UNIVERSITY OF RAJASTHAN
JAIPUR

SYLLABUS

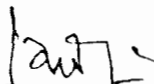## Integrated Programme In
B.SC. – B.ED.

Annual Scheme

(Academic session 2017-18)

Examination Part- I (2018)

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University ~~of Rajasthan~~
~~JAIPUR~~

NOTICE

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

2. All court cases shall be subject to the jurisdiction of Rajasthan Univeristy headquarter Jaipur only and not any other place.

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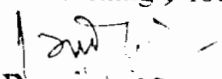
01. The Objective and the Learning outcomes of the Integrated B.Sc.-B.Ed. Degree are-

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 methods in large classes.
7. Ability to examine pupil's progress and effectiveness of their own teaching through the use of proper evaluation techniques.

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8. Equipment for diagnosing pupil progress and effectiveness of their own teachings through the use of proper evaluation techniques.

9. Readiness to spot talented and gifted children and capacity to meet their needs.

10. Ability to organize various school programmes, activities for pupil.

11. Developing guidance point of view in educational, personal and vocational matters.

12. Ability to access the all round development of pupils and to maintain a cumulative record.

13. Developing certain practical skill such as:

   a. Black board work

   b. Preparing improvised apparatus

   c. Preparing teaching aids and ICT.

14. Interest and competence in the development of the teaching profession and education. Readiness to participate in activities of professional organizations.

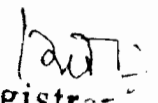## Integrated Programme of B.Sc.-B.Ed. Degree Shall Consist of

i)   First Year B.Sc.-B.Ed.
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

Terminal 80 marks or   20 marks = Total 100

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

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1. Compulsory Papers :

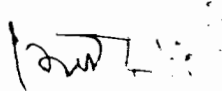| Year	Paper
Its Year	Gen. English
II Year	Gen. Hindi
III Year	Computer Application (ICT)
IV Year	Environmental Education

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

Group – A :- Subject Speciliasation :

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

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

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

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

| Chemistry |
| Botany |
| Zoology |
| Physics |
| Mathematics |

- ❖ In all the subjects the student has to study a minimum of 12 papers in 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 5(a,b). 6(a,b), 7 (a,b) will carry 150 marks.(with practical part).

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

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

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

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.- B.Ed. 01	Gen. English(Compulsory)*	80	20	-	100
II	B.Sc.-B.Ed. 02	Childhood and Growing Up	80	20	-	100
III	B.Sc.-B.Ed.	Contemporary India and	80	20	-	100

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	03	Education				
VIII	B.Sc.-B.Ed. 04 (G-A)	Instructional System & Educational Evaluation	80	20	-	100
V VI & VII	B.Sc.-B.Ed 05, 06 & 07 (G-B)	Content (PCB & PCM Group) (Select any Three)				
		1. Chemistry(I,II,III)	33+33+34	25	25	150
		2. Botany (I,II,III)	33+33+34	25	25	150
		3. Zoology(I,II,III)	33+33+34	25	25	150
		4. Physics (I,II,III)	33+33+34	25	25	150
		5. Mathematics(I,II,III)	33+33+34	25	25	150
						750

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

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

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.-B.Ed. 01	Gen. Hindi(Compulsory)*	80	20	-	100
II	B.Sc.-B.Ed. 02	Knowledge and curriculum	80	20	-	100
III	B.Sc.-B.Ed. 03	Learning and Teaching	80	20	-	100
IV	B.Sc.-B.Ed 04 (G-A)	Peace Education	80	20	-	100

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V	B.Sc.-B.Ed	Content				
VI	05.	(PCB & PCM Group)				
&	06	(Select any Three)				
VII	&	1. Chemistry(I.II.III)	33~33~34	25	25	150
	07	2. Botany (I.II.III)	33~33~34	25	25	150
	(G-B)	3. Zoology(I.II.III)	33~33~34	25	25	150
		4. Physics (I.II.III)	33~33~34	25	25	150
		5. Mathematics(I.II.III)	33~33~34	25	25	150
VIII	B.Sc. - B.Ed	OPEN AIR / SUPW CAMP		25		100
		1. Community Service		25		
		2. Survey (Based on social and educational events)		25		
		3. Co-Curricular Activities		25		
		4. Health and Social awareness programme (DISASTER MANAGEMENT AND CLEANINESS)				
						750+100

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

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Pract ical	Total
I	B.Sc.-B.Ed. 01	Information & Communication Technology(ICT) (Compulsory)*	80	20	-	100
II	B.Sc.-B.Ed. 02	Language Across the Curriculum	80	20	-	100
IV	B.Sc.-B.Ed-04 (G-A)	Guidance and Counseling in School	80	20	-	100

V VI & VII	B.Sc.-B.Ed 05. 06 & 07 (G-B)	Content (PCB & PCM Group) (Select any Three)				
		1. Chemistry(I,II,III)	33-33-34	25	25	150
		2. Botany (I,II,III)	33-33-34	25	25	150
		3. Zoology(I,II,III)	33-33-34	25	25	150
		4. Physics (I,II,III)	33-33-34	25	25	150
		5. Mathematics(I,II,III)	33-33-34	25	25	150
VIII	08(a,b)	Pedagogy of a School Subject (part-1) , Ist & IInd Year(candidate shall be required to offer any two papers from the following for part-1 & other for part-2). 1.Mathematics 2. Physics 3. Chemistry 4. Biology 5. General Science	80	20		100
Practicum		Special Training Programme				
		• Micro Teaching			10	100
		• Practice Lesson			50	
		• Observation Lesson			05	
		• Technology Based Lesson			05 20	
		• Criticism Lesson			10	
		• Attendance Seminar Workshop				
		Final Lesson	100			100
						750-100=100

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

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Prac tical	Total
I	B.Sc.-B.Ed. 01	Environmental Education(Compulsory)*	80	20	-	100
II	B.Sc - B.Ed. 02	Creating and inclusive school	80	20	-	100
III	B.Sc B.Ed. 03	Understanding Disciplines and Subject	80	20	-	100
IV	B.Sc.-B.Ed. 04(G-A)	Physical Education & Yoga	80	20	-	100
V	B.Sc -B.Ed. 05	Gender, School and Society	80	20	-	100
VI	B.Sc -B.Ed. 06	Assessment for Learning	80	20	-	100
VIII	B.Sc- B.Ed. 08(a,b)	Pedagogy of a School Subject (part-2) . Ist & IInd Year(candidate shall be required to offer any two papers from the following for part-1 & other for part-2). 1.Mathematics 2. Physics 3. Chemistry 4. Biology 5. General Science	80	20	-	100
Practicum		1. Practice teaching		50		
		2. Block Teaching (Participation in School Activities Social Participation in Group)		20 10		
		3. Report of any feature of school / case study/action research		20		100

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	4. Criticism Lesson			
	Final Lesson	100		100
				600+100+ 100

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

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

Compulsory Papers

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

Group – A	Group – B (PCB & PCM Group) (Select any Three)
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 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).

Chemistry
Botany
Zoology
Physics
Mathematics

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❖ 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 5(a.b). 6(a,b), 7 (a,b) will carry 150 marks.(with practical part).

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

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

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

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

PART II

Practical Work

Objectives:

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

1. To be conscious of sense of values and need for their inculcation in children through all available means including one's own personal life.

2. Possess a high sense of professional responsibility.

3. Develop resourcefulness. so as to make the best use of the situation available.

4. Appreciate and respect each child's individuality and treat him as independent and integrated personality.

5. Arouse the curiosity and interest of the pupils and secure their active participation in the educative process.

6. Develop in the pupil's capacity for thinking and working independently and guide the pupils to that end.

7. Organize and manage the class for teaching learning.

8. Appreciate the dynamic nature of the class situation and teaching techniques.

9. Define objectives of particular lessons and plan for their achievements.

10. Organize the prescribed subject- matter in relation to the needs, interest and abilities of the pupils.

11. Use the appropriate teaching methods and techniques.

12. Prepare and use appropriate teaching aids, use of the black board and other apparatus and material properly.

13. Convey ideas in clear and concise language and in a logical manner for effective learning.

14. Undertake action research.

15. Give proper opportunity to gifted pupils and take proper care of the back-ward pupils.

16. Co-relate knowledge of the subject being taught with other subjects and with real life situations as and when possible.

17. Prepare and use assignments.

18. Evaluate pupil's progress.

19. Plan and organize co curricular activities and participate in them.

20. Co-operates with school teachers and administrators and learns to maintain school records and registers.

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

1. Observation of lesson delivered by experienced teachers and staff of the college.

2. Planning units and lessons.

3. Discussion of lesson plans, unit plans and lessons given (including criticism lesson)

4. Organization and participation in co- curricular activities.

5. Setting follows up assignment.

6. Evaluation in terms of educational objectives use of teachers made tests & administration of standardized tests.

7. Black-board work.

8. Practical work connected with school subjects.

9. Preparation and use of audio visual aids related to methods of teaching.

10. Experimental and laboratory work in chemistry, botany, zoology, physics, and mathematics subjects of experimental and practical nature.

