with school subjects.
9. Preparation and use of audio visual aids related to methods of teaching.
10. Experimental and laboratory work in sciences, home-science, Geography and other subjects of experimental and practical nature.
11. Study of the organization of work and activities in the school.
12. Observation and assistance in the health education programme.
13. Observation and assistance in the guidance programme.
14. Maintenance of cumulative records.
15. Techniques of teaching in large classes.

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

Notes :

i. Teaching subject means a subject offered by the candidate at his/her running B.Sc. B.Ed. course either as a compulsory subject or as an optional subject provided that the candidate studied it for at least two years. Thus the qualifying subjects like General English, General Hindi, General Education, History of Indian Civilization and Culture. 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.

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ii. Only such candidate shall be allowed to offer Social Studies for the B.Sc.-B.Ed. Examination as have taken their running B.Sc.- B.Ed. course with any two subjects out of History, Political Science/Public Administration, Economics, Geography, Sociology, Philosophy / Psychology.

iii. A candidate who has offered Political Science or Public Administration at his Bachelor's or the Master's Degree Examination shall be deemed eligible to offer Civics as a teaching subject in the Integrated B.Sc.-B.Ed. Examination.

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

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

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

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

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

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

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

Regulation 42:

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

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

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

Part II- Practice Teaching - Micro Teaching, Internship, Practice Teaching of 20 weeks (10 at B.Sc.-B.Ed Year III & 10 at B.Sc.-B.Ed Year IV) Block Teaching and Criticism and Final Le on 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(20120) lessons as desired in the syllabus should be completed as full period class room lesson. Micro teaching lesson to be used in addition to those 40 lessons for developing certain teaching skills.
3. A minimum of ten lessons in each subject will be supervised evaluated by the subject specialist or a team of specialists of the subjects.
4. By and large, the evaluation of the performance in the practical teaching will be based on the last ten lessons in the subject when the student has acquired some competence and skills of teaching.
5. The internal assessment in practice of teaching will be finalized by the principal with the help of members of the teaching staff and the same will be communicated to the university before the commencement of the practical each year.
6. At Integrated B.S -B.Ed III Year each candidate should be prepared to teach one lessons at the final practice examination. At the Integrated B.Sc.-B.Ed IV 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.Sc.-B.Ed IV Year.
7. There will be a board of Examiners for the external examination for each college which will examine each candidate in at least one lesson and a minimum of 15% in two lessons (one in each of the two subjects).

8. The board of Examination will consist of:

   (a) The principal of the college concerned.

   (b) A principal or a senior and experienced member of the teaching staff of another training college, affiliated to University of 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.Sc.-B.Ed. I, II, III & IV Year Examination shall be required to pass separately in Part I (Theory) and Part II (Practice of Teaching).

(2) For a passing in Part I (Theory) a candidate shall be required to obtain at-least (a) 30 percent marks in each theory paper and sessionals (24 marks out of 80 and 6 marks out of 20): (b) 30% marks in each theory paper and sessional (11 marks out of 35 & 4 marks out of 15) (C) 36 percent marks in the aggregate of all the theory papers.

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

   * 40 percent marks in the external examination.

   * 40 percent marks in internal assessment.

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

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

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

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B. A. / B. Sc. / B. Com. Part I

2. General English

Duration: 3 hrs. Max. Marks: 100

Objectives of the Syllabus:

1. Strengthening the vocabulary of the students.
2. Reinforcing selected components of grammar and usage.
3. Enabling the students' comprehension skills of poetry, prose and short stories.
4. Develop compositional skills.

The pattern of the question paper will be as following:

SECTION 1

Vocabulary: 20 Marks

Note: The students will be required to answer any four out of five options

i.	Synonyms	05 Marks
ii.	Antonyms	05 Marks
iii.	Homonyms	05 Marks
iv.	One Word Substitution	05 Marks
v.	Phrasal Verbs	05 Marks

Section 2

Grammar and Usage 20 Marks

Note: The students will be required to answer any four out of five options

i.	Sequence of Tense	05 Marks
ii.	Prepositions	05 Marks
iii.	Modal Auxiliaries	05 Marks
iv.	Articles	05 Marks
v.	Transformation of Sentences (Narration, Voice, Interchange of Degrees of Comparison)	05 Marks

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Section 3

Comprehension 30 Marks

Note: *A. There will be an extract from the prescribed texts for comprehension.* 10 Marks

B. There will be seven questions (based on the prescribed texts) to be answered in three to five lines. The students will be required to answer any five. 20 Marks

i.	William Wordsworth:	Three Years She Grew in Sun and Shower
ii.	Rupert Brooke:	The Soldier
iii.	R K Narayan:	Dasi the Bridegroom
iv.	Leo Tolstoy:	How Much Land Does a Man Need ?
v.	O Henry:	The Gift of the Magi
vi.	A G Gardiner:	All About a Dog
vii.	John Bright:	Peace

Section 4

Composition 30 Marks

Note: *The Students will be required to answer any three out of four options.*

i.	C V and Job Application	10 Marks
ii.	Letter Writing (Formal and Informal)	10 Marks
iii.	Paragraph Writing	10 Marks
iv.	Notice and Advertisement Writing	10 Marks

Prescribed Book : A Pattern to General English by Arvind Singh & Shailen Sharma

1. 2. 3. 4.

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B.Sc-B.Ed – 02

Childhood and Growing up

Marks -100

Objectives:

After completing the course the students will be able:-

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

Unit I: Role of psychology to understand the child

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

Unit II: Multi dimensional development

- Growth and development- concept, stages principles, dimensions, Factors in influencing development- genetic, biological, environmental and physical
- Theories of development
  - a) Piaget's Vygotsky cognitive development
  - b) Freud's psycho sexual development
  - c) Erikson's psycho social development
  - d) Linguistic development
  - e) Kohlberys' gilligan's moral development
  - f) Bandura's social developments
  - g) Gessel's maturation theory

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Unit 2: 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, peer group, social climate and social media.
- Personality: concept and nature, theories of personality, assessment of personality
- Individual differences: Concept, areas (With Special Educational needs-Concepts and educational implication.
- Stress: meaning, types and coping strategies with special reference to personality of adolescent

Unit 3: Learning to Learn

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

Unit 5: Psychological Attributes of an individual

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

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Test and Assignment:-

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

1. Preparation of a 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. Administration of an experiment on learning, span of attention, memory Administration and Application of an individual group test of intelligence.

References:

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2. Agarwal, S.C. (1981). Essential of Educational Psychology, Delhi, Doaba Book
3. Arora, Dr. Suraj, Bhargava, Rajshri (2014). Bal Manovigyan, Rakhi Prakashan, Agra
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5. B.P. (2000). Personality theories, Boston: Allyn and Bacon House.
6. Chauhan, S.S. (2001). Advanced educational psychology, New Delhi: Vikas Publishing House.
7. Diane E. Papalia, Sally Wendkos olds, Ruth Durkin Feldman, Ninth Edition, Human Development, Tata Mcgraw Hill Publishing company Limited, New Delhi.
8. Helen Bee Denise Boyd, First Indian Reprint 2004, The Developing Child, Published by Pearson Education Pre. Ltd. Indian Branch Delhi, India
9. Jack Snooman, Robert Bichler Ninth Edition, Psychology Applied to Teaching, Houghton Mifflin Company, Bosten New York (http://www.coursewise.com)
10. Ormrod Ellis Jenne, Third Edition, Educational Psychology Developing Learners Multimedia Edition (http://www.prenhall.com/ormrod)
11. Sadhani Kuldeep (2015). Bal Vikas evam Bachpan, Published by Rakhi Prakashan, Agra
12. Woolfolk, A. (2004). Educational Psychology published by Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in South Asia.

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B.Sc-B.Ed – 03

Contemporary India and Education

Objectives:- MARKS-100

After completing the course the students will be able to

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

Course Content

Unit I Education as an Evolving Concept

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

Unit II: Issues and Challenges

- Diversity, Inequality, Marginalization:- Meaning, Concept, Levels with special reference to Individual, Region, Language, Caste, Gender.

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- Role of education in multicultural and multilingual society for Equalization and upgradation of Marginalization groups.
- Dynamics 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
- Kothari Committee (1990), Yashpal Committee Report (1993) Revised National Education Policy (1992) NCF–2005, NKC–2006, NCFTE– 2009, RTE–2010.
- SSA, MDL, RMSA, CCE, Navodaya Vidyalaya, Kasturba Gandhi Balika Vidyalaya, Model School

Unit – V: Innovative Practices

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

Test and Assignments :-

1. Class Test: 10 marks

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2. Any one of the following: 10 marks

- Donate or Organize a one day discussion on the topic related to the subject and submit a report
- Critical appraisal of 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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1. Agnihotri, P. (1994) Adhunik Bhartiya Shiksha Samasyaye Aur Samadhan. Jaipur: Rajasthan Hindi Granth Academy
2. Agrawal, J.C: Land Marks in the History of Modern Indian Education. New Delhi 2. Brubacher, John.S: A History of the Problems of Education
3. Altekar, A. S.(1992) Education in Ancient India, Varanasi: Manohar Prakashan
4. Dev, A.,Dev, T.A.,Das,S. (1996) Human Rights a Source Book. New Delhi: NCERT. Pp. 355
5. Dubey, S.C. (1994) Indian Society. New Delhi. NBT. Pp.
6. Education and National Development: Report of the Kothari Commission on Education. New Delhi, 1966.
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8. Gore, M. S. (1982) Education and Modernization in India. Jaipur: Rawat Publications
9. Gupta, S.C. (1995) The History of Education in Modern India (1757- 1986). New Delhi: Orient Longman Ltd.
10. J.F. Brown: Educational Sociology
11. Kabir, H. (1982) Education in New India, London: George Allen an Unwin.
12. Kasayap Subhash C., Our constitution: An Introduction to India's constitution and constitutional laws. National Book Trust India. 2011.
13. Keay,F.E. Indian Education in Ancient and later Times
14. M.N. Srinivas: Social Change in Modern India
15. Mookerji, R. K. (1947) Ancient Indian Education: (Brahmanical and Buddhist). London: Mac Milan and Co. Ltd

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19. National Curriculum Framework. (2005).

20. National curriculum Framework for teacher education (2004).

21. Sanchez, M. (1998) Human Rights and Indian Values. New Delhi: N.C.E.R.T.

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

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24. Shukla, K.P. (2005). Value Education and Human Rights. New Delhi: Samp & Sons.

25. Varghese, A. (2008) Education for the Third Millennium. Indore: Satprachar Press

26. अग्रवाल, डी.डी. : आधुनिक भारतीय शिक्षा पद्धति।

27. [illegible] : शिक्षा के मूलभूत आधार, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर।

28. [illegible] एवं अलका [illegible] : भारत में शिक्षा प्रणाली का विकास, शारदा पुस्तक प्रकाशन, इलाहाबाद।

29. [illegible] : भारतीय शिक्षा का इतिहास, आगरा।

30. [illegible] : भारत में शिक्षा व्यवस्था का विकास एवं समस्याएं, शारदा पुस्तक भवन, इलाहाबाद।

31. [illegible] : भारतीय शिक्षा और उसकी समस्याएं, रस्तोगी पब्लिकेशन्स, मेरठ।

32. [illegible] : महिला एवं बाल विकास विभाग, राज. सरकार, जयपुर।

B.Sc.- B.Ed. 04

Instructional System and Educational Evaluation

MARKS-100

Objectives:

This course will enable the student teacher to:

* Explain the need, importance and characteristics of educational evaluation.

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

Unit I: Instructional System.

- Educational Objectives and instructional objectives.
- Relationship between educational objectives and instructional objectives
- Classification of educational objectives (Cognitive, affective and psycho motor)
- Functioning of educational objectives
- Usefulness of the taxonomical classification.

Unit II: Need, importance and characteristics

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

Unit III: Approaches to Evaluation

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

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

- The relationship between instructional objectives, entering behavior, learning experiences and Performance assessment.
- Diagnosis to over come deficiency in learning.
- Importance of results of evaluation to students, teachers, institutions with

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special reference to help in determining the effectiveness of a course, programme and functioning of a school

Unit V: Nature of tools and techniques of evaluation

- Nature of test and Purposes of testing with reference to: instructional purpose b) Guidance purpose c) Administrative purpose
- Administration of Test and Interpreting test result.
- Meaning of Norms, types of Norms, age, Grade, Percentile and standard score. d. Norms and interpretation of test scores.
- Concept of grade system. Absolute grading, comparative grading and its advantages and disadvantages.

Tut and Assignments :-

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

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

References:

Anastasi, Anne. (1976). Psychological Testing, 4m ed., New York: Macmillan Publishing Co. Inc.

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Bloom, Benjamin S., Et.al., (1971): Handbook on formative and Summatice Evaluation in Student Learning, McGraw Hill, USA.

Ebel,Robert. L. (1996) : Measuring Educational Achievement. Prentice-Hall of India, New Delhi, 27

Ferguson, G.A (1974): "Statistical Analysis in Psychology and Education", McGraw Hill Book Co., New York.

Freeman, Frank S.,(1962). Theory and Practice of Psychological Testing, New Delhi, Oxford and IBH Publishing Co.

Guilford, J.P.(1965). Fundamental Statistics in Psychology and Education. Mc Graw Hill Book Company, New York.

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2. CHEMISTRY

Max. Marks: 150

Duration (hrs.)	Max. Marks
3	50
3	50
3	50
3	50

Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to attempt 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 structures, radius ratio effect and coordination number, limitation of radius ratio rule, ionic solids, semiconductors, lattice energy and Born Haber cycle; solvation energy and its effect on some solids, polarizing power and polarizability of ions, Fajan's rule.

Covalent, free electron, valence bond and band theories.

Interactions: Hydrogen bonding, vander Waals forces.

Unit-II

Bonding: Valence bond theory, and its limitations, directional and shapes of simple molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, PCl_5, IF_5, H_2O

Orbital Theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, concept of hybridization in simple molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Unit-III

Elements: Comparative study, diagonal relationships, salient features of hydrogen, noble gas compounds, xenon, introduction their function in biosystems, accumulation of metals.

Chemistry of p-block elements: Periodicity in properties of p-block elements with special reference to atomic and ionic radii, ionization energy, electron affinity, electronegativity, oxidation states.

UNIT-IV

Inorganic Compounds of p-block Elements: Hydrides of boron, diborane and higher boranes, boranes, hydrazides, silicones, carbides, fluorocarbons, silicates, silicones, tetrasulphur tetranitride, inert properties of halogens, interhalogens and polyhalides.

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[illegible] of Noble Gases: Chemical properties of the noble gases, chemistry of Xenon [illegible] compounds.

Unit- V

[illegible] Chemistry: Fundamental particles of nucleus (nucleons); Concept of nuclides and its [illegible] Isotones, Isobars, and Isotopes (with specific examples); Forces operating [illegible] (n/p ratio).
[illegible] Natural and artificial radioactivity, Radioactive disintegration series [illegible] law, Radioactive decay rates; Half life and average life, Nuclear [illegible] mass defect and calculation of defect and binding energy; Nuclear reactions, [illegible] fission and fusion.

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

Unit-I

[illegible] of Organic Reactions: Homolytic and heterolytic bond cleavage. Types of [illegible] and nucleophiles. Reactive intermediates - carbocations, carbanions, free [illegible], arynes and nitrenes (with examples). Types of organic reactions. Energy [illegible]. Methods of determination of reaction mechanism (product analysis, [illegible] isotope effects, kinetic and stereochemical studies).

Unit-II

[illegible] of Organic Compounds: Concept of isomerism, Types of isomerism [illegible] configuration and conformation, Flying wedge and Fischer projection [illegible]

Optical Isomerism: Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, [illegible] properties of enantiomers, chiral and achiral molecules with two stereogenic [illegible], threo and erythro isomers, meso compounds. Resolution of enantiomers [illegible] and racemization (with examples).
[illegible] configuration, sequence rules, D / L and R / S systems of nomenclature.
[illegible] Isomerism: Determination of configuration of geometric isomers - cis / trans and E / [illegible] Geometrical isomerism in oximes and alicyclic compounds.
[illegible] Isomerism: Newman projection and Sawhorse formulae, Conformations [illegible] and cyclohexane.

Unit-III

[illegible] and Cycloalkanes: IUPAC nomenclature of branched and unbranched [illegible] Methods of formation (with special reference of Wurtz [illegible] Corey House reactions and decarboxylation of carboxylic acids). [illegible] and chemical properties of alkanes. Mechanism of free radical halogenation [illegible] Cycloalkanes - nomenclature, methods of formation, [illegible] Baeyer strain theory and its limitations. Theory of strainless rings.

[illegible] Alkenes, Dienes and Alkynes: Methods of formation, mechanisms of [illegible] and dehydrohalogenation of alkyl halides. Regioselectivity in alkenes [illegible] Markovnikov's rule. Physical properties and relative stabilities.

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[illegible] reactions of alkenes: mechanisms involved in hydrogenation, electrophilic [illegible] addition, Markovnikov's rule, hydroboration-oxidation, oxymercuration [illegible] hydroxylation and oxidation with $KMnO_4$, [illegible] of alkenes. Substitution at the allylic and vinylic positions of alkenes.

[illegible] and Nomenclature of isolated, conjugated and cumulated dienes. Structure of [illegible] and allenes. Methods of formation, properties, Chemical reactions - 1,2- and 1,4 ad[illegible] addition and polymerization.

[illegible] bonding in alkynes. Methods of formation. Chemical reactions - acidity of alkynes, [illegible] electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal [illegible] reduction, oxidation and polymerization.

Unit-IV

[illegible] Aromaticity, Nomenclature of benzene derivatives. The aryl group, aromatic [illegible] halides. Structure of benzene: molecular formula and Kekule structure. Stability [illegible] heat of hydrogenation of benzene, resonance structure, MO diagram.

[illegible] of the Huckel's rule, aromatic ions - three to eight membered.

[illegible] electrophilic substitution: General pattern of the mechanism, role of sigma and pi [illegible] Mechanism of nitration, halogenation, sulphonation, mercuration, Friedel-Crafts [illegible] and chloromethylation. Energy profile diagrams. Activating and deactivating [illegible] Directive influence - orientation and ortho/para ratio. Side chain reactions of [illegible] derivatives, Birch reduction.

Unit-V

[illegible] Alkyl Halides: Methods of formation of alkyl halides, chemical reactions. Mechanism [illegible] substitution reactions of alkyl halides S_N2 and S_N1 reactions with energy profile [illegible]

[illegible] compounds: Chloroform, carbon tetrachloride.

[illegible] of aryl halides, nuclear and side chain reactions. The addition-elimination [illegible] mechanism of nucleophilic aromatic substitution reactions.

[illegible] of alkyl, allyl, vinyl and aryl halides.

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

-SECTION-I

[illegible] Concepts: equations, relations, curve sketching, linear graphs and calculation [illegible] of functions like k_x, x^2, x^n, sinx and log x; maxima and minima, partial [illegible] and reciprocity relations, integration of some useful/relevant functions: [illegible] combinations, permutations, probability.

[illegible] intermolecular forces, structure of liquids (a qualitative description). Structural [illegible] between solids, liquids and gases. Liquid crystals: Difference between liquid crystal [illegible] Classification, structure of nematic and cholestric phases. Thermography and [illegible]

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UNIT- II

[illegible] Gases. Postulates of kinetic theory of gases, deviation from ideal behavior, van der [illegible] equation of state.

[illegible] Thermodynamic PV isotherms of real gases, continuity of states, the isotherms of van der [illegible] and their relation ship between critical constants and van der Waals constants, the law of [illegible] forces, reduced equation of state.

[illegible] velocities. Root mean square, average and most probable velocities. Qualitative [illegible] of the Maxwell's distribution of molecular velocities, collision number, mean free [illegible] collision diameter. Liquefaction of gases (based on Joule-Thomson effect.)

UNIT- III

[illegible] Crystal of matter, lattice, unit cell.

[illegible] crystallography (i) Law of constancy of interfacial angles (ii) Law of rationality of [illegible] (iii) Law of symmetry. Symmetry elements in crystals.

[illegible] X-ray diffraction by crystals. Derivation of Bragg's equation Determination of [illegible] of NaCl and KCl (Laue's method and powder method), band theory of solids, [illegible]

UNIT IV

[illegible] Colloids. Definition of colloids, classification of colloids.

[illegible] liquids (sols) properties- Kinetic, optical and electrical, stability of colloids. Protective [illegible] Hardy-Schulze law, gold number.

[illegible] colloids (sols)- Preparation, preparation and properties, inhibition, general applications [illegible]

[illegible] Emulsions- Types of emulsions, preparation, Emulsifier

UNIT V

[illegible] Kinetics. Chemical kinetics and its scope, rate of a reaction, factors influencing the [illegible] reaction, concentration, temperature, pressure, solvent, light, catalyst. Concentration [illegible] of rate, mathematical characteristics of simple chemical reactions - zero order, first [illegible] order, pseudo order, half-life and mean-life. Determination of the order of [illegible] differential method, method of integration, method of half-life period and isolation [illegible]

[illegible] as a first order phenomenon.

[illegible] methods of chemical kinetics: conductometric, potentiometric, optical methods, [illegible] and spectrophotometry. Theories of chemical kinetics. Effect of temperature on rate [illegible] Arrhenius equation, concept of activation energy.

[illegible] theory based on hard sphere model transition state theory (equilibrium [illegible] Expression for the rate constant, cases on equilibrium constant and thermodynamic [illegible]

[illegible] Laboratory Course -I

(6 hrs or 6 periods / week)

[illegible]

[illegible] (3 cations and 3 anions) in the given mixture [illegible]

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[illegible] ANALYSIS

[illegible] Derivatives

[illegible] determination of melting point (naphthalene, benzoic acid, urea, etc.); boiling point [illegible] solvent, cyclohexane, etc.) and mixed melting point (urea-cinnamic acid, etc.).

[illegible] crystallization of phthalic acid and benzoic acid from hot water, acetanilide from boiling [illegible] naphthalene from ethanol etc., Sublimation of naphthalene, camphor, etc.

[illegible] Analysis

[illegible] Detection (N, S and halogens). Functional group determination (unsaturation, [illegible] alcoholic, carbonyl, carboxyl, ester, carbohydrate, amine, amide, nitro) in simple [illegible] and liquids.

[illegible] CHEMISTRY

[illegible] following experiments should be given in the examination)

[illegible] Kinetics:

[illegible] determine the specific reaction rate of the hydrolysis of methyl acetate/ ethyl acetate [illegible] by hydrogen ions at room temperature.

[illegible] Effect of ionic strength on the hydrolysis of an ester.

[illegible] compare the strengths of HCl and H_2SO_4 by studying the kinetics of hydrolysis of [illegible] esters.

[illegible] Kinetically the reaction rate of decomposition of iodide by H_2O_2.

[illegible] Surface Tension:

[illegible] the viscosity/surface tension of a pure liquid (alcohol etc.) at room [illegible] temperature. (using the Ostwald viscometer/stalagmometer).

[illegible] the percentage composition of a given binary mixture by surface tension [illegible] (acetone & ethyl methyl ketone).

[illegible] the percentage composition of a given mixture (non- interacting systems) [illegible] method.

[illegible] the viscosity of amyl alcohol in water at different concentration and [illegible] the excess viscosity of these solutions.

(Instructions to the Examiners)

CHY 104: Chemistry Practical (Pass course)

[illegible] Duration of Exam. 5 hrs.

[illegible]

[illegible] and identification of 3 cations and 3 anions in the mixture — 15

[illegible]

[illegible] — 3

[illegible]

[illegible] and identification of functional group — 10

[illegible]

[illegible] the experiments mentioned in the syllabus — 12

[illegible] — 5

[illegible] — 5

[illegible] — 50

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4. Botany

B.Sc. Part- I

Max. Marks - 50

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

Duration of examination of each theory paper- 3 hours

Duration of examination of practicals 4 hours

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 20 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.

M.S.R. UNIVERSITY, BHARATPUR

B.Sc. Part I

Paper- I

ALGAE, LICHEN AND BRYOPHYTA

Unit- I

General characters, Classification (Smith), Diverse Habitat, Range of thallus structure, Vegetative phase, pigments and Food reserves, Reproduction (Vegetative, Asexual, Sexual), Types of life cycles, Economic Importance.

Unit- 2

Type Studies-

Cyanophyceae - *Oscillatoria, Nostoc*

Chlorophyceae- *Volvox, Oedogonium , 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 Asexual, Economic importance.

Unit-4

Type Studies

Bryophyta: *Riccia, Marchantia*

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Anthocerotophyta – *Anthoceros*.

Bryophyta – *Fossils*.

Lichens – General characters. Habitat, Structure, Reproduction , Economic and ecological importance of Lichens.

Suggested Laboratory Exercises

- Study of class material by making suitable temporary slides and study of permanent slides of *Oscillatoria, Nostoc, Volvox, Oedogonium, Chara, Vaucheria, Sphacelaria, Polysiphonia*
- Study of external morphology and preparation of suitable sections of vegetative/reproductive parts of *Riccia, Marchantia, Anthoceros, Funaria*.
- Study of lichens.

Suggested Readings

Bold, H.C. : Alexopoulous, C.J. and Delivoryas, T Morphology of Plant and Fungi (4th Ed.) Harper & Row Co. New work, 1980.

Bhatnagar, M.S. Kapoor, J.N. and Narayan, H.S. A text Book of Algae. Ramesh Book Depot, Jaipur, 1976.

Coleman, M. Smith, Crypogamic Botany, Vol. I & II (2nd Ed.) Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1985.

Fritsch, F.E. : Introductory Phycology. Affiliated East- West Press, Ltd. New York, 1985.

Pal, P. : Bryophytes, Atmaram & Sons, Delhi, Lucknow, 1985.

Sambasi, R.C. and Saxena, R.C. : A text book of Botany. Vol. I & II, Ratan Prakashan Mandir, Meerut, 1986.

Vashi, V. Pande, P.C. and Jain, D.K. : A text book of Botany. Rastogi. & Co., Meerut, 1991.

Vashishta, H.R. : Botany for Degree Students (Algae, Bryophytes) S.Chand & Co., New Delhi, 1993.

Paper II

Microbiology, Mycology and Plant Pathology

Unit-I

Microbiology, Meaning and scope, history and development in the field of microbiology. Concept of quorum sensing and biofilms.

Bacteria: General account, occurrence, morphology (structured and shapes), flagella, capsule, endospore, reproduction (binary fission, transformation, conjugation), classification, economic and biological importance.

Mycoplasma and Phytoplasma: occurrence, morphology, reproduction and importance.

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

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Unit-II

Fungi: General characters, occurrence, thallus organization, reproduction, economic importance, classification of fungi (Alexopoulos).

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

Phycomycetes which infect *Sclerospora* and Downy mildew/Green ear disease of Bajra; *Aspergillus*;

Unit -III

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

Basidiomycetes (Black rust of wheat, *Ustilago* and loose smut of wheat and covered smut of barley; Ascomycetes, *Alternaria* and early blight of potato.

Unit-IV

Symptoms and signs of plant diseases with special reference to green ear disease of Bajra, smut of wheat, ergot and leaf blight of brinjal and root knot disease. A brief account of principles of plant protection.

Suggested Laboratory Exercises:

- Study of bacteria using curd or any other suitable material, Gram's staining of bacteria.
- Study of mycoplasma, TMV, bacteriophage (Photographs/3-D models).
- Study of symptoms of plant diseases- Downy mildew of Bajra. Green ear of bajra. Powdery mildew.
- 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, *Aspergillus* and *Alternaria*- early blight of potato.
- Study of preparation potato dextrose agar, Nutrient agar.
- Culture techniques of fungi and bacteria.

Suggested Books:

- Alexopoulos, C.J. and Mims, C.W.: Introductory Mycology, John Wiley and Sons, New York, 1979.
- Gaur, H.C.: Fungi, Rastogi Publication, Meerut, 1989.
- Sundhal, R.C. and Sexena, R.C.: A Text book of Botany, Rastogi Publication, Meerut, 1993.
- Sharma, O.P. Fungi, Today and Tomorrow Printers and Publishers, New Delhi, 2000.
- Vashishta, B.R. Botany for degree students- Fungi, S.Chand & Co. New Delhi, 2001.
- Singh, R.S. and Dube, H.C.: A Text book of modern plant Pathology, Vikas publications, New Delhi 2000.

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Tarsane, N.D. and Biswasar: An Introduction to Viruses, Vikas Publications, New Delhi 1981

Collins, S.: Introduction of Bacteria. McGraw Hill co. Ltd., New York, 1985.

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

Pelczar M.J. Jr. Chan, E.C.S. and Krieg, N.R. : Microbiology, McGraw hill Edu. Pvt. Ltd., London, 2001

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

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

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

Prescott, L. and Sherman, N.: Microbiology: A Laboratory Manual (10 Th Ed.), Pearson Cummings, 2013

Vasudeva, N.P.: 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, 2017

M.S.R. UNIVERSITY, BHARATPUR
B.Sc. Part- I BOTANY:
CAPSULE- CELL BIOLOGY, GENETICS AND PLANT BREEDING

Unit- 1 : Cell organelles and Nuclear material:

Ultrastructure and function of different cell organelles (cell wall, plasma membrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, Lysosome, Golgi bodies and endoplasmic Reticulum). Chromatin structure and chromosome organisation: eukaryotic and prokaryotic. 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.

Non-nuclear genetics: Mitochondrial and chloroplast genome, plasmids.

Chromosomal aberrations: Deletion, Duplication, Translocation, Inversion, Aneuploidy and Polyploidy.

Unit- 3 : Mendelian Inheritance

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

Cytoplasmic inheritance: Maternal influence, shell coiling in snails, kappa particles in Paramecium, multiple alleles – ABO blood groups in men.

Unit – V Plant Breeding

Introduction and objectives of plant breeding ; general methods of plant breeding- in self-pollinated, cross pollinated and vegetatively propagated crop plants.

Inbreeding 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.

Brief history, 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 *Lycopersicon*, *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:

- Chaudhary, H.K. (1989). Elementary Principles of Plant Breeding. Oxford and IBH Publishing Co. New Delhi.
- Gupta, P.K. (2009) Cytology, Genetics Evolution and Plant Breeding. Rastogi Publications. Meerut.
- Khalani, GS (2008). Advanced Genetics, Narosa Publishing House, New Delhi.
- Russel, PJ (1998). Genetics The Benejamins/Cummings Publishing Co., Inc. USA.
- Singhal, R.S and chandel, P.S. (2000) Cytogenetics, Evolution and Plant Breeding. S.Chand & Co. Ltd. New Delhi.
- Singh, B.D.(1999). Text Book of Plant Breeding, Kalyani Publishers, Ludhiana.
- Dhamanagar, VR. (1986). Cytology and Genetics, Tata McGraw Hill Pub.Co. Ltd. New.
- 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.

5. ZOOLOGY

3 Hrs. duration	33 Marks
3 Hrs. duration	33 Marks
3 Hrs. duration	34 Marks
4 Hrs. duration	50 Marks

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 11(Paper III) very short answer (Maximum 25 Marks) type questions, each of 1 mark. This part is compulsory to attempt. Question 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 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.

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

PAPER - I: Z-101
DIVERSITY OF ANIMAL AND EVOLUTION

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 11(Paper III) very short answer (Maximum 25 Marks) type questions, each of 1 mark. This part is compulsory to attempt. Question 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 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.

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

Section - A

Unit - I

Zoogeographical distribution: Principal zoogeographical regions of the world with special reference to their characteristic fauna.

Biodiversity: Status of India and the world.

A perspective of animal and their modes of life and the environment.

Need of protection of biodiversity and conservative measures of biodiversity wherever needed.

Unit - II

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Section - B

Phylogenetic and Taxonomy

- Types and Principles of taxonomy, concept of five kingdom scheme, international code of nomenclature (ICZN) cladistics, molecular taxonomy.
- Concept of Protozoa and Metazoa, and levels of organisation.
- Systematic, the basis of classification of non-chordata and chordate; symmetry, coelom, segmentation and embryogeny.
- Outline classification of non-chordata and Chordata (up to sub orders with examples).
- Evolutionary of major invertebrate phyla (Sponges, Crustacea, Echinodermata & Arthropoda)

Section - C

Evolution

- Theory of evolutionary thoughts(Lamarckism and Darwinism).
- Natural selection, speciation.
- Speciation, isolation and adaptations.
- Palaeontology: Fossils, geological division of the Earth's crust, imperfection of the fossil record.
- Evolutionary trends: Dinosaurs, Archaeopteryx.

PAPER - II: Z-102
CELL BIOLOGY AND GENETICS

There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 very short Answer (Max. 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 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.

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

Section - A

Cell Biology

Introduction to cell; Morphology, size, shape, characteristics and structure of prokaryotic and eukaryotic animal cell; basic idea of virus and cell theory.

Cell membrane: Characteristics of cell membrane molecules, fluid-mosaic model of Singer and Nicholson, concept of unit membrane.

Cell membrane transport: Passive (diffusion and osmosis, facilitated, mediated) and active transport.

Complex organelles:

- (a) Structure and biogenesis of mitochondria; electron transport chain and generation of ATP molecules.
- (b) Structure and function of endoplasmic reticulum, ribosome (prokaryotic and eukaryotic) and Golgi complex.

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(iv) Structure and function of lysosome, microbodies and centrioles.
(v) Structure and function of cilia, flagella, microvilli and cytoskeleial elements.

Section - B

Nuclear Organization:

(i) Structure and function of Nuclear envelope, nuclear matrix and nucleolus.
(ii) Chromosomes. Morphology, chromonema, chromomers, telomeres, primary and secondary constrictions, chromatids, prokaryotic chromosome.
(iii) Giant chromosome types: Poletene and Lampbrush.
(iv) Chromosomal organization: Euchromatin, heterochromatin and folded fiber model and nucleosome concept.

Nucleic Acids:

(v) 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 bidirectional), leading and lagging strands, RNA primers and Okazaki fragments, elementary idea about DNA repair.
(vi) RNA structure and types (mRNA, rRNA and tRNA and transcription.

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

Cell & 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, 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 genes 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 genes, Recon, muton and cistron.

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PAPER - III: Z-103
GAMETS AND DEVELOPMENTAL BIOLOGY

There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 very short Answer (Maximum 25 Marks) 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 section out of which candidate will be required to attempt any 4 questions selecting at least one question from each section. Each question will carry 6 marks.

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

Section - A

1. Gametogenesis: Biology: Scope and Early Events
   - Historical review: Type and scope of embryology.
   - Gametogenesis:
     - (a) Formation of ova and sperm.
     - (b) Vitellogenesis.
   - Fertilization. Activation of ovum, essence of activation; Changes in the organization of cleavage cytoplasm.
   - Parthenogenesis.

Section - B

2. Developmental Biology Pattern and Processes
   - Cleavage: Definition, planes and patterns of cleavage among non chordates and chordates; significance of cleavage, blastulation and morulation.
   - Gastrulation: morphokinetic cell movements, significance of gastrulation.
   - Neurulation: induction, primary organizer, Differentiation and competence.
   - Development of chick up to 96 hours stage.
   - Extra embryonic adaptations:
     - (a) Extra embryonic membranes in chick, their development and functions.
     - (b) Placentation in Mammals: Definition, types, classification on the basis of morphology and histology, functions of placenta.
     - (c) Parthogenesis and neotony.

Section - C

3. Introduction to Developmental Biology
   - Regeneration.
   - Various type of stem cells and their applications.
   - Cloning of animals.
     - (a) Nuclear transfer technique.
     - (b) Embryo transfer technique.
   - Teratogenesis (Genetic and induced)
   - Theories of aging.
   - Cell biology

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Zoology Practical

4 Hrs. / Week Max. Marks:50

Microscopic Techniques:

- Organisation and working of Optical Microscope, Dissecting and Compound microscopes.
- General methods of microscopic slide preparations; narcotization; fixing and preservation; washing; staining; destaining; dehydration; clearing and mounting; General idea of composition, preparation and use of:
  - (i) Fixatives, Formalin, Bouin's fluid.
  - (ii) Stains: Aceto-carmine, Aceto-orcein, Haematoxylin-Eosin, Giemsa.
  - (iii) Common reagents:Normal saline, Acid water, Acid alcohol and Mayer's albumin
- Collection and Culture Methods:
  - (i) Collection of Animals from their natural habitat during field tips such as Amoeba, Paramecium, Euglena, Planaria, Daphnia, Cyclops, etc.
  - (ii) Culture of Paramecium in the laboratory and study of its structure life - process and behavior in live state.
  - (iii) Vermicomposting (Theory and Practice).

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

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

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

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

Ctenophora: Any Ctenophore.

Platyhelminthes: *Taenia*, *Planaria*, *Fasciola*, (W.M.) T.S. body of *Fasciola* through various regions, Miracidium, Sporocyst, Redia, Cercaria and Metacercaria Larvae of Fasciola, Scolex, L.S. mature proglottid of Taenia, Cysticercus larva.

Aschelminthes: *Ascaris*, *Wuchereria*, *Dracunculus*.

2. Biodiversity: Appliances used in Biodiversity study.
Sieve mills, water sieving.
Preserve in lum in college campus/university campus/Forest reserves/sanctuaries/National Parks.
Biodiversity survey:
Estimation in vegetation: Bird counts with general information on survey methods.

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Preparation of fact sheet of common wild life found in your campus /area.

IX. **Fields visits/Excursion to wild life areas.**

i. A candidate is expected to submit a written report of the visit. ii. No protected animal to be harmed in any way).

Study of the following Through Permanent Slide Preparation: Paramecium Euglena, Monocystis, Sponge spicules, Spongin fibres, Gemmule, Hydra, Obelia colony and Statoblast, Cirripedium, Nereis and Heteronereis, Cyclops, Daphnia.

Exercise in Cell Biology

1. Squash preparation for the study of mitosis in onion root tip.
2. Squash preparation for the study of meiosis in grasshopper or cockroach testis.
3. Study of giant chromosomes in salivery glands of chironomous or Drosophila larva.
4. Study of cell permeabilility using mammalian R.B.C.
5. Permanent slides of mitosis and meiosis (all stages).

VII. **Exercise in Genetics:**

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

VIII. **Developmental Biology:**

1. Study of development of frog/toad with the help of Chart/Slides/Models:
   (i) Eggs, cleavage, blastula, gastrula, neurula, tail-bud, hatching, mature tadpole larva, 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, 24 hrs, 28 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.
   (iv) Study of various foetal membranes in a 10-12 day old chick embryo.

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Scheme of Practical Examination and Distribution of Marks

Time : 3 Hrs.

Max. Marks : 50

	Regular	Ex. /N.C. Student
Study of Biodiversity	06	4
Permanent Preparation	04	7
Cell Biology and Genetics	4+4	6+6
Developmental Biology	6	6
Dissection and Comments on Spots (1 to 8)	16	16
Viva-Voce	5	5
Practical Record	5	-
	50	50

With reference to study of museum specimens and developmental Biology, candidate must be well versed in the study of various systems with the help of chart/models/CD-ROM multimedia computer based simulations including computer assisted learning (CAL) and other softwares.

With reference to permanent preparations and microscopic slides, in case of non-availability, the exercise should be substituted with diagrams, photographs, models, charts etc.

Candidates must keep a records of all work done in the practical class and submit the same for the inspection of the time of the practical examination.

Candidates may be asked to write detailed methodology wherever necessary and suitable marks may be allocated for the same.

Biology material for permanent preparation would be as per the syllabus or as available through collection and culture methods.

Care should be ensure that animal used in the practical exercises are not covered under the Wildlife act 1972 and amendments made subsequently.

Recommended Books:

Gilbert SF, Land Fabain BC. Introduction to Embryology. CENGAGE Learning 2012.

Hyman JW. The Biology of Hemichordata and Protpchordata. Oliver & Boyd Edinburgh, 1962.

Berrill NJ. Development Biology. Tata McGraw Hill 1971.

Romer AS. Evolution of the Vertebrates 2nd edition John Wiley & Sons, New York.

Kardong KV, Morales M, Minkoff EC. Colberts Evolution of the Vertebrates: A History of the Backbone of Animal Through Time 5th edition Wiley Liss 2001.

Sherwood L. Physiology. 4th edition Saunders Inc 2009.

Swingland IR. An outline of Animal Development. Addison-Wesley Longman Inc 1979.

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1. Roberts EDP and De Robertis Jr EMF. Cell and Molecular Biology. 8th edition Lippincott Williams & Wilkins 2006.
2. Pasquier CD Manual of Laboratory. Experience Cell Biology Mc Graw-Hill Professional publishing 1989.
3. Gilbert SF and Singer SR: Development Biology, Sinauer Associates; 9th addition 2010.
4. Lodish H, Berk A, Kaiser CA, Krieger M, Bertscher A, Ploegh H, Amon A, scott M P: Molecular Cell Biology 6th edition W.H. Freeman and Company, New Yark. 2008.
5. Lodish H, Berk A, Kaiser CA, Krieger M, Bertscher
6. Lodish H, Berk A, Matsudaira, P, Kaiser CA, Krieger M, scott MP, Zipursky SL, Darnell J: Molecular Cell Biology 5th addition W.H. freeman and Company. New York 2004.
7. Lodish H, Berk A, Zipursky SL, Masudaira P, Baltimore D., Darnell J: Molecular Cell Biology 4th addition W.H. freeman and Company. New York 2000.
8. Hartwell LH: The Cell Cycle: Principal of Control, Sinauer/Panima Books 2007.
9. Creighton A and Rings D: Protein structure and function Sinauer/Panima Books 2004.
10. Gilbert SF Development Biology: A Modern synthesis. Oxford and IBH publishing 1994.
11. Rastogi VB Animal Distribution, Evolution and development Biology. Kedar Nath Ram Nath Educational Publisher
12. Rastogi VB Evolutionary Biology Kedar Nath Ram Nath Educational Publisher.
13. Sinnott SP and Tomar BS: Cell Biology 10th edition Rastogi ,Publication Meerut New Delhi [illegible]
14. Gardner EJ and Simmons MJ, Principle of genetics 4th eddition John Wile & Sons Inc. [illegible]
15. Verma PS: A manual of Practical Zoology: invertebrates. S. Chand & Co Ltd New Delhi [illegible]
16. Verma PS & Agrawal VK, Chordate Embrylogy: Development Biology. S. Chand & Co Ltd [illegible]
17. Verma PS & Agrawal VK, Cell Biology, Genetic Molecular Biology. Evolution and Ecology. 14th addition S. Chand 2004.
18. Winchester AM: An introduction to genetics Barners & Noble. Canada. 2002.
19. Winchester AM: Genetics: A survey of principal of Heredity Oxford & IBH Publishing Co 1967.
20. Winchester AM: Human Genetics: Ohio Charles E. Merrill Publishing Co. 1971.
21. Trigunayat, M.M & Krishna Trigunayat, A manual of practical Zoology, Part-I Scientific Publishers Jodhpur.
22. [illegible] त्रिगुणायत व कृष्णा त्रिगुणायत, प्रायोगिक मैन्युअल भाग–1 साईटिफिक पब्लिशर्स जोधपुर [illegible]

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B.Sc. Part I

1. Physics

Scheme

Paper I	Exam. 3 Hours Duration	Max. Marks 33
Paper II	Exam. 3 Hours Duration	Max. Marks 33
Paper III	Exam. 3 Hours Duration	Max. Marks 34
Practical	Exam. 5 Hours Duration	Max. Marks 50

Paper-I (Mechanics)

Work Load: Two hours lecture per week

Examination Duration: 3 Hrs.

Scheme of Examination: Five questions shall be set and all are compulsory. First question shall contain 12 short answer type questions (3 questions from each unit) of one mark each with answer to each question not exceeding 50 words. Candidates have to attempt any nine questions out of these 12 questions. Remaining four questions will be of 6 marks each and will be set with one question from each unit. Second to fifth questions will have 100% internal choice.

Unit – I

Physical Law and frame of Reference:

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.

Special theory of Relativity: Postulates of Special theory of relativity, Lorentz transformation, transformation of velocity and acceleration, Length contraction and time dilation with experimental verification.

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

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

Equation of a motion of a rotating body, Inertial coefficient, Case of J not parallel to w, Kinetic energy of rotation and idea of principal axes, Determination of moment of inertia of symmetric bodies using inertial coefficients. Precessional motion of a spinning top.

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Unit – III

Motion under Central Forces:

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

Elastic Properties of Matter

Stress, strains and relations among them, Elastic theorems, Bending of beams and cantilever, Torsion of a cylinder, Experimental determination of Y by bending of beam; η by torsion, Searle's Eq and σ by Searle's method & η by static method

Unit – IV

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 example.

Driven Harmonic Oscillations

Driven harmonic oscillator with damping, Frequency response, Phase relation, Quality factor, Resonance, Series and parallel of LCR circuit, Electromechanical system-Ballistic galvanometer.

Coupled Oscillations

Equations of motion of two coupled Simple Harmonic Oscillators, Normal modes, motion in normal modes, transient behaviour, Dynamics of a number of oscillators with neighbour interactions.

Recommended Books

1. Mechanics Berkeley Physics Course Vol- I, Charles Kittel
2. Mechanics H.S. Hans S.P. Puri, Tata McGraw-Hill
3. The Physics of Waves & Oscillations, N.K. Bajaj, Tata McGraw-Hill
4. Classical Mechanics L.N. Hand, J.D. Finch (Cambridge University Press).

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Paper - II (Electromagnetism)

[illegible] two hours twelve per week.

[illegible] Duration: Three hours

[illegible] of examination: Five questions shall be set and all are compulsory. First question shall contain 12 short answer type questions (3 questions from each unit) of one mark each [illegible] question not exceeding 50 words. Candidates have to attempt any nine questions out of these 12 questions. Remaining four questions will be of 6 marks each and [illegible] one question from each unit. Second to fifth questions will have 100% [illegible]

Unit I

[illegible] and Vector Fields

[illegible] Scalar and Vector Fields, Gradient of scalar field, Physical significance and [illegible] of gradient, Divergence and Curl of a vector field in Cartesian co-ordinates [illegible] problems based on Gradient, Divergence and curl operators.

[illegible] of Solid angle, Gauss's divergence and Stokes' theorem, Differential and integral [illegible] of Gauss's and Ampere's law and Faraday's law.

Unit II

[illegible] Faraday and moving charges

[illegible] of system of (i) Discrete N-charges (ii) Continuous charge distribution, [illegible] of field of a uniformly charged sphere, classical radius of electron, Electric [illegible] charge, electric dipole, interaction of electric dipole with external uniform and [illegible] field, potential due to a uniformly charged spherical shell.

[illegible] equations in Cartesian co-ordinates and their applications to solve the [illegible] problems of electrostatics.

[illegible] charge, Electric field measured in moving frames, Electric field of a point [illegible] constant velocity.

Unit III

[illegible] charge

[illegible] of approach to charge distribution, Dielectrics, Induced [illegible] polarizable molecules, Free and bound charges, Polarization, Atomic [illegible] displacement vector, electric susceptibility, dielectric constant, relation [illegible]

[illegible] and electric field due to a uniformly polarized sphere (i) outside the sphere [illegible] the sphere (ii) inside the sphere, Electric field due to a dielectric sphere [illegible] field (i) outside the sphere (b) inside the sphere, Electric field

[illegible] and Gauss law, Charge conserved equation in electrostatics, Laplace's equation, Series R-C Circuit with a DC Source.

Unit IV

Magnetostatics and magnetic field in matter

[illegible] properties of magnetic field, Ampere's law, magnetic field due to a current carrying solid conducting cylinder (i) outside (ii) at the surface and (iii) inside the cylinder, [illegible] of differential form, Introduction of Magnetic Vector potential, Poisson's equation for vector potential, Derivation of Bio-Savart law using Magnetic Vector potentials, Differential form of Ampere's law, Transient behaviour of series L-R Circuit with a DC source.

Magnetic materials, Gyromagnetic ratio, Bohr magneton, Larmor frequency, induced magnetic moment, orbital magnetism and magnetic moment, para and ferro magnetism, Intensity of magnetization, Magnetic permeability and Susceptibility, free and bound current densities, Magnetic field due to uniformly magnetized material and Non-uniformly magnetized [illegible]

Reference Books:

1. Fundamentals of Magnetism: AN Matveyev & Abbas A Rangwala, Tata McGraw-Hill
2. Introduction to Electrodynamics, David J. Griffith, Prentice Hall
3. Berkeley Physics Course, Vol II
4. Fundamental University Physics Vol II: Fields and Waves, M. Alonso and EJ Finn: Addison Wesley Publishing Company.

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[illegible]

[illegible] Lectures/lectures per week

Examination Duration: Three hours

Scheme of Examination: Five questions shall be set and all are compulsory. First question will consist of 10 short answer type questions (3 questions from each unit) of one mark each with answer to each question not exceeding 50 words. Candidates have to attempt any ten questions out of these 10 questions. Remaining four questions will be of 6 marks each and will be set from one question from each unit. Second to fifth question will have 100% internal choice.

Unit-1

Interference

Concept of Spatial and Temporal Coherence, coherence length, coherence time. Types of interference, interference by division of wave fronts: Fresnel's Biprism, Measurement of wavelength 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 and refractive index by Newton's Rings. fringes of equal inclination (Haidinger Fringes) and equal thickness (Fizeau fringes). Michelson's Interferometer, shape of Fringes. Determination 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 a lens, Fraunhofer diffraction by single slit and a circular aperture. Fraunhofer diffraction by a parallel slits with two slits as a special case, Missing order, Plane diffraction grating, Dispersion in terms of wavelength, Dispersion by a grating, Rayleigh's criterion of resolution, Resolving power of a Telescope and a Grating.

Unit - 3

Polarization

Introduction, Plane, Circular and Elliptically Polarized light, Polarization by reflection, Brewster's law, and Malus's law, Explanation of double refraction, Production and detection of Circularly and Elliptically Polarized light; Quarter wave and Half wave plates, optical activity, Specific rotation, Biquartz and Laurent's Polarimeters and their comparison.

Lasers: Spontaneous and Stimulated emission Einstein's A&B coefficients, Energy density of radiation in terms of stimulated emission and absorption, population inversion, Methods of optical pumping, Energy level schemes, He-Ne, Ruby, CO-Lasers.

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[illegible] Holography: Principle, Theory, Construction and Reconstruction of image. Application of holography.

Unit-4

Wave motion:

Equation of wave equation, Transverse waves in a stretched string, Elastic waves in solids, Sound waves in a gas medium, spherical waves, Fourier's Theorem and its application to square and saw-tooth waves, Phase and group velocities, Dispersion of waves, Electromagnetic waves, Energy density of Electromagnetic waves, Electromagnetic waves in an isotropic and Dispersive medium, Spectrum of Electromagnetic waves.

Reference Books:

1. Optics by Ajoy Ghatak & Subramanyam, S. Chand.
2. Optics by E. Hecht, Addison Wesley.
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. Laser Theory of Lasers by Allen.

Practical

Total Hours: Four hours Laboratory work per week

Examination Duration: Four hours

Total No. of experiments: Total sixteen taking eight from each section.

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 R-C circuit with a different time constant using a DC source.
3. To study the behaviour of a R-C circuit with varying resistance and capacitance using AC source as a power source and also to determine the impedance and phase relations.
4. To study the rise and decay of current in an L-R circuit with a source of constant emf.
5. To study the voltage and current behaviour of an L-R 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 variation of field with distance and 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 an ammeter of a given range.
10. To convert a galvanometer into a voltmeter of a given range.

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Section B

To study the random decay and determine the decay constant using the statistical board.

Using compound pendulum study the variation of time period with amplitude in large angle oscillations.

To study the damping using compound pendulum

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

To study the frequency of coupled oscillator as a function of coupling strength using coupled resonators.

To study the resonance and damping of a compound pendulum and determining damping coefficient and Q of the oscillator.

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

To study the Cohrausch and Barda's Method

To determine Young's modulus by bending of beam.

To determine Y and η by Searle's method.

To study Curie temperature of Metal alloy

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

Study of normal modes of a coupled pendulum system. Study of oscillations in uncoupled mode and find the periodic energy exchange between the two oscillators.

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

To study the specific rotation of sugar solution by polarimeter

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[illegible] question paper I & II for B.Sc. [illegible] Examination 2020

[illegible] compulsory and is of 9 marks. This question contains 12 short answer type [illegible] of one mark each. Candidates have to attempt any 9 questions with answer no [illegible] Section-B to fifth questions are of six marks each with internal choice.

[illegible] अनिवार्य है। इस प्रश्न के अन्तर्गत 12 लघुउत्तरात्मक प्रश्न है, जिन्हें [illegible] उत्तर दिये जाने हैं, जिनका उत्तर 50 शब्दों से अधिक न हो। प्रश्न संख्या 2 से 5 तक [illegible] के अन्तर्गत आन्तरिक विकल्प है।

[illegible] प्रश्न हल कीजिए।

(ii) (iii) (iv)

(vi) (vii) (viii)

(x) (xi) (xii)

(b) I इकाई

(a)

(b)

Or / अथवा

(a)

(b)

Unit II द्वितीय इकाई

(a)

(b)

Or / अथवा

(a)

Unit III तृतीय इकाई

(a)

(b)

Or / अथवा

Unit IV चतुर्थ इकाई

(a)

(b)

Or / अथवा

(a)

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Syllabus to setting question paper [illegible] for B.Sc. part I Physics Examination - 2018

[illegible] is compulsory and it of [illegible] marks. This question contains 12 short answer type [illegible] each. Candidates have to attempt any 10 questions with answer not [illegible] words. Second to fifth questions are of six marks each with internal choice.

[illegible] है। इस प्रश्न के अन्तर्गत 12 लघुउत्तरात्मक प्रश्न है, जिनमें [illegible] शब्दों से अधिक न हो। प्रश्न संख्या 2 से 5 तक [illegible] विकल्प है।

[illegible]

(ii) (iii) (iv)

(vi) (vii) (viii)

(x) (xi) (xii)

Unit – I प्रथम इकाई

[illegible]

Or / अथवा

[illegible]

Unit – II द्वितीय इकाई

[illegible]

Or / अथवा

[illegible]

Unit – III तृतीय इकाई

[illegible]

Or / अथवा

[illegible]

Unit – IV चतुर्थ इकाई

[illegible]

Or / अथवा

[illegible]

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B. A./B. Sc. Part I Examination - 2019

5. MATHEMATICS

Teaching : 3 hours per week per theory paper

2 hours per week per batch for practical

(26 candidates in each batch)

Examination Scheme :

		Max. Pass Marks
	Science	150

		Duration	Max Marks
Paper - I	Discrete Mathematics	3 hrs	40 (Science)
Paper - II	Advanced Calculus	3 hrs	40 (Science)
Paper - III	Coordinate Geometry and Vector Calculus	3 hrs	40 (Science)
Practical		2 hrs	30 (Science)

Note :

1. Syllabus of each of three papers is divided into FIVE units.
2. Each paper is divided into THREE sections A, B & C.
3. Section-A : TEN short answer type questions will be set taking two questions from each unit. Each question will carry 1 mark for Science and 1.5 mark for Arts. All questions will be compulsory .
4. Section-B : TEN questions will be set taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt ONE question from each unit
5. Section-C : FIVE questions will be set taking one questions from each unit. Each question will carry 5 marks for Science in all three papers and 6 marks for Arts in Paper I & II and 6.33marks in paper III. Student has to attempt ANY THREE Questions
6. Common paper will set for Faculty of Science and Faculty of Social Science .

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7. 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 the head, department of Mathematics in the college.

8. An internal/external examiner can conduct practical examination of not more than 100 (one hundred) candidates (20 candidates in each batch).

9. Each candidate has to pass in theory and practical examinations separately.

Paper – I : **Discrete Mathematics**

Teaching : 3 hrs per week

Duration of Examination : 3 hrs

Max. Marks 40 (Science)

Note: *This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. **Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt any THREE questions.*

Unit – I : Algebraic Structures – Binary operations, Definition and examples of groups, Elementary properties of groups, Order of an element, Cyclic groups, properties of cyclic groups, Permutation: product of two permutations, even and odd permutations, inverse permutations, cyclic permutations, Permutation groups.

Unit – II: Graph theory – Introduction, definition of graph, degree of vertex, Directed graphs, finite and infinite graphs, hand shaking property, Regular graphs, Bipartite graphs, Operations on graphs, Isomorphism, Sub graphs, Connected and Disconnected graphs, Euler circuit and Euler graphs, Hamiltonian cycles and Hamiltonian graphs, Weighted graphs, Shortest path problem, Dikstra algorithm.

Unit – III : Planar and non planar graphs, Euler's formula, Detection of planarity, Dual of planar graphs, Graph colouring, Chromatic number, Map colouring, Five colour theorem, Matrix representation of graphs, Trees, properties of trees, rooted tree, binary tree, Prefix tree, Spanning tree in weighted graphs, Kruskal's algorithm and Prim's algorithm for finding spanning tree in a weighted graph.

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Unit – IV : Boolean Algebra: Definition, duality, properties of Boolean algebra. Ordered relation in Boolean algebra. Lattices. Homomorphism, Boolean functions and expressions. Conjunctive an Disjunctive normal forms. Fundamental theorem of arithmetic. divisibility in Z. Congruences. Chinese Remainder Theorem.

Unit – V : Generating functions – Discrete numeric function, ordinary generating function. Convolution of sequences. Summation using convolution, counting techniques. Partition of integers. Exponential generating function. Recurrence Relation – First order relation. second order linear homogeneous relation, Third and higher order linear homogeneous relations. Linear non homogeneous relations of second and higher order. Solution of recurrence relations using generating functions. Logic and propositional calculus: propositions, basic logical operations. truth tables, tautologies and contradictions, quantifiers.

Paper – II Advanced Calculus

Teaching : 5 hrs per week

Duration of Examination : 3 hrs

Max. Marks 40 (Science)

Note: *This paper is divided into THREE Sections A, B, & C. Section-A consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. Section-B consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. Section-C consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt ANY THREE questions.*

Unit – I : Convergence and Divergence of Infinite Series- Introduction, Tests for convergence: Comparison test, D' Alembert ratio test, Cauchy's n^{th} root test, Raabe's test, De Morgan and Bertrand test, Cauchy's condensation test.
Successive Differentiation- n^{th} derivative of single variable functions. Leibnitz's theorem, Expansion of functions Using Maclaurin's theorem.

Unit – II : Polar Coordinates – Angle between radius vector and tangent, length of perpendicular from pole to the tangent, polar sub tangent and subnormal. Pedal equation of Cartesian and polar curves. Derivatives of arcs- – Cartesian and polar forms. Curvature – Definition, radius of curvature for Cartesian, polar and parametric curves, curvature at the origin, centre of curvature, circle of curvature, chord of curvature. Partial differentiation, Euler's theorem on homogeneous functions, Total differentiation.

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Unit – III : Envelopes – Family of curves, Definition of envelope, Envelopes of Cartesian, polar and parametric curves. Asymptotes – Definition, methods to find asymptotes of Cartesian and polar curves, Intersection of curve and its asymptotes. Maxima and Minima of functions of two or three variables – Lagrange's condition for two independent variables, Lagrange's method of undetermined multipliers, cusp, double point, Tracing of Cartesian and polar curves.

Unit – IV : Gamma and Beta functions – Definition, Transformations of Gamma functions, Relation between Beta and Gamma functions, Euler's functional equation, Double multiple formula. Double integral- Evaluation of double integrals, Change of order of integration. Triple integrals – Evaluation of triple integrals, Dirichlet's formula for triple integrals.

Unit – V : Rectification – Meaning, lengths of Cartesian and polar plane curves. Quadrature – Areas bounded by plane curves (Cartesian and polar), Use of double integrals to find areas. Volume and Surfaces of solids of revolution, Pappus theorem, Use of triple integrals to find volumes.

Paper – III Coordinate Geometry and Vector Calculus

Teaching : 3 hrs per week

Duration of Examination : 3 hrs

Max. Marks 40 (Science)

Note: This paper is divided into THREE Sections A, B, & C. Section-A consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. Section-B consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting one question from each unit. Section-C consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6.33 marks for Arts. Student has to attempt ANY THREE questions.

Unit – I : Two Dimensional Coordinate Geometry – Conic sections, Parabola , Ellipse and Hyperbola, Intersection with straight lines, Condition of tangency, Tangent and Normals, Pair of tangents, Chord of contact, Pole and Polar lines, diameter, Parametric coordinates.

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Unit-II : Three Dimensional Coordinate Geometry– Sphere, Plane sections of sphere, Intersection of a sphere with a line, Tangent plane, Plane of contact, Pole and Polar planes, Orthogonality of two spheres, Radical plane, Radical line and Radical centre of sphere, Cone – Definition and equation, Enveloping cone , Representation of cone by a general equation second degree, Tangent plane, Reciprocal cone, Right circular cone.

Unit-III: Cylinder – Definition and Equation of cylinder, Enveloping cylinder, Right circular cylinder – Central Conicoid – Definition and standard equation, Tangent lines and tangent planes , Director sphere, Pole and Polar planes, Enveloping cone and enveloping cylinder, Normals to conicoids, Diameter and diametral planes.

Unit – IV: Generating lines of conicoids- condition for a straight line to be a rectilinear, system of generating lines, properties of generating lines of hyperboloid. Reduction of general equation of second degree- principal planes and principal directions, centre of a conicoid , canonical forms, transfer of origin and rotation of coordinate axes for canonical form.

Unit – V: Vector Calculus - Differentiation and Integration of vector point function, Gradient of scalar point function, Divergence and Curl of vector point functions, Identities on gradient, curl, divergence, Gauss and Stock's theorems(no proofs are required) and their applications.

Practical

Teaching : 2 hours per week

Examination Scheme:

Duration - 2 hours

	Science
Maximum Marks	30
Minimum Pass Marks	11

Distribution of Marks:

Two exercises one from each group

10 marks each	20 marks
Practical record	05 marks
Viva-voce	05 marks
Total Marks	30 marks

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Group – A : Graphs of some standard functions- x^n (for different value of n), e^x, $\log_e x$, $\log_a x$ (a< 1 and a>1), sin x, cos x, tan x, cot x, cosec x, sec x.

Tracing of Cartesian and polar two dimensional curves.

Group – B : Classification and Tracing of conics representing by general equation of second degree $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$.

Classification of conicoid representing by general equation of second degree $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy + 2ux + 2vy + 2wz + d = 0$

Note :- Each candidate (Regular/Non-collegiate) has to prepare his/her record.

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