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-
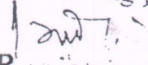
Objectives:

- 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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JAIPUR

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अकादमिक-प्रथम

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 :

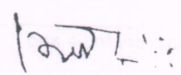| Year	Paper
Its Year	Gen. English
II Year	Gen. Hindi
III Year	Computer Application (ICT)
IV Year	Environmental Education

*ELIGIBILITY CRITERIAN ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.
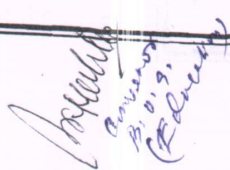
Group – A :- Subject Speciliasation :

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

	03	Education				
IV	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

		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. 12 Paper in IIIrd Year and 7 Paper in IVth Year (Total 43 Papers).

❖ 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	12 Paper +Practical	600 +150= 750
II Year	12 Paper +Practical	600 +150+100= 850
III Year	12 Paper +Practical + Practicum +Final Lesson	600 +150+ 100 +100= 950
IV Year	7 Paper +Practical + Practicum +Final Lesson	600+ 100 +100= 800
Total	43 Papers	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.

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University of Rajasthan
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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.

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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.

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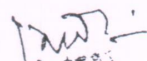
Part II- Practice Teaching - Micro Teaching, Internship, Practice Teaching of 20 weeks (10 at B.Sc.-B.Ed Year III & 10 at B.Sc.-B.Ed Year IV) Block Teaching and Criticism and Final Lesson in III & IV Year per teaching subject.

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.

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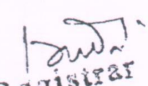(Academic)
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JAIPUR

16

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.

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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13

B.Sc - B.ED. 01

GENERAL ENGLISH

Duration: 3Hrs

Max. Marks: 100

External – 80

Internal – 20

The syllabus aims at achieving the following objectives:

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

The pattern of the question paper will be as follows:
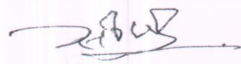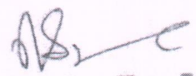
SECTION A: Phonetics and Translation   **(20 marks)**

(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 Word form Hindi to English	(05)

प्रभारी अधिकारी

अकादमिक–प्रघम

SECTION B: Grammar and Usage   19 (Marks)

(10 periods)

I.   Transformation of Sentences   (05)

      a. Direct and Indirect Narration

      b. Active and Passive Voice

      c. Articles (a, an, the)

II.   Modals   (05)

III. Sequence of Tenses   (05)

IV.   Prepositions   (04)

SECTION C: Comprehension   (23 Marks)

(25 periods)

Following essays and Stories in *Essential Language Skills* revised edition compiled by
Macmillan for 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 at Deoli
M.K. Gandhi	The Birth of Khadi
J.L. Nehru	A Tryst with Destiny
A. P. J. Abdul Kalam	Vision for 2020

प्रभारी अधिकारी
शैक्षिक-प्रथम

Five questions to be answered out of eight questions. Two marks each based on 6 units of the prescribed texts $\qquad$ 5x2 = 10

Five questions of 2 Marks each to be answered from the given passage: 5x2 = 10 marks

One vocabulary question from the given passage (at least 3 words):

(Synonyms/Antonyms/Word Formation (Prefix & Suffix) 3 Marks
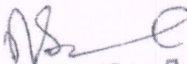
SECTION D: Compositional Skills (18 Marks)

(15 periods)

I.	Letters-Formal and Informal	( ) 6
II.	CVs and Job Applications	( ) 6
III.	Paragraph Writing	( ) 6

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. Gunashekar ed. *A Foundation English Course for Undergraduates*. Book I, CIEFL, Hyderabad.

7. Quirk and Greenbaum: *A University Grammar of English* Longman, 1973.

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अकादमिक–प्रथम

B.A. – B.ED.– 02

CHILDHOOD AND GROWING UP

Marks-100
External-80
Internal -20

Objectives:

After completing the course the student will be able:-

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

Course Content

Unit I : Role of Psychology to understand the child

- Psychology: Meaning, nature and branches of Psychology.
- Methods of Psychology: Case study and experimental.
- Educational Psychology: Meanings, 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 and Vgotsky cognitive development.
  b) Freud's psycho –sexual development.
  c) Erikson's psycho –social development.
  d) Linguistic development.
  e) Kohlbery's and Gilligan's moral development.
  f) Bandura's social development.
  g) Gessel's maturation theory.