11. Study of the organization of work and activities in the school.

12. Observation and assistance in the health education programme.

13. Observation and assistance in the guidance programme.

14. Maintenance of cumulative records.

15. Techniques of teaching in large classes.

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

Notes :-

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

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

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

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

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

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

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

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

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

O.326 B: No candidate shall be permitted to appear as an Ex-student at more than one subsequent examination. The Integrated B.Sc-B.Ed programme shall be of duration

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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 :-

<u>Scheme of Integrated B.Sc-B.Ed Four Year Examination:-</u>

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

Part I- Main theory papers of Integrated B.Sc-B.Ed.- I:-

In Integrated B.Sc.-B.Ed I Year, Paper nos. are 01, 02, 03 & 04 are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Paper 05, 06 , 07 (G-B). in each session are three hours carrying 150 marks (100 marks theory 25 sessional + 25 practical.

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

Organization evaluation of practice teaching:

1. Every candidate will teach at-least 40 lessons (20 in III Year & 20 in IV Year) during practice teaching session. At least ten lessons in each subject should be supervised.

2. 40(20+20) lessons as desired in the syllabus should be completed as full period class room lesson. Micro teaching lesson to be used in addition to those 40 lessons for developing certain teaching skills.

3. A minimum of ten lessons in each subject will be supervised evaluated by the subject specialist or a team of specialists of the subjects.

4. By and large. the evaluation of the performance in the practical teaching will be based on the last ten lessons in the subject when the student has acquired some competence and skills of teaching.

5. The internal assessment in practice of teaching will be finalized by the principal with the help of members of the teaching staff and the same will be communicated to the university before the commencement of the practical each year.

6. At Integrated B.Sc-B.Ed III Year each candidate should be prepared to teach one lessons at the final practice examination. At the Integrated B.Sc-B.Ed IV 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.

9. Approximately 50 lessons will be examined by the board each day.

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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%

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

B.Sc-B.Ed – 01

General English Compulsory - 100 Marks

The syllabus aims at achieving the following objectives:

1. Introduce students to phonetics and enabling them to consult dictionaries for correct pronunciation (Sound and Word stress)
2. Reinforcing selected components of grammar and usage
3. Strengthening comprehension of poetry, prose and short-stories
4. Strengthening compositional skills in English for paragraph writing, CVs and Job Applications

The pattern of question paper will be as follows:

Unit A: Phonetics and Translation   (20 marks)
    (10 periods)

I.	Transcription of Phonetic symbols	(05)
II.	Word Stress	(05)
III.	Translation of 5 sentences from Hindi to English	(05)
IV.	Translation of 10 words from Hindi to English	(05)

Unit B: Grammar and Usage   (20 marks) (10 periods)

I.	Transformation of sentences	(05)
	a. Direct & Indirect narration	
	b. Active and Passive Voice	
	c. Interchange of Degrees of Comparison	
II.	Modals	(05)
III.	Sequence of Tenses	(05)
IV.	Punctuation of a short passage with 10 punctuation marks (05)	

Unit C: Comprehension   (30 marks) (25 periods)

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

William Blake	The Little Black Boy
Sujata Bhatt	Voice of the Unwanted Girl
Ruskin Bond	Night Train for Deoli
M. K. Gandhi	The Birth of Khadi
J. L. Nehru	A Tryst with Destiny
A. P. J. Abdul Kalam	Vision for 2020

Five questions to be answered out of eight questions Two marks each based on 6 units of the prescribed texts

Five questions of 3 marks each to be answered from the given passage: 15 marks

One vocabulary question from the given passage (at least 10 words) : 5 marks

Unit D: Compositional Skills   (30 marks) (15 periods)

I.	Letters – Formal and Informal	(10)
II.	CVs and Job Applications	(10)
III.	Paragraph Writing	(10)

Recommended Reading:

1. Sasikumar, V., Dutta and Rajeevan, A Course in Listening and Speaking-I Foundation Books, 2005
2. Sawhney, Panja and Verma eds., English at the workplace, Macmillan, 2003
3. Singh, R. P. Professional Communication, OUP, 2004
4. Judith Leigh, CVs and Job Applications, OUP, 2004
5. Arthur Waldhorn and Arthur Zeiger, English made Simple, Upa and Co.
6. Gunasekhar ed. A Foundation English Course for Undergraduates Book-I, CIEFL, Hyderabad

Quirk and Greenbaum, A University Grammar of English, Longman, 1973

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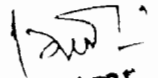 g) Gessel's maturation theory

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Unit 3: Child Growing up

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

Unit 4: Learning to Learn

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

Unit 5: Psychological Attributes of an individual

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

Test and Assignment:-

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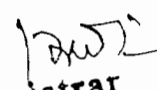- Project (Any one of the following)   10 Marks

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

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

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

References:

1. Agarwal, Reetu, Shukla Geeta (2014). Bal Vikas evam Manovigyan, Rakhi Prakashan, Agra

2. Aggarwal, J.C.. (1981). Essential of Educational Psychology, Delhi, Doaba Book

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

4. Bigge, M.L. (1982). Learning Theories for Teachers. New York: Harper and Row

5. B.P. (2000). Personality theories, Bosten: Allyn and Bacon House.

6. Chauhan, S.S. (2001). Adanaced educational psychology, New Delhi: Vikas Publishing House.

7. Diane E. Papalia, Sally Wendkos olds, Ruth Durkin Feldman, Ninth Edition, Human Development, Tata Mcgraw Hill Publishing company Limited, New Delhi.

8. Helen Bee Denise Boyd, First Indian Reprint 2004. The Developing Child, Published by Pearson Education Pre. Ltd. Indian Branch Delhi, India

9. Jack Snooman, Robert Biehler Ninth Edition. Psychology Applied to Teaching, Houghton Miflin Company, Bosten New York (http://www.coursewise.com)

10. Ormrod Ellis Jenne. Third Edition, Educational Psychology Developing Learners Multimedia Edition (http://www.prenhall.com/ormrod)

11. Sarswat Kuldeep (2015). Bal Vikas evam Bachpan, Published by Rakhi Prakashan, Agra

12. Woolfolk, A. (2004). Educational Psychology published by Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in South Asia.

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B.Sc-B.Ed – 03

Contemporary India and Education

MARKS-100

Objectives:-

After completing the course the students will be able to :

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

2. To develop an understanding of the trends, issues and challenges faced by contemporary education in India.

3. To appreciate the developments in Indian education in the post independence era.

4. To understand the Commissions and committees on education constituted from time to time.

5. To understand issues and challenges of education and concern for the underprivileged section of the society.

6. To develop awareness about various innovation practices in education.

7. To develop and understanding of self teaching technical devices.

8. To understand the constitutional values and provisions for education.

Course Content

Unit I   Education as an Evolving Concept

- Education: Meaning, concept and nature, Ancient to present education as an organized and institutionalized form, formal and state sponsored activities.

- Aims of Education: Historicity of aims of Education, changing aims of education in the context of globalization, sources of aims of Education: Educational aims as derived from the constitution of India influence of aims of education on the curriculum and transactional strategies. Idea of educational thinkers such as Gandhi, Tagore, Aurobindo, Dewey Krishnamurthy, Friere and Illich.

Unit – II: Issues and Challenges

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

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- Role of education in multicultural and multilingual society for Equalization and Improvement of Marginalization groups.
- Hindrances of Education in India: Quality, Facilities, Access, Cost, Political unwillingness, Youth unsatisfaction, Moral Crisis.

Unit – III: Constitution and Education

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

Unit – IV: Programme and Policies

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

Unit – V: Innovative Practices

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

Test and Assignments :-

    1. Class Test   10 marks

2 .Any one of the following: - 10 marks

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

REFERENCES :-

1. Agnihotri, R. (1994) Adhunik Bhartiya Shiksha Samasyaye Aur Samadhan, Jaipur: Rajasthan Hindi Granth Academy
2. Agrawal, J.C: Land Marks in the History of Modern Indian Education, New Delhi 2. Brubecher, John.S: A History of the Problems of Education
3. Altekar, A. S.(1992) Education in Ancient India, Varanasi: Manohar Prakashan
4. Dev, A..Dev, T.A..Das.S. (1996) Human Rights a Source Book, New Delhi, NCERT, Pp. 233.
5. Dubey, S.C. (1994) Indian Society, New Delhi, NBT, Pp.
6. Education and National Development: Report of the Kothari Commission on Education, New Delhi, 1966.
7. अग्निहोत्री, रवीन्द्र : आधुनिक भारतीय शिक्षा समस्याएँ और समाधान, राजस्थान हिन्दी ग्रंथ अकादमी।
8. Gore. M. S. (1982) Education and Modernization in India, Jaipur: Rawat Publications
9. Ghosh, S.C. (1995) The History of Education in Modern India (1757- 1986), New Delhi : Orient Longman Ltd.
10. J.F. Brown: Educational Sociology
11. Kabir, H. (1982) Education in New India, London: George Allen an Unwin.
12. Kashyap Subhash C.. Our constitution: An Introduction to India's constitution and constitutional laws, National Book Trust India, 2011.
13. Keay.F.E: Indian Education in Ancient and later Times
14. M.N. Srinivas: Social Change in Modern India
15. Mookerji. R. K. (1947) Ancient Indian Education (Brahmanical and Buddhist), London: Mac Milan and Co. Ltd.

16. Mookerji, R.S: Ancient Indian Education

17. Naik, J. P., Nurullah, S.(1974) A Student's History of Education in India, (1800-1973), New Delhi : Orient Longman Ltd.

18. Nayar, P. R. Dave, P.N. Arora, K. (1983) The Teacher and Education in Emerging Indian Society, New Delhi: Orient Longman Ltd

19. National Curriculum Framework. (2005).

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

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

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

23. Saiyidain. K.G. (1966) The Humanist Tradition in Indian Education Thought, New Delhi: Aria Publishing House

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

25. Varghese, A. (2000) Education for the Third Millennium, Indore: Satprachar Press

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

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

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

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

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

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

32. साथिन संदर्भ सामग्री पुस्तिका : 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:
o Instructional purpose b) Guidance purpose c) Administrative purpose
- Administration of Test and Interpreting test result.
- Meaning of Norms, types of Norms, age, Grade, Percentile and standard score. 4. Norms and interpretation of test scores.
- Concept of grade system. Absolute grading, comparative grading and its advantages and disadvantages.

Test and Assignments :-

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

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

References:

1. Anastasi, Anne, (1976), Psychological Testing, 4m ed., New York; Macmiflan Publishing Co. Inc.
2. Bertrand, Arthur and Cebula, Joseph P., (1980) : Tests, Measurement and Evaluation, A Developmental Approach, Addision-Wesley, U.S.A.
3. Bloom, Benjamin S., Et.al., (1971): Handbook on formative and Summatice Evaluation in Student Learning, McGraw Hill, USA.
4. Ebel,Robert, L. (1996) : Measuring Educational Achievement, Prentice-Hall of India, New Delhi. 27
5. Ferguson. G A (1974). "Statistical Analysis in Psychology and Education", McGraw Hill Book Co., New York.
6. Freeman. Frank S.,(1962), Theory and Practice of Psychoiogical Testing, New Delhi, Oxford and IBH Publishing Co.
7. Guilford, J.P.(1965). Fundamental Statistics in Psychology and Education. Me Graw Hill Book Company, New York.
8. Khan, Mohd. Arif. (1995): School Evaluation, Ashish Publishing House. New Delhi.
9. Noll. V .C (1957). Introduction to Educational Measurement, Houghton Miffline Company. Boston.
10. Nunnally, Jume, (1964), Educational Measurement & Evaluation, New York;

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B.Sc.- B.Ed. 05, 06, 07

I. CHEMISTRY

Scheme;

Max marks: 150

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

Note:Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to answer any five (05) questions selection at least one (01) question from each unit.

CH-101 Paper I: Inorganic Chemistry

(2hrs or 3periods/week)

Objectives:-

After completion their study of inorganic student should be able-

1. To understanding to particle and wave nature of any substance.
2. To differentiate among the characteristics of the elements according to their electronic configuration and position in periodic table.
3. To explain learn about periodic law
4. To explain critical vocabulary like electronegativity, Ionization energy, atomic size and ionic radius.
5. To analyze periodic trends in properties of elements in periodic table
6. To use molecular orbital theory to predict for diatomic molecules the electron configurations, bond orders, magnetic properties, and relative bond lengths.
7. To learn to draw molecular orbital electron configurations energy diagrams.
8. To compare properties of ionic compounds and covalent compounds
9. To classify elements into s,p,d,and f block of the periodic table.
10. To described and explain the periodicity in the physical properties of the s-and p- block elements.

Unit-I

Ionic Solids : Ionic structures. radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors. lattice energy and Born-Haber cycle, salvation energy and solubility of ionic solids, polarizing power and polar ability of ions. Fagan's rule.

Metallic bound: Free electron. valence bond and band theories

Unit-II

Covalent Bond: Valence bond theory and it's limitations, directional and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3 H_2O. SF_4. ClF_3. ICl_2. H_2O.

Molecular Orbital Theory: Homonuclear and Heteronuclear (CO and NO) diatomic molecules. multicenter bonding in electron deficient molecules, bond strength and bond energy. percentage ionic character from dipole moment and electro negativity difference.

Unit-III

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

Unit-IV

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

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

Unit-V

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

Weak Interactions: Hydrogen bonding, Van der Walls forces.

CH-102 Paper II : Organic Chemistry

(2hrs of 3 Periods/Week)

Objectives:-

After completion their study of inorganic student should be able-

11. To Study of organic compound and their properties & specific properties of carbons atoms

12. To Use curly arrow reaction mechanisms and a knowledge of the relative stability of intermediates to predict and ' or account for the products of reactions.
13. To recognize neighboring group participation and rearrangement   reactions.
14. To study about the isomerism in organic compound nomenclature , confirmation properties
15. To explain alkenes, alkynes, alkanes aromatic hydrocarbons and their properties in difference chemical reactions.

Unit-I

Mechanism of Organic Reactions: Homolytic and heterolytic bond cleavage. Type of reagents, electrophiles and nucleophiles.Reactive intermediates- carbocations, carbanios, free radicals, carbenesarynes and nitrees (with examples).Types of organic reactions.Energy considerations. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies)

Unit-II

Stereochemistry of Organic Compounds: Concept of isomerism, Types of isomerism, Difference between configuration and conformation. Flying wedge and Fischer projection formulae.

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

Relative and absolute configuration. sequence rules D L and R/S systems of nomenclature.

Geometric Isomerisem: Determination of configuration of geometric isomers-cis/ trans and E/ Z systems of nomenclature. Geometric isomerism in oximes and alicyclic compounds.

Conformational Isomerisem: Newman projection and Sawhorse formulae. Conformational analysis of ethane. n-butane and cyclohexane.

Unit-III

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

Alkens, Cycloalkenes, Dienes and Alkynes: Methods of formation mecha..isms of dehydration of alcohols and dehydrohalogenation of alkyl halides. Regioselectivity in alcohol dehydration- the Saytzeff rule, Horrmann elimination.Physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions. Markownikoffs rule, hydroboration- oxidation. oxymercuration- reduction.Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$ polymerization of alkenes.Substitution at the allylic and vinylic positions of alkenes.

Classification and Nomenclature of isolated, conjugated and cumulated dienes.Structure of allenes and butadiene. Methods of formation. Properties and chemical reactions- 1,2 and 1,4 additions diels-Alder reaction and polymerization reactions. Structure and bonding in alkynes. Methods of formation Chemical reactions-acidity of alkynes mechanism of electrophilic and nucleophilic addition reactions; hydroboration- oxidation; metal-ammonia reduction. oxidation and polymerization.

Unit-IV

Arenes and aromaticity: Nomenclature of benzene drerivatives: the aryl group, aromatic nucleus and side chain. Structure of benzene molecular formula and Kekule structure.Stability Aromaticity the rule. aromatic ions- three to eight membered rings.

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

Unit-V

Alkyl and aryl Halides:

Methods of formation of alkyl halides, chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides S_2 and sn1 reactions with energy profile diagrams.

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

CH-103 Paper III: Physical Chemistry

(2hrs of 3perods/week)

Objectives:-

After completion their study of inorganic student should be able-

16. To analyzing physical state of molecules and inter molecular forces in solids , liquids and gases.
17. To be able to apply problem solving and logical skills.
18. To be able to communicate mathematical / logical ideas in writing.
19. To be able familiar with several subfields of mathematics (e.g, numerical analysis, topology, operations research)
20. To describe the distribution of molecular velocities for a sample of gas.
21. To explain how the distribution changes with the temperature or molecular weight of a sample of gas.
22. To give the definition of a mineral from the historical, legalistic to scientific perspective.
23. To describe the importance of mineralogy and its application to other related fields of scientific and technological endeavor.
24. To study of elements in correlate with mathematics mathematical derivation like root mean squire, molecular velocities, collision of molecules in solids, liquids and gases.
25. To study the role of computers in analyzing quantitative properties of elements along with languages and configurations of computers.

Unit-I

sMathematical Concepts: Logarithmic relations. curve sketching, linear graphs and calculations of slopes, differentiation of functions like K_x, e^x, x^n. $\sin x$ and $\log x$: masima and minima, partial differentiation and reciprocity relations. integration of some useful relevant function: permutations and combinations, factorials, probability.

Liquid State: Intermolecular forces. structure of liquids (a qualitative description) Structural differences between solids liqids and gases. Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermographs and seven segment cell.

Unit-II

Gaseous States: postulates of kinetic theory of gases, deviation form ideal behavior, van der Waals equation of state

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

Molecular Velocities: Root mean square, average and most probable velocities. Qualitativediscussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases (based on joule-Thomson effect)

Unit-III

Solid State: Definition of space lattice. unit cell

Laws of crystallography- (i) law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry-Symmetry elements in crystals.

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

Unit-IV

Colloidal State: Definition of colloids, classification of colloids.

solids in liquids (sols): properties-kinetic, optical and electrical, stability of colloids. Protective action hardy-Schulze law. gold number.

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

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

Unit-V

Chemical kinetics: Chemical kinetics and it'sscope, rate of a reaction, factors influencing the rate of a reaction: concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions-zero order, first order, second order and pseudo order, half-life and mean-life.Determination of the order of reaction- differential method, method of integration, method of half-life period and isolation method.

Radioactive decay as a first order phenomenon.

Experimental methods of chemical kinetics: conduct metric, potentiometric, optical methods, (polarimety) and spectrophotometric methods. Theories of chemical kinetics.Effects of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

Simple collision theory based on hard sphere model transition state thory (equilibrium hypothesis).Expression for the rate constant bases on equilibrium constant and thermodynamic aspects.

Suggested Books:

1. Principles of physical Chemistry: B.R Puri and L.R Sharma
2. A Text Book of Physical Chemistry A.S Negi and S.C Anand.
3. Physical Chemistry: Ira N. Levine.
4. Physical Chemistry. Pt I&II: C.M Gupta, J.K Saxena and M.C Purohit.

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CH-104 Chemistry Practical

(4hrs of 6 Periods/week)

Inoraganic Chemistry

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

Organic Chemistry

Laboratory Techniques

(a) Determination of melting point (naphthalene, benzoic acid, urea, etc.): boiling

point (methanol, ethanol, cyclohexane, etc.): mixed melting point (urea-   cinnamic acid etc.)

(b) Crystallzation of phthalic acid and benzoic acid from hot water, acetanilide

from boiling water, naphthalene from ethanol etc.; Sublimation of

naphthalene, camphor, etc.

Qualitative Analysis

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

Physical Chemistry

One of the following experiments should be given in the examination

(i) Chemical kinetics:

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

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

    (c) To mom pare the Strengths of HCL and H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.

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

(ii) Viscosity/and surface Tension:

    a) To determine the viscosity/surface tension of a pure liquid (alcoholetc.) at room temperature. (Using the Ostwald viscometer/stalagmometer)

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

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

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

(Instructions to the Examiners)
CH-104: Chemistry practical (pass course)

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

Inorganic Chemistry
Ex,1 Separation and identification of 3 cations and 3 anions in mixture   15
Organic Chemistry
Ex.2 Laboratory Techniques   3
Ex.3 Qualitative Analysis
    Detection of element and detection of functional group   10
Physical Chemistry
Ex.4 Perform one of the experiments mentioned in the syllabus.   12
Ex.5 Viva-voce   5
 Ex.6 Record   5

Total
Sessional Work(Max. Marks -25)

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Any one of the following (25 Marks)

1. Life sketch & contribution of any prominent chemist
2. Visualize the importance of chemistry in daily life
3. Write an abstract on chemical in food / Artificial sweetening agent.
4. Prepare a activity Game Play / Scarab book on chemistry
5. Chemistry is essential the study of materials and the development of new material for the betterment of humanity

Books Suggested (Theory Course)

1. Basic Inorganic Chemistry F.A Cotton. G. Wikinson and P.L Caus. Wiley
2. Concise Inorganic Chemistry. J.D Lee. ELBS
3. Concepts of Models of Inorganic Chemistry B. Douglas, D McDaniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D.E. Shriver. P.W atkins and C.H Langford, Oxford
5. Inorganic Chemistry, W.W. Porterfield Addison Wesley.
6. Inorganic Chemistry, A.G. Sharpe, ELBS
7. Inorganic Chemistry, G.L Miessler and D.A Tarr, Prenitce Hall.
8. Organic Chemistry, Morrison and Boyd. Prentice Hall.
9. Organic Chemistry, L.G. Wade ji Prentice Hall.
10. Fundamentals of Organic Chemistry, Solomouns John Wiley
11. Organic Chemistry, Vol. I, II, III, S.M Mukherji, S.P Singh and R.P Kapoor, Wiley.
12. Organic Chemistry, F.A Carey, McGraw Hill Inc.
13. Introduction to Organic Chemistry Streitwicscr. Heathcock and Kosover. Macmilan.
14. Physical chemistry, G.M Barrow. International Student Edition, McGraw Hill.
15. Basic Programming with Application, V.K. Jain Tata McGraw Hill.
16. Computers and common Sense, R. Hunt and Shelly, Prentice Hall.
17. University General Chemistry, C.N.R. Rao, Macmillan.
18. Physical Chemistry R.A Alberty, Wiley Eastern Ltd.
19. The Elements of Physical Chemistry, P.W Atkins, Oxfrod.
20. Physical Chemistry Throught Problems, S.K Dogra and S. Dogra, Wiley Easterm Ltd.

Books Suggested (Laboratory Courses)

1. Vogel's Qualitative inorganic Analysis, revised, Svehla, Orient Longman.
2. Vogel's Textbook of quantiative Inorganic Analysis (revised) J.Bassett. R.C Denely. G.H Jeffery and J. mendham. ELBS
3. Standard Methods of Chemical Analysis W.W Scott. The Technical Prass.
4. Experimental Inorganic Chemistry W.GPalmer Cambridge.
5. Hanbook of sprparative Inorganic Chemistry. Vol. I & II Braver, Academic Press.
6. Inorganic synthesis McGraw Hill.
7. Experimental Organic Vol. I&II P.R Singh, D.S Gupta and K.S Bajpai, rata McGraw Hill.
8. Laboratory manual in Ortganic Chemistry, R.K Bansal, Wiley Eastern.
9. Vogel's Textbook of Practical Organic Chemistry, RS Fumiss, Hannaford, V. Rogers. P.V.G Smith and A.R tatchell. ELBS
10. Experiments in General Chmistry, C.N.R Rao and U.C Agarwal, East-West Press.
11. Experiments in Physical Chemistry, R.C Das and B. Behra, Tata McGraw Hill.
12. Advanced Practical Physical Chemistry, J 13 Yadav, Goel Publishing House.
13. Advanced Experimental Chemistry, Vol I-Physical, J.N. Gurhii and R. Kapoor, S. Chand & co.
14. Selected Experiments in physical Chemistry, N.G Mukerjee, J.N. Ghjose& Sons.
15. Experiments in Physical Chemistry. J.C Ghosh, BharatiBhavan.

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B.Sc. – B.Ed. -05, 06, 07

BOTANY

Min. Pass marks : 36   **Max Marks : 100**

Paper I	3 hrs duration	Max Marks 33
Paper II	3 hrs duration	Max Marks 33
Paper III	3 hrs duration	Max Marks 33
Practical Min. Marks: 18	4 hrs duration	Max Marks 50

Duration of examination of each theory paper-

Duration of examination of practicals-

Note :
1. There will be 5 questions in each paper. All questions are compulsory, Candidate has to answer all questions in the main answer book only.
2. Q.no. 1 will have 18 very shot 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.

B.Sc. – B.Ed. (Botony)

Paper 1

Cell Biology , Genetics & Plant Breeding.

1.Student will understand the structure of cell organtles& nuclear material.

2.Student will apply their knowledge of cell biology to selected exmaples of changes loses in cell division.

3.To understand the Mandelian& non Mendelian modes of inhesitance that govein passage of genetic trite across generation &categosige& Predict geneotype& phenotype.

4.To understand the basic structure of DNA & chromosomes.

5.To improve the characteistics of plant so that they become more desirable agronomically& economically.

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Paper-I
Cell Biology: Genetics and Plant Breeding
(2 hrs/week)

Unit-I

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

Unit-II

Cell divisions: Cell cycle mitosis stages structure and functions of spindle apparatus an aphasic chromosome movement meiosis its   different stages- Meiosis I, meiosis II, Synaptonemal complex, dhiasmata formation and crossing over.

Basis of genetic material: Griffith's trransformation experiment and the hershey and Chase blender experiment to demonstrate DNA as the genetic material. Concept of Gene: Neurospora and ida about prokaryotic and eukaryotic structure of gene- operson concept, exons and introns.

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

Unit-III

Genetic inheritance : Mendel's laws of infieritance and their exceptions; allelic (incomplete and co-dominance, lethality) and non allelic interactions (complementary genes, epitasis and duplicate genes) Quantitative inheritance: grain color in wheat, corolla length in nicotinic tabacum.
Cytoplasmic inheritance- maternal influence shell coiling in snails, kappa particles in paramecium, Multiple allelism: ABO blood groups in men.

Unit-IV
Plant Brecding: Introduction and obectives of plant breeding: general methods of plants breeding in self-pollinated cross-pollinated and vegetatively propagated crop plants Introduction and acclimatization selections hybridizations hybrid vigour and inbreeding depression. Role of mutation and polyploidy in plant breeding Famous Indian And International plant breeders and their contribution. National and International agricultural reseachr institutes.

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

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Suggested Laboratory Exercises:

- Study of cell structure form onion, Hydrilla and Spirogyra
- Study of cyclosis in tradescantia spp
- Study of Plastid for pigment distribution in Lycopersicom, Cassia and capsicum.
- Study of electron microphotographs of eukaryotic cells for various cell organelles.
- Study of electron microphotographs of virus bacteria and eukaryotic cells for comparative study of cellular organizarion
- Study of different stages of mitosis and meiosis in root-tip- cell and flower buds respectively of onion.
- to solve genetic problems based upon Mendel's laws of inheritance: M onohybrid, Dihybrid, Back Cross and test cross.
- Permanent slides/photographs of different stages of mitosis and meiosis, sex, chromosomes, Polygene chromosome and salivary gland chromosomes.
- Emasculation, bagging & tagging techniques
- Cross pollination techniques.

Suggested Readings:

- Choudhary, H.K (1989). Elementary Principles of plant breeding. Oxford and IBM publishing Co, New Delhi.
- Gupta P.K (2009) cytology genetics Evolution and plant Breeding Rastogi Publications Meerut
- Miglani, GS (200) Advanced genetics, Nerosa Publishing House New Delhi
- Russel PL (1998) Genetics. The bnejamins/cummings publishikng co., Inc U.S.A
- Shukla R.S and Chandel, P.S (2000) Cytogenetics Evolution and Plant Breeding, S. Chand& co.Ltd. New Delhi.
- Singh R.B (1999) Text Book of plant breeding Kalyani PublishersLudhiana.
- Dnyansagar VR (1986) Cytology and Genetic, Tata McGraw-Hill Pub. co. Ltd. New Delhi.
- Roy, SC and De KK (1999) Cell Biology New Central Book Agence (P) Ltd.
- Verma PS and Agarwal, VK (2012) Cell Biology Genetics, Molecular Biology. Evolution And Ecology s Chand and co. Ltd New Delhi.

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Paper 2

Microbiology Myeology& Plant Pathology

1. To know the economic importance of fingi
2. To study the diseases or disorder caused by biotic & abiotic agent.
3. To study the interaction between plant & pathogen in relation to the overall environment.

Paper-II
Microbiology, Mycology and plant pathology
(2hrs/week)

Unit-I

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

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

Mycoplasma: occurrence, morphology, reproduction and importance.

Unit-II

Virus: General characteristics and importance structure of TMV and pos virus structure and multiplication of bacteriophage
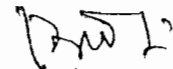
Fungi: General characteristics occurrence thallus organization reproductions, economic importance classification of fungi (Alexopoulos and Ainsworth's)

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

Unit-III

Brief account structure importance and life history and/or disease cycle and control of the following
Alb ago and white rust: Sclerospora and Downy mildew/Green ear disease of Bajra, Aspergillus. Claviceps and Ergot: peziza.

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Unit-IV

Brief account structure importance and life history and/or disease cycle and control of the following
puccinia and Black rust of wheat; Ustilago and loose smut of wheat and covered smut of barley Agarics', alternation and early blight of potato.

Suggested Laboratory Exercises:
1. Study of bacteria using curd or any other suitable material Gram's staining of bacteria.
2. Study of Mycoplasma. TMV, Poxvirus, bacterophage(Photographs/3-Dmodels)
3. Study of symptoms of plant diseases-Downy mildew of Bajra, Green ear of bajra, Powdery mildew mosaic of bhindl.
4. Study of specimen, permanent slides and by making suitable temporary slides: Albugo- white rust Sclerospora- downy mildew green ear aspergillus; claviceps-ergot; ustilago-loose smut of wheat covered smut of barley. puccinia-Black rust of wheat; agaricus; peziza and alternaria-early blight of potato.
5. Media preparaqtion: potato dextrose agar Nutrient agar
6. Culture techniques of fungi and bacteria.

Suggested Books:
- Alexopoulos C.J and Mims, C.W Introductory Myology, Jhon Wiley and Sons, New york. 2000.
- Dube, H.C : Fungi Rastogi publication meerut 1989
- Sarabhai R.C and saxena, R.C; A text book of botany Rastogi publication meerut 1990
- sharma, O.P Fungi today and Tomorrow Printers and Publishers, New Delhi. 2000
- Vahihsta B.R Botany for degree Students- fungi, S Chand & co. New Delhi 2001
- Bilgrami, K.S and Dube. H.C A text book of modern Plant pathology, Vikas publications New Delhi. 2000
- Biswas. S.B and Biswas. A: An Introduction to viruses, vikas Publication New Delhi 2000
- Clifton A; Introduction of Bacteria McGraw Hill Co.Ltd New York 1985
- Madahar, C.L Introduction of ;oants virus, S. Chand and Co. New Delhi. 1978
- Palzar M.J Jr. Chan, E.C.S and krieg, N.R: Microbiology, McGraw Hill Edu. Pvt. ltd. London 2001
- Purohit, S.S Microbiology, Agra Bot. Publication Jodhpur 2002
- Sharma, P.D Microbiology and pathology, Rastogi publication meerut 2003
- Singh V and Srivastava V: Introduction of bacteria vikas publication 1998
- Cappuccion, J and Sherman, N: Microbilogy : A Laboatory Manual (10th E.d) Benjamin cummings. 2013
- Aneja, K.R:Experiments in Microbiology. Plant Paqthology and Biotechnology New Age International (P) Ltd. Publishers New Delhi 2003
- Mehrotra. R.S and Aggarwal. Ashok: Plant pathology, Tata McGraw-Hill education 2003

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Paper 3

Algae , Lichens &Biyophyta

1.To know the mayor classes of Algae ,Lichens &Biyophyta.

2.To identify general characteistcs of Algae ,lichens &Beyophyta.

3.To know the economic importance of lichens

Paper-III
Algae I lichens and Bryophyta
(2hrs/week)

Unit-I

General characters, classifications (smith) Diverse Habitat Range of thallus structues, Photosynthetic Pigments and Food reserves. reproduction (Vegetative, Asexual, Sexual) Types of the life cycle. Economic importance

Unit-II

Type Studies
Cyanophyceae-Oscillatoria Vastoc
Cholorophyceae-Volvox Chara
Xanthophyceae-Vaucheria
Phaeophyceae-Ectocarpus.
Rhodophyceae-Plolysiphonia.

Unit-III

General charcacters, Origin and evolution of Bryophyte. Classification (Eichler): Habitat, Range of thallus structure. Reproduction (Vegetative and sexual): alternation of generations: Economis Importance

Type Studies: Hepaticosida- Riccia-Marchantia.

Unit- IV

Type studies: Anthocerotopsida - Anthoceros : Bryopsida - Funaria
Lichens-General characters. Habitat. Structure. reproduction and economic and Ecological importance of lichens.

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Suggested Laboratory Exercies.

1. Study of class work material by making suitable temporary slides and stury of permanent slides of; Oscillatoria.
2. Study of external morphology and preparation of suitable sections of vegetative/reproductive parts of Riccia, Marchania. Anthaceros. Funaria.
3. Study of Lichens.

Suggested Readings;

1. Bold H.C Alexopoulous, C.J and Devevoryas, T Morphology of plant and Fungi (4th Ed) Harper & Foul co. New Work 1980.
2. Ghemawat, M.S Kapoor, J.N and Narayan H.S A text book of Algae, Ramesh Book Depot, Jaipur. 1976
3. gilbart, M.Smith: Crypogamic botany: Vol I & II (2nd Ed.) Tata McGraw Hill publication Co.Ltd New Delhi. 1985
4. Kaumar H.D introductory Phycology, Affiliated East- West press, Ltd new york, 1988.
5. Puri P; Bryophytes Atmaram&sons. Delhi, Lucknow. 1985
6. Sarabhai: R.C and saxena, R.C A text book of Botany, Vol I & II Ratan prakashan Mandir meerut 1980
7. Singh V Pande. P.C and Jain D.K A text book of Botany Rastogi & co. Meerut, 2001
8. Vashista. B.R Botany for degree Students (Algae bryophytes) S. Chand & Co. new Delhi. 2002

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BOTANY PRACTICAL EXAMINATION
SKELETON PAPER

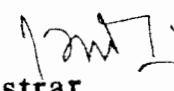**M.M 50**   **TIME: 4Hours**

S.No.	Practical	Regular	Ex NC
1(a)	Prepare the acetocarmine stained slide of the material "A" provided to you. Draw a well labeled diagram of any one stage of nuclear division Identify it giving reasons.	5	5
1(b)	Comment and solve the problem on Genetics allotted to you along with reasons.	5	5
2	Make suitably stained glycerine-preparation of any one alga from the given mixture "B' Draw its labelled diagrams: assign it to its systematic position giving reasons.	5	5
3	Make suitable preparation of the reproductive structure of material "C" (Fungi). Draw labelled diagrams Identify giving reasons.	5	5
4	Make suitable stained preparation of material "D" (Bryophyta Vegetative/reproductive) Draw labelled diagrams. identify giving reasons.	5	5
5	One microbilogy experiment for comments. or Gram's staining.	5	5
6	comment upon spots (1-5)	10	15
7	Viva-voce	5	5
8	Practical Record	5	-
	Total	50	50

Sessional Work (Botony)

1. Prepare a Harbariumatleast 20 plant.

2. Prepare an Article , Poster on any topic of biology.

3. Preservation of plant & prepare specises.

Project work on symbiosis .

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B.Sc. – B.Ed. 05, 06, 07
ZOLLOGY

Scheme:

max marks: 100   Min. Pass marks : 36

Paper I	3 hrs duration	33 Marks
Paper II	3 hrs duration	33 Marks
Paper III	3 hrs duration	34 Marks
Practical	4 hrs duration	50 Marks

Note: 1- There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No.1 containing 9 (Paper-I & II)/10 (Paper-III) very short answer (maximum 25 words) type question, each of 1 mark. This part is compulsory to attempt. Question should be evenly distributed covering entire syllabus.
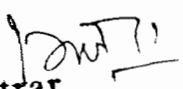
Second part of the question paper will be of long answer type question having three sections. There will be total 9 Questions (Q. No. 2 to 10) in this part i.e. three from each unit/section, out of witch candidate will be required to attempt any 4 questions selecting at least one question from each/section. Each question will carry 6 marks.

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

Zoology (Paper 1)

Diversity of Animals and Evolution

1. To know the zoogeographical region of the world.
2. To know the Biodiversity of Fauna of India & World.
3. To know the continental drift.
4. To differentiate now chordata&chordata Habits.
5. To know the evolutionary history of Lamarkism& Darwinism.
6. Students will learn to appreciate the life ferms that exisited on earth ,before human life appeared.

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PAPER-I Z-101
DIVERSITY OF ANIMALS AND EVOLUTION

Note:- 1 There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No.1 containing 9 very short answer (maximum 25 words) type question, each of 1 mark. this part is compulsory to attempt.

Question should be evenly distributed covering entire syllabus

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

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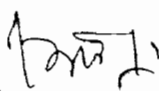
Section-A

Diversity of animals
1. Zoogeographical distribution: principal zoogeographical regions of the world with special reference to their mammalian fauna.
2. Biodiversity of Fauna of India and World.
3. Adaptation to their modes of life and environment.
4. Conservation measures of biodiversity where required
5. Continental drift.

Section-B

Diversity of Animals
1. General principles off taxonomy; concepts of the five kingdom scheme.
2. Concept of Protozoa, Metazoa and levels of organization.
3. Taxonomy and basis of classification of Non-chordata and Chordata symmetry, coelom, segmentation and embryogeny.
4. Detailed classification of Non-chordata and Chordata, habits habitat and external features only of the following prescribed types, viz, Amoeba, Paramecium, Euglena, Sycon, Obelia, Fasciola, Taenia, Nereis, Hirudinaria, Palaemon, Pila, Lameilidens and Asterias, Balanoglossus, Herdmania, Amphioxus, Petromyzon, Scoliodon, Labeo, any lung fish, Ichthyophis, Salamander, Frog, Hemidactylus, Naja, Python, Crocodile, Pigeon, Great Indian Bustard, Hare Camel and Chinkara.

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Section-C

Evolution
1. History of evolutionary thoughts (Lamarckism and Darwinism).
2. Natural Selection. Genetic basis of evolution; Speciation.
3. Variations, Isolation and Adaptations.
4. Paleontology: fossils, geological divisions of the earth's crust, imperfection of the geological recored.
5. Study of extinct forms: Dinosaurs, Archeopterys.

Paper 2

Cell Biology & Genetics

Objectives.

1. To understand the structure & function of Prokasyotic&eukouyoticcell.
2. To understand the arrangement of chromosomal DNA in the nucleus & how it changes during the cell division.
3. To differential m-RNA,r-RNA & t-RNA.
4. To learn the principals of genetic segregration.
5. To understand how meiosis & crossing over result in recombinant.
6. To understand why mendel's law of inhesitance do not apply to linked genes.

PAPER -II Z-102
CELL BIOLOGY AND GENETICS

Note- 1- There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No.1 containing 9 very short ansewer (maximum 25 words) type question, each of 1 mark. This part is compulsory to attempt. Question should be evenly distributed covering entire syllabus.

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

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

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Sction-A : Cell Biology

1. Introduction to cell: Morphology, size shape and characteristics of Prokaryotic, Eukaryotic and Animal cells; basic idea of virus and cell-theory.
2. Cell membrane: Characteristics of cell membrane molecules, fluid-mosaic model of singer and Nicholson, concept of unit membrane.
3. Cell membrane transport: Passive (diffusion and osmosis, facilitated, mediated) and active transport.
4. Cytoplasmic organelles:

   i. Structure and biogenesis of mitochondria; electron transport chain and generation of ATP molecules.
   ii. Structure and function of endoplasmic reticulum, ribosome (Prokayotic and Eukaryotic) and Golgi complex.
   iii. Structure and function of lysosome, micro bodies and centrioles.
   iv. Structure and functions of cilia, flagella, wicrovilli and cytoskeletal elements.

Section- B: Nuclear Organization

1- Nucleus:
   i. Structure and function of nuclear envelope, nuclear matrix and nucleolus.
   ii. Chromosomes: Morphology, Chromonema, chromomeres, telomeres, primary and secondary constriction, chromatids, prokaryotic chromosome.
   iii. Giant chromosome type: Polytene and Lampbrush.
   iv. Chromosomal organization: Euchromatin, heterochromatin and folded fibre model and nucleosome concept.

2- Nucleic Acids:
   i. DNA structure polymorphism (A,B and Ztype) and replication (semi conservative mechanism), experiments of Messelson and stahl: elementary idea about poylmerases. topoisomerase, single strand binding protein, replication forks (both unidirectional and bidirectional), leading and lagging strands, RNA primers and Okazaki fragments; elementary idea about DNA repairs.
   ii. RNA structure and type (mRNA, rRNA and tRNA) and transcription (brief idea about polymerase, exon and introns)
3- Genetic code and translation; triplet code, characteristics of triplet code; protein synthesis (translation)
4- Cell in Reproduction:
   i. Interphase nucleus and cell cycle ; S, G-1. G-2 and M- phase.
   ii. Mitosis: Phases and process of mitosis, structure and function of spindle apparatus; an aphasic movement.
   iii. Meiosis: Phases and process of meiosis, synapses and synaptonemal complex, formation and fate of chiasmata and significance of the crossing over.

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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 of chromosomal mutations, translocation. inversion. deletion. and dupication. Variations in chromosome numbers; haploidy. diploidy; polyploidy, aneuploidy, euploidy and polysomy.
3. linkage and crossing over, elementary ida of chromosome mapping.
4. Genetic interactiion: Supplementary genes, comoplementary genes dupicate genes, epistasis. inhibitory and polymorphic genes multiple gene inheritance; ABO blood groups and Rh factor and their significance.
5. Cytoplasmic inderitance.

Paper 3

Gamete & Developmental Biology

1.To understand & master basic concept developmental biology.

2.Understand basic concept of growth regeneration & aging.

3.Explain the historical background of developmental biology.

4.Explain the significance of gametogenesis & fertilization.

5.Describe the stpesin the cleavage formation,blastulation , gastrulation.

PAPER-III: Z -103
GAMETE AND EVELOPMENTAL BIOLOGY

Note: 1- There will be two parts of every theory quesrion paper with total duration of 3 hours. First part of question paper will comprise question No.1 containing 10 very short answer (maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed coveringg entire syllabus.

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

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

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Section-A

Development Biology-Scope and Early Events

1. Historical review and types and scope of embryology
2. Gametogenesis:
    i. Formation of egg and sperm.
    ii. Vitellogenesis
3. Fetilization: Activation of ovum, essence of activation: changes in the o organization of the egg cytoplasm.
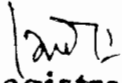4. Parthenogensis

Section-B
Development Biology-pattern and Processed

1. Cleavage: definition, planes and patterns among non-chordates and chordates, significance of cleavage, blastulation and morulation.
2. Fate mps, morphogenetic cell movements, significance of gastrulation.
3. Embryonic induction; primary organizer, differentiation and competence;
4. Development of chick up to 96 hours stage.
5. Embryonic adaptations:
    i. Extra-embryonic membranes in chick, their development and functions.
    ii. Placentation in Mammals: Definition, types classification on the basis of morphology and histology; functions of placenta.

Section-C
Dimensions in developmental Biology

1. Regeneration
2. Various types of stem cell and their applications
3. Cloning of animals:
    i. Nuclear transfer technique.
    ii. Embryo transfer technique.
4. Teratology- (elementary idea)
5. Biology of aging (brief accomed)

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B.Sc. – B.Ed 05, 06, 07
Practical Zoology

Min. Marks : 18　　　　4hrs/week　　　　**Max. Marks:50**

I. Microscopic Techniqes:
1. Organization and working of Optical Microscope: Dissecting and compound microscopes.
2. General methods of microscopic slide preparation; narcotization: fixing and preservation; washing staining; distaining, dehydration; clearing and mounting; general idea of composition, preparation and use of:
   a. Fixatives: Formaline. Bouni's fluid.
   b. Stains: borax carmine Aceto-carmine Aceto-orcein, haematoxyline-eosin.
   c. Common reagents: Normal saline, Ringer's solution, Acid water, Acid alcohol, and Mayer's albumin.
3- Collection and Culture Methods:
   i. Collection of animals from their natural habitat during field trips such as Amoeba Paramecium, Euglena, Plan aria, Daphnia, Cyclops, etc.
   ii. Culture of Paramecium in the laboratory and study of its structure life-processes and behavior in live state.

II. Study of microscopic Slides and Museum Specimens:

Protozoa: Euglena, trypanosoma, Giardia, Entamoeba, Elphidium (Polystomella), Foraminiferous shells. Monocystis, Plasmodium. Paramecium, Paramecium showing binary fission and conjugation. Opalina. Nyctoherus. Balantidium Vorticella.

Pofifera: Leucosolenia, Euplectella, Spongilla, T.S. Sycon, Spicules, Spongin fibers, Gemmules.
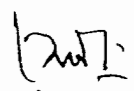
Coelenterata: Millepora, Physalia, Velella, Aurelia, Alcyonium, Gorgonia Pennatula, Sea anemone, Stone corals, Obelia colony and medusa.

Ctenophora : Any ctenophore.

III. Anatomy:

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

Cockroach: External features appendages (wing and leg), mouth parts, alimentary canal reproductive and nervous system.

IV.Study of the Following Through Permanent Slide Preparation: Paramecium, Euglena, Foraminiferous shells, Sponge spicules, Spongin fibres, Gemmule, Hydra, Obelia colony Medusa: parapodium of Nereis and Heteronereis.

V. 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 of cockroach testes.
3. Study of giant chromosomes in salivary glands of Chironomous or Drosophila larva.
4. study of cell permeability using mammalian RBC.

VI. Exercises in Genetics:

A- Study of Drosophila:

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

B- Idenitfication of blood groups (A,B,O & Rh factor).

VII. Developmental Biology:

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

2. **Study of development of chick with the help of whole mounts**

   i. 18 hrs. 21hrs 24hrs, 33hrs, 48hrs, 72hrs, and 96hrs of incubation.
   ii. Primitive streak stage in living embryo, if possible, after removal of the blastoderm from the egg.
   iii. Study of the embruyo at various stages of incubation in vivo by making a window in the egg-shell may also be demonstrated.
   iv. Study of various foetal membranes in a 10-12 day old chick embryo.

Scheme of Practical Examination and Distribution of Marks

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

		Regular	Ex/N.C. Students
1.	Anatomy (any system)	5	7
2.	Permanent Preparation	5	7
3.	Cell Biology and Genetics	5÷5	5÷5
4.	Developmental Biology	4	4
5.	Idenification and comments on Spots (1to8)	16	16
6.	Viva Voce	5	5
7.	Class Record	5	-
		50	50

Note:

1. With reference to anatomy, study of museum specimens and developmental biology, candidates must be well versed in the study of various systems with the help of charts/models/CD-ROMs, multimedia computer based simulations including computer assisted learning (CAL), and other software's.
2. With reference to permanent preparations and microsopic slides, in case of non-availability, the exercise should be substituted with diagrams/photographs/models/charts etc.
3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.

Sessional work Zoology

1. Article on zoogeographical regions of the world.
2. Project work on Biodiversity conservation & threat.
3. Life History of Indian zoologist.

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1. PHYSICS

SCHEME

PAPER I   EXAM. 3 Hours duration   Min. pass marks 12   Max. marks. 33

PAPER II   EXAM. 3 Hours duration   Min. pass marks 12   Max. marks. 33

PAPER III   EXAM. 3 Hours duration   Min. pass marks 12   Max. marks 34

Practical Exam.   4 Hours Duration   Min. pass marks 18   Max. marks. 50

PAPER- 1 (Mechanics)

Work load: Two hours lecture per week

Examination Duration: Three hours

Scheme of Examination: First question will be of nine marks comprising of six parts of short

Answers type with answer not exceeding half a page. Remaining four questions will be set with

One form each of the unit and will be of six marks each. Second to fifth question will have two

Parts namely (A) and (B) each carrying 3 marks. Parts (A) of second to fifth question shall be

Compulsory and part (B) of these questions will be have internal choice.

UNIT- I

Physical Law and Frame of Reference

(a) Internal and non-internal frames, transformation of displacement. velocity, acceleration between differ frames of reference involving translation Galilean transformation and invariance
Of Newton's laws.

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(b) 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.

(c) CORIOLIS FORCE: Transformation of displacement, velocity and acceleration between rotating frame, pseudo forces, coriolis, motion relative to earth, focult's pendulum.

Unit – II
Center of Mass

Introduction about center Mass, Center of Mass Frame: Collision of two particles in one and two dimension (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, Internal coefficient, case of J not parallel to $\square$, Kinetic energy of rotation and idea of principal axes, Processional motion of a spinning top.

Conservative Forces

Introduction about conservative and non- conservative forces, Rectilinear motion under conservative Forces, Discussion of Potential energy curve and motion of particle.
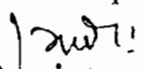
Unit III

Motion under Central Forces

Iroduction about central forces, Motion under central forces, Gravitational interaction, Inertia and

Gravitational mass, General solution under gravitational interaction, Keplers Laws, Discussion of Trajectories , Cases of elliptical and circular orbits, Rutherford scattering.

Damped Harmonic Oscillations

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

Unit-4

Driven Harmonic Oscillations

Driven harmonic oscillator with damping, Frequency response, phase relation, Quality factor. Response, Series and parallel of LCR circuit, Electromechanical system-Ballistic Galvanometer.Coupled Oscillations

Equation of motion of two coupled simple harmonic oscillators, Normal modes, motion in mixed modes, Transient bahaviour, Dynamics of a number of oscillators wih neighbor interactions.

Reference Books:

1.Mechanics : Berkeley Physics Course Vol-1, 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.Analytical Mechanics L.N. Hand, J.D. Finch.(Cambridge University Press).

Paper-II (Electromagnetism)

Work Load : Two hours lecture per week

Examination Duration : Three hours

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

Unit-1

Scalar and Vector fields

Concept of Field , scalar and vector Fields , Gradient of scalar field , physical siginificance and formalism of Gradient . Divergence and curl of a vector field in Cartesian co-ordinates system. problems based on Gradient . Diveregence and curl operators.

Concept of solid angle .Gauss divergence and Stoke's theorem ,

Gauss law from inverse square law, Differential form of Gauss law.

Unit II

Field of stationary and moving charges

Potential energy of system of (1) discrete N-charges(2) continuous charge distribution . energy required to build a uniformly charged sphere, classical radius of electron , electric field due to a short electric dipole, interaction of electric dipole with external uniform and non uniform electric field, potential due to a uniformly charged spherical shell.

Poisson's and laplace equation in Cartesian co-ordinates and their application t solve the problems of electrostatics .

Invariance of charge , Gaussian and SI units and their inter conversations, electric field measured in moving frames , electric field of a point charge moving with constant velocity.

Unit 3

Electric field in matter

Multipole expansion definition of moments of charge distribution , dielectrics, induced dipole moments , polar molecules , free and bound charge, polarization , atomic polarizabilty , electric displacement vector, electric susceptibility, dielectric constant, relation between them.

Electric potential and electric field due to a uniformly polarized sphere (1) outside the sphere (2) at the surface of the sphere (3) inside the sphere , electric field due to a dielectric sphere placed in a uniform electric field (a) outside the sphere (b) inside the sphere , electrics field due to a charge placed in dielectric medium and gauss law, clausius-mossotti relation in dielectrics .

Unit 4

Megnetostatics and magnetic field in matter

Lorentz force. properties of magnetic field , ampere's law. field due to a current carrying solid conducting cylinder (a) outside (b) inside the cylinder . ampere's law in differential form . introduction of magnetic vector potential . poisson's eqation for

vector potential. Deduction of bio-savart law using magnetic vector potentials, differential form of Ampere 's law.

Atomic magnet, Gyromagnetic ratio , bohr-magneton , Larmor frequency , induced magnetic moment and dia-magnetism spin magnetic moment para and ferro magnetism In tensity of Magnetization Magnetic permeability and Susceptivility free and bound current dencities ,magnetic field due to a uniformly magnetized material and non-uniformly magnetized material.

Reference books

1. Electricity & magnetism; A.S. mahajan& Abbas A.rangwala,Tata Mc Graw – hill
2. Introduction to electrodynamics ; david J. Griffith. Prentice hall

3 Berkley physics course , vol.II

4. Fundamental university physics vol.II: Fields and waves ; M.Alonso and E.J.Finn; Addison-wesley publishing company.

Paper III OPTIC

Work Load: Two hours lecture per week

Examination duration: Three hours

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

Unit -1

Interference:

Concept of Spatial and Temporal Coherence length, coherence time, Definition and propagation of a wave front. Huygen's principle of secondary wavelets. Young's double slit experiment. Types of interference, interference by division of wave fronts: Fresnel's Biprism, measurement of λ and thickness of a thin transparent sheet, Interference by division of amplitude: Interference in thin films of constant thickness in transmitted and reflected waves. Interference produced by a wedge shaped film.

Newton's rings, determination of wavelength λ and refractive index μ by Newton's rings: fringes of equal inclination (haidinger fringes) and equal thickness (frzeau fringes), Michelson's interferometer, shape of fringes. Measurement of wavelength, difference between two spectral lines and thickness of a thin transparent sheet.

Unit-2

Diffraction:

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

Unit-3

Polarization:

Polarization, plane, circular and elliptically polarized light, polarization by reflection, double refraction and Huygen's explanation of double refraction, production and detection of plane, circular and elliptically polarized light, quarter wave and half wave plates, optical activity, specific rotation, and half shade polrimeters and their comparison.

i. Laser: spontaneous and stimulated emission Einstein's A&B coefficients, energy density of radiation as a result f stimulated emission and absorption, population inversion. methods of optical pumping, energy level schemes. He-Ne, ruby, CO_2, lasers.

ii. Holography: basic concept of holography, principal, theory, construction and reconstruction of image. Application of holography

Unit-4

wave motion:

1D and 3D wave equation, transverse waves in a stretched string, elastic waves in solids, pressure waves in a gas column, spherical waves. Fourier's Theorem and its application to square and saw Tooth waves. Phase and group velocities, Dispersion

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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 Brij lal & Subramanium, S.chand.
2. Optics by D.P. Khandelwal.
3. Principals of optics by B. K. Mathur.
4. Introduction to modern optics by A.K. Ghatak.
5. Essentials of lasers by Allen.
6. An introduction to modern optics by G.R. Fowels.

Practical

Work load: four hours laboratory work per week
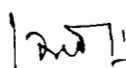
Examination duration: four hours

Minimum experiments: total sixteen taking eight from each section.

The colleges are free to set new experiments of equivalent standard. This should be intimated and approved by the Convener, Board of studies before the start of academic session. It is binding on the college to have experimental set up of at least sixteen experiments listed below (8 from each section).

In case number of experiments performed by the students is less than sixteen, his marks shall be scaled down in final examination on pro rate basis. For example, if he has performed fourteen experiments the marks shall be multiplied by fourteen and divided by sixteen. The number of experiments performed shall be verified from Practical record. Laboratory examination paper will be set by the external examiner by making pairs of experiments taking one from each section out of sixteen or more experiments available at the center. Different combinations shall be given for different batch.

Section A

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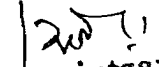
2. To study the variation of charge and current in a RC circuit with a different time constant (using a DC source).
3. To study the behavior of a RC circuit with varying resistance and capacitance using AC mains as a power source and also to determine the impedance and phase relations.
4. To study the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

8- to determine the specific resistance of a material and determine difference between two small resistance using Carey Fosters Bridge.

9- to convert a galvanometer into a ammter of a given range.

10-to convert a galvanometer in to a voltmeter of given range.

SECTION – B

1. To study the random decay and determine the decay constant using the statistical board.
2. Using compound pendulum study the variation of time period with amplitude in large angle oscillations.
3. To study the damping using compound pendulum.
4. To study the excitation of normal modes and measure frequency splitting using two coupled oscillators.
5. To study the frequency of energy transfer as a function of coupling strength using couplled oscillators.
6. To study the viscous fluid damping of a compound pendulum and determining damping coefficient and Q of the oscillator.
7. To study the electromagnetic damping of a compound pendulum and to find the variation of damping coefficients with the assistance of a conducting lamina.
8. To find J by Callander and Barne's Method.
9. To determine Youngs modulas by bending of beam.
10. To determine Y .σ and η by Searle's method.
11. To ensure Curie temperature of Monel alloy.

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12. To determine modulus of rigidity of a wire using Maxwell's needle.
13. Study of normal modes of a coupled pendulum system. Study of oscillations in mixed modes and find the period of energy exchange between the two oscillators.
14. To study variation of surface tension with temperature using Jaegger's method.
15. To study the specific – rotation of sugar solution by polarimeter.

B.Sc. – B.Ed. 05, 06, 07
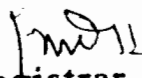
MAHEMATICS

Teaching: 3 Hours per week per theory paper.

2 Hours per week per batch for practical

(20 candidates in each batch)

Examination:

	Min. pass marks		Max. marks
Scheme:	Science - 54		150
	Arts - 72		200

		Duration	Max.marks
paper- I	Discrete mathematics	3 hours	50 (Science)
			66 (Arts)
Paper- II	Calculus	3 hours	50 (Science)
			66 (Arts)
Paper- III	Three Dimensional Geometry and Optimization Theory	Theory: 2.5 hours	32 (Science)
			66 (arts)

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Papers I and II are divided into FIVE units. Two questions will be set from each unit. Candidates are required to attempt FIVE questions in all taking ONE question from each unit. All questions carry equal marks.

Paper III is divided into FOUR units .TWO question will be set from each unit. Candidates are required to attempt Four question in all taking ONE question from each unit. All question carry equal marks.

Common paper will be set for both the faculties of social science and science. However the marks obtained by the candidates in the case of faculty of social science will be converted according to the ratio of the maximum marks of the papers in the two faculties.

Each candidate is required to appear in the practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the principal in consultation with Local Head /Head, department of mathematics in the college.

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

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

Paper I: Discrete Mathematics

Teaching: 3Hours per Week

Duration of Examination: 3 Hours   Max. Marks:50 (Science)

                                                              66 (Arts)

Note :- This paper divided in to five units. TWO questions will be set from each unit. Candidates are required to attempt FIVE questions in all taking ONE question from each unit. All question carry equal marks.

Unit 1 : Sets and proposition- Cardinality, Principle of inclusion and exclusion, Mathematical induction.

Relations and Functions- Binary relations, Equivalence relations and Partitions, Partial ordered relation and lattices, Chains and Antichains, Pigeon Hole principle.

Unit 2 : Algebraic structures- Group, Rings, Integral domains, Fields (Definitions. simple examples and elementary properties only)

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Boolean Algebras- Lattices and Algebraic structure, Duality, Distributive and complemented Lattices, Boolean functions and expressions.

Unit 3 : Logic and Propositional Calculus, Propositions, Simple and Compound, Basic Logical operations. Truth Tables, Tautologies and contradictions, Propositional Functions, Quantifiers.

Discrete numeric functions and Generating functions. Recurrence relations and Recursive Algorithm – Linear recurrence relations with constant coefficients. Homogeneous solution. Particular solution. Total solution. Solution by the method of generating functions.

Unit 4 : Graphs- Basic terminology, Multigraphs, Weighted graphs, Paths circuits, Shortest Paths, Eulerian paths Circuits. Travelling salesman problem, Union, Join, Product and composition of graphs. Planar graphs and Geometric dual graphs.

Unit 5 : Trees- Properties, Spanning tree, Binary and Rooted tree.

Digraphs- Simple Digraphs, Asymmetric Digraphs, Symmetric Digraph and Complete Digraphs. Digraph and Binary relations. Matrix representation of graphs and digraphs.

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Paper- II CALCULUS

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Teaching: 3 Hours per Week

Duration of Examination: 3 Hours   **Max. Marks: 50 (Science)**

                                                            66 (Arts)

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

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

Unit 2: Derivative of the length of an arc. Pedal equations. Curvature – Various formulae, centre of curvature and chord of curvature. Partial differentiation . Euler's

theorem for homogeneous functions. Chain rule of partial differentiation. Total differentiation of implicit functions.

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

Unit 4: Rectification, Areas, volumes and surfaces of solids of revolution.

Unit 5: Double integrals in Cartesian and polar coordinates, change of order of integration. Triple integrals. Application of double and triple integrals in finding areas and volumes. Dirichlet's integral.

Paper-III: Three-Dimensional Geometry and Optimization Theory

Teaching : 3 Hours per Week

Duration of Examination : 2.5 Hours　　　　　　**Max. Marks: 32(Science)**
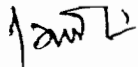
44(Arts)

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

Unit 1: Sphere, Cone.

Unit 2: Cylinder, Central Conicoids- Ellipsoid, Hyperboloid of one and two sheets, tangent lines and tangent planes, Direct sphere, Normals.

Unit 3: Generating lines of hyperboloid of one sheet system of generating lines and its properties. Reduction of a general equation of second degree in three- dimensions to standard forms.

Unit 4: The linear programming problem. Basic solutions. Some basic properties and theorems on convex sets. Fundamental theorem of L.P.P. Theory of simplex method only Duality. Fundamental theorem of duality, properties and elementary theorems on duality only.

Practical :

Teaching: 2Hours per Week per Batch

(20 Candidates in each Batch)

Examination: Duration: 2 Hours

Scheme	Science	Arts
Max.Marks	18	24
Min. Pass Marks	06	08

Distribution of Marks:

Two Practicals one from each group

6Marks each = 12Marks (08 Marks each)	16	
Practical Record=03 Marks	04	
Viva-voce =03 Marks	04	
Total Marks = 18 Marks	24	

Group A: Modelling of industrial and engineering problems in to mathematical   LPP and its dual and their solution by Simplex Method.

Group B: Modelling of industrial and engineering problems into

(1) Assignment Problems and (!!) Balanced and unbalanced Transportation Problems and their solution

Note:

1. Problems will be solved by using Scientific Calculators (non -Programmable)
2. Candidate must know about all functions and operations of Scientific Calculator.
3. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
4. Each Candidate has to pass in practical and Theory examinations separately.