प्रभारी अधिकारी
अकादमिक -प्रथम

Unit III: Child Growing up

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

Unit IV: Learning to Learn.

- Concept and beliefs about Learning : Defining Misconception , Brain's role in learning .
- Memory and forgetting Behaviouristic learning theories (Thorndike, Skinner ,Pavlov), Gestalt's 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 V: Psychological Attributes of an Individual.

- Intelligence -Meaning , Types of intelligence –Social ,Emotional and spiritual Intelligence ,Theory of Intelligence, Grander '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 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. Agarwal, 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). Advanaced Educational psychology, New Delhi: Vikas Publishing House.
7. DianeE. 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, publishing by Pearson Education Pre.Ltd.Indian Branch Delhi, India
9. Jack Snooman Robert Biehler Ninth Edition. Psychology Applied To Teaching ,Hughton Miflin Company ,Bosten New York (http:// www.coursewise.com)
10. Ormord 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 Droling Kindersley (India) pvt.Ltd. Licenensees of Pearson Education in South Asia.

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B.A. – B.ED. – 03

CONTEMPORARY INDIA AND EDUCATION

Marks-100
External-80
Internal -20

Objectives:

After completing the course the student will be able:-

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 and 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- Education aims as derived from the constitution of India influence of aims of education on the curriculum and transactional strategies.

Unit II:Philosophy and Thinkers

- Implication and Contribution of Philosophies, Philosophy Idealism, Naturalism , Pragmatism , Jainism, Geeta and Buddhism.
- Idea of India & Western Educational Thinkers Such as Gandhi , Tagore, Aurbindo, Dayanand Saraswati, Swami Vivekanand, J.Krishnamurthy, Dewey, Frieze, Illich,Plato, Aristotle, Rousseau, Anton Makarenko.

Unit III: Issues and Challenges

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

Unit IV: 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.
- Educational and politics, Constitutional vision related to aims of education, peace education, role of educational, School and Teachers as agents for imparting Culture, Education and Development. Education and industrialization.

Unit V: 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.
- Ramamurthy Committee (1990) ,Yashpal Committee Report (1993) Revised National Education Policy –(1982)NCF -2005 ,NKC -2006 , NCFTE 2009 , RTE -2010.
- SSA , MLL ,RMSA , CCE Navodya Vidyalya ,Kasturba Gandhi Balika Vidyalya. Model School.

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 report or recommendations of any Commission and Committee.
   - Organize collage, Poster Making activity in your respective institution.
   - Collection of at leasts three handouts of related topics of the subject.

भारती अधिकारी
अकादमिक शाखा

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3. Altekar , A. S. (1992) Education In Ancinent India, Varanasi: Manohar Prakashan
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6. Education And National Development: Report Of The Kothai Commission On Education, New Delhi,1966.
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10. J.F. Brown: Educational Sociology.
11. Kabir, H.(1982) Education In New Delhi India, London :Gorge Allen an Unwin.
12. Kashyap subhash C., Our Constitution: an introduction to India'Constitution laws, National Book Trust india, 2011
13. Keay,F.E: Indian Education In Ancient and Later Times.
14. M.N. Srinicvas: Social Change In Modern India.
15. Mookerji, R.K. (1974) 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) The Humanist Tradition On Indian Education Thought, New Delhi: Aria Publishing House.
23. Saiyidain, K.G. (1966) The Humanist Tradition in Indian Educational Thoughts, 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. सावत, 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

External – 80
Internal – 20

Objectives:

This course will enable the student teacher to:

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

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(Academic)
University of Rajasthan
JAIPUR

27

B.Sc.-B.Ed.

- 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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JAIPUR

28

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
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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, Mc Graw Hill Book Company, New York.
8. Khan, Mohd. Arif. (1995): School Evaluation, Ashish Publishing House, New Delhi.
9. Noll, V .C (1957). Introduction to Educational Measurement, Houghton Miffline Company. Boston.
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B.Sc. – B.Ed. 05, 06, 07.

B.Sc. Pt-I (2017-18)

CHEMISTRY

Scheme:
Max Marks: 150

	Duration (hrs.)	Max. Marks	Min. Pass Marks		Max. Marks	Min. Pass Marks
Paper I	3	33	12			
Paper-II	3	33	12			
Paper-III	3	34	12			
Practical	5	25	09	Internal –	25	09

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

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

Unit-I

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

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

Weak Interactions: Hydrogen bonding, vander Waals forces.

Unit-II

Covalent Bond: Valence bond theory and its limitations, directional and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+ SF_4, CIF_3, ICl_2, H_2O.

Molecular Orbital Theory: homonuclear and heteronuclear (CO and NO) diatomic molecules. Multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.
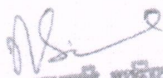
Unit-III

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

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

UNIT-IV

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

प्रभारी अधिकारी
अकादमिक-प्रथम

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

Unit- V

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

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

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

Unit-I

Mechanism of Organic Reactions: Homolytic and heterolytic bond cleavage. Types of reagents, electrophiles and nucleophiles. Reactive intermediates - carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Types of organic reactions. 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, stereogenic centre, optical activity. Properties of enantiomers, chiral and achiral molecules with two stereogenic centres. Diastereomers, threo and erythro isomers, meso compounds. Resolution of enantiomers. Inversion, retention and racemization (with examples).

Relative and absolute configuration, sequence rules, D / L and R / S systems of nomenclature.
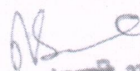
Geometric Isomerism: Determination of configuration of geometric isomers - cis / trans and E / Z systems of nomenclature. Geometric isomerism in oximes and alicyclic compounds.

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

Unit-III

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

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

प्रभारी अधिकारी
अकादमिक-प्रथम

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

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

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

Unit-IV

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

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

Unit-V

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

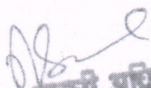**Polyhalogen compounds:** Chloroform, carbon tetrachloride.

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

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

UNIT-I

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

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

प्रभारी अधिकारी
अकादमिक-प्रथम

UNIT- II

Gaseous States: Postulates of kinetic theory of gases, deviation from 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 state.

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

UNIT- III

Solid State: Definition of space lattice, unit cell.

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

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

UNIT IV

Colloidal State: Definition of colloids, classification of colloids.

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

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

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

UNIT V

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

Radioactive decay as a first order phenomenon.

Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, polarimetry and spectrophotometry. Theories of chemical kinetics. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

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

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

INORGANIC

EX.1 (i) Preparation of standard solution.

Dilution 0. 1M to 0.001M solution.

(ii) Volumetric Analysis

(a) Determination of acetic acid in commercial vinegar using naoh.

(b) Estimation of Hardness of water by EDTA

(c) Extimation of copper using thiosulphate (Iodometric)

(i) Complexometric Titrations (EDTA) : Extimation of Ca^{+2} and Mg^{+2}

ORGANIC CHEMISTRY

Laboratory Techniques

(a) Determination of melting point (naphthalene, benzoic acid, urea, etc.) boiling point (methanol, ethanol cyclohexane, etc.); mixed melting point (urea - cinnamon acid, etc.).

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

Qualitative Analysis

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

PHYSICAL CHEMISTRY

(one of the following experiments should be given in the examination)

(i) Chemical Kinetics:

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

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

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

(d) To study kinetically the reaction rate of decomposition of iodide by H_2O_2.
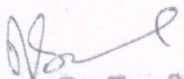
(ii) Viscosity , Surface Tension:

(a) To determine the viscosity/surface tension of a pure liquid (alcohol etc.) at room temperature. (using the Ostwald viscometer/Stalagemometer).

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

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

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

प्रभारी अधिकारी
रत्नादिमिक-प्रथम

CH - 104: Chemistry Practical

Max. Marks : 25   **Duration of Exam: 5 hrs.**   **Minimum Pass Marks :** 09

Inorganic Chemistry

Ex.1 (i) Preparation of standard solution $2\frac{1}{2}$

    (ii) Volumetric Analysis   5

Organic Chemistry

Ex. 2 Laboratory Techniques $1\frac{1}{2}$

Ex. 3 Qualitative Analysis

    Detection of element and detection of functional group   5

Physical Chemistry

Ex. 4 Perform one of the experiments mentioned in the syllabus.   6

Ex. 5 Viva - Voce $2\frac{1}{2}$

Ex. 6 Record $2\frac{1}{2}$

Total   25

    Internal   —   25

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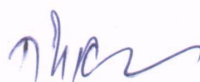अकादमिक-प्रथम

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

Botany

Scheme

Min. Pass Marks : 54

Max. Marks : 150

Paper – I	3 hrs. duration	Max. Marks : 33
Paper – II	3 hrs. duration	Max. Marks : 33
Paper – III	3 hrs. duration	Max. Marks : 34
Practical Min Marks : 09	4 hrs. duration	Max. Marks : 25
Internal		Max. Marks : 25

Note.

1- There will be 05 questions in each paper. All Questions are compulsory. Candidate has to answer all questions in the main answer book only.

2- Q No. 01 (objective/short answer type) will have 18 (paper – I & II) and 20 (paper - III) questions 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. 02 to 05 will have internal choice, having 06 marks each.

प्रभारी अधिकारी
अकादमिक-प्रथम

RAJ RISHI BHARTRIHARI MATSYA UNIVERSITY, ALWAR

Syllabus-Botany

B.Sc.- Part-I

Cell Biology Genetics and Plant Breeding

(2 hrs or Three Periods/week)

Duration: 03 Hours   Max. Marks: 33

Unit- 1

Cell biology : Introduction to modern tools and techniques of cell biology (light microscopy and electron microscopy), structure and functions of different cell organelles of eukaryotic and prokaryotic cells (cell wall, plasma membrane, nucleus, mitochondria, chloroplast, ribosome, peroxisome, lysosome, golgibody etc.)

Study of chromosome, nucleosome model. Model. Type of chromosomes (sex chromosome, polytene, lampbrush), chromosomal aberrations, deletion, duplication, translocation, inversion aneuploidy and polyuploidy.

Unit- 2

Techniques in cell Biology cell signalling and cell receptors. Nucleic acid: DNA, RNA structures and their functions, DNA replication (Involved enzymes, Primer, okazaki fragments), Basic mechanism of transcription and translation. Extranuclear genome (mitochondrial, plastid DNA), plasmids, Transposons.

Cell division : cell cycles, mitosis and meiosis: function of spindal apparatus, synaptonimal complex, chiasmata and crossing over.

Unit- 3

Genetic inheritance Mendals law of inheritance and their exceptions: allelic (Complete dominance, co-dominance, incomplete dominance), nonalleleic interactions (complementary genes, epistasis and duplicate genes), linkage and crossing over. Elementary idea of chromosome mapping. Cytoplasmic inheritance-shell coiling in snails, kappa particles in paramecium, multiple allelism: ABO blood groups in man.

Unit-4

Plant breeding: introduction, objectives and general methods (introduction, acclimatization, selection, hybridization) of plant breeding. Hybrid vigour and inbreeding depression. Mutation and polyploidy in plant breeding. National and international agricultural research institutes. Methods of Breeding in self pollinated and cross pollinated crop plants, Green revolution.

Suggested laboratory exercises:-

1. Demonstration of centrifuge machine, electrophoresis, simple microscope and compound microscope, laminar air flow.
2. Study of electron microphotographs of virus, bacteria and eukaryotic cells for comparative cellular organization.
3. Study of electron micrograph of eukaryotic cells for various cell organelle.
4. Study of cell structure from onion, hydrilla and spirogyra.
5. Study of cyclosis in stamina hairs of tradescantia spp.
6. Study of plastids for pigment distribution in lycopersicon and cassia and capsicum
7. Study of different stages of mitosis and meiosis in root tip cells and flower buds respectively of onion.
8. Permanent slides/ photographs of different stages of mitosis and meiosis, sex chromosomes, polytene chromosomes and salivary gland chromosome, bar bodies.
9. To solve genetic problems based upon mendel's law of inheritance (monohybrid, dihybrid, back cross, test cross and all variations)
10. Hybridisation, emasculation, Bagging, tagging.
11. Methods of vegetative propagation, budding grafting, layering.
12. Model Prepration, field visits.

Suggested Readings:-

1. Alberts; B., Bray, D.J.,Raff, M., Roberts, K. and Wasson, L.D. Molecular Biology of cell, Garland Publishing Co., Inc., New York(2001).

प्रभारी अधिकारी
अकादमिक-प्रथम

2. Choudhary, H.K. : Elementary Principles of plant Breeding. Oxford and IBM Publishing Co., New Delhi, 1989.
3. Gupta, P,K, : Cytology, Genetics, Evolution and Plant Breeding, Rastogi Publishing, Meerut(2009).
4. Miglani , G. S. : Advanced Genetics, Narosa Publishing House, New Delhi(2000).
5. Russel, P.J. Genetics. The Benjamins/Cummins Publishing Co., Inc. U.S.A. (1998).
6. Shukla, R. S. and Chandel, P.S. : Cytogenetics, Evolution and Plant Breeding, S. Chand & Co. Ltd., New Delhi (2000).
7. Singh, R. B. : Text Book of Plant Breeding, Kalyani Publishers, Ludhiana (1999).

Paper II

Microbiology, Mycology and Plant Pathology

(Teaching hours-15 hours for each unit) (2hrs/week)

Unit-1

Microbiology: Meaning and Scope, history and development in the field of microbiology.

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

Mycoplasma: occurrence, morphology, reproduction and importance.

Unit-2

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

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प्रभारी अधिकारी
सेल-प्रथम

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

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

Unit-3

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

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

Unit-4

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

Puccinia and rusts of wheat (Black, orange, yellow); *Ustilago* and loose smut of wheat and covered smut of barley; *Agaricus*; *Alternaria* and early blight of potato.

Suggested Laboratory Exercises:

1. Study of bacteria using curd or any other suitable material, Gram's staining of bacteria.
2. Study of *Oscillatoria* and *Nostoc*
3. Study of Mycoplasma, TMV, Poxvirus, bacteriophage (photographs/ 3-D models)
4. Study of symptoms of plant diseases—Downy mildew of Bajra, Green ear of bajra, Powdery mildew, mosaic of bhindi.
5. 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; *Agaricus*; *Peziza* and *Alternaria*- early blight of potato.
6. Media preparation: potato dextrose agar, Nutrient agar

प्रभारी अधिकारी
अकादमिक–प्रथम

7. Culture techniques of fungi and bacteria.

Suggested Books:

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

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

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

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

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

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

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

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

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

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

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

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

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

James Cappuccino and Natalie Sherman: Microbiology: A Laboratory Manual (10th Ed.), Benjamin Cummings 2013.

प्रभारी अधिकारी

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

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

Paper III
Algae, Lichens and Bryophyta
(2 hrs/week).
(Teaching Hours — 15 hours for each Unit)

Unit-1

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

Unit-2

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

Unit-3

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

Type Studies

Hepaticopida—*Riccia, Marchantia*

प्रमारी अधिकारी
अकादमिक-प्रथम

Unit-4

Type Studies

Anthocerotopsida- *Anthoceros.*

Bryopsida- *Funaria*
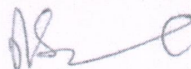
Lichens- General characters, habitat, Structure; reproduction and economic and Ecological importance of lichens.

Suggested Laboratory Exercises

1. Study of classwork material by making suitable temporary slides and study of permanent slides of; *Volvox, Chara, Vaucheria, Ectocarpus, Polysiphonia.*

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

3. Study of lichens.

Suggested Readings

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

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

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

Kumar, H.D.: Introductory Phycology, Affiliated East—West Press, Ltd. New York, 1988.

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

Sarabhai. R.C. and Saxena, R.C.: A text book of BotanyVol I & II, Ratan Prakashan Mandir, Meerut, 1980.

Singh, V., Pande, P.C. and Jain, D.K.: A text book of Botany, Rastogi, & Co., Meerut, 2001.

Vashista, B.R.: Botany for Degree Students (Algae, Bryophytes) S. Chand & Co., New Delhi, 2002.

प्रभारी अधिकारी
अकादमिक-प्रथम

BOTANY PRACTICAL EXAMINATION B.Sc PART-I

SKELETON PAPER

M.M. 25

TIME: 4 Hours

S.No.	Practical	Regular	ExNC
1(a)	Prepare the acetocarmine stained slide of the material "A" provided to you. Draw a well labelled diagram of anyone stage of nuclear division. Identify it giving reasons.	$2\frac{1}{2}$	3
1(b)	Comment and solve the problem allotted to you along with suitale reasons.	2	$2\frac{1}{2}$
2	Make suitably stained glycerine-preparation of any one alga from the given mixture "B" Draw its labelled diagram; assign it to its systematic position giving reasons.	$2\frac{1}{2}$	3
3	Make suitable preparation of the reproductive structure of material "C" Draw labelled diagram, Identify giving reasons.	$2\frac{1}{2}$	3
4	Make suitable stained preparation of material 'C' (vegetative/ reproductive) Draw labelled diagram. Identify giving reasons.	$2\frac{1}{2}$	$2\frac{1}{2}$
5	One Microbiology experiment for comments. Or Gram staining.	2	$2\frac{1}{2}$
6	Comment upon spots (1-6)	6	6
7	Viva-Voce	$2\frac{1}{2}$	$2\frac{1}{2}$
8	Pratical records + Visits Lab/ Models/ Project Reports	$2\frac{1}{2}$	
	TOTAL	25	25

Note: For NC spcts may be 1-8.

Internal ——— M.M. 25

प्रभारी अधिकारी
अकादमिक-शाखा

(40)

B.Ed.

Syllabus: B.Sc. Part-I (━━━━━)
Zoology

Scheme:

Max.Marks:150   Min. Pass Marks:54

                                                                                min. marks

Paper I	: 3 Hrs duration	33 Marks	12
Paper II	: 3 Hrs duration	33 Marks	12
Paper III	: 3 Hrs duration	34 Marks	12
Practicals	: 4 Hrs. duration	25 Marks	09
Internal		25 *marks*	09

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PAPER –I: Z-101
BIODIVERSITY, BIOSYSTEMATICS AND EVOLUTION

Total teaching Hrs. - 60

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 questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
    Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part,*i.e.,* three from each unit /section out of which candidate will be required to attempt any 4 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   (Teaching hours: 20)

Biodiversity
1. Zoogeographical distribution: Principal zoogeographical regions of the world with special reference to their mammalian fauna.
2. Bio-diversity of fauna of India and World.
3. Reasons of depletion of biodiversity andconservation measures of biodiversity where required.
4. Adaptation of animals to their modes of life and environment.
5. Continental drift.

प्रभारी अधिकारी
अकादमिक–प्रथम

Section – B   (Teaching hours: 20)

Biosystematics

1. General principles of taxonomy, concepts of the five kingdom scheme. International code of zoological nomenclature, cladistics, molecular taxonomy.
2. Concept of Protozoa, Metazoa and levels of organization.
3. Basis of classification of non-chordata and chordata: symmetry, coelom, segmentation and embryogeny.
4. Detailed classification of various phyla of Non-chordata with diagnostic features of classes and sub-classes with examples.

Section –C   (Teaching hours: 20)

Evolution

1. Evidences of evolution and theories of evolution (Lamarkism and Darwinism).
2. Natural selection (Differential reproduction), Genetic basis of evolution and Speciation.
3. Variations and isolation.
4. Paleontology: Fossils, geological time scale.
5. Study of extinct forms: Dinosaurs, *Archeopteryx*.
6. Evolution of man.

PAPER –II: Z-102
CELL BIOLOGY AND GENETICS

Total teaching Hrs. - 60

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 questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.,* three from each unit /section out of which candidate will be required to attempt any 4 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   (Teaching hours: 20)

Cell Biology

1. Introduction to cell: Morphology, size, shape, characteristics and structure of prokaryotic and eukaryotic animal cell; 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; Gap junctions.
3. Cell membrane transport: Passive (diffusion and osmosis, facilitated, mediated) and active transport.
4. **Cell organelles** : Structure, composition and functions of- Endoplasmic reticulum, golgi-complex, lysosome, ribosome, mitochondria, microbodies, centrioles, cilia, flagella, microvilli and cytoskeletal elements.

<center>Section –B   (Teaching hours: 20)</center>

1. **Nuclear Organization:**
   (i)   Interphase nucleus: Structure and function of nuclear envelope, nuclear matrix and nucleolus.
   (ii)   Chromosomes: Morphology, chromonema, chromomeres, telomeres, primary and secondary constrictions, chromatids; prokaryotic chromosome.
   (iii) Giant chromosomes: Polytene and Lampbrush.
   (iv)   Chromosomal organization: Euchromatin, heterochromatin, folded fibre model and nucleosome concept.

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

3. **Genetic code and protein synthesis:** Triplet code, characteristics of triplet code; transcription and translation.

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

<center>Section –C   (Teaching hours: 20)</center>

Genetics

1. **Mendelism:** Brief history of genetics and Mendel's work; Mendelian laws, their significance and current status; chromosomal theory of inheritance; Gene concept:Recon, muton and cistron.

2. **Gene - interaction:** Supplementary genes, complementary genes, duplicate genes, epistasis, inhibitory and polymorphic genes.

3. Linkage and crossing over, elementary idea of chromosome mapping.

4. Multiple gene inheritance: ABO blood groups, Rh factor and their significance.

5. **Chromosomal mutations:** Translocation, inversion, deletion and duplication; Variations in chromosome numbers:haploidy, diploidy, polyploidy, aneuploidy, euploidy and polysomy.

6. Cytoplasmic inheritance.

7. Sex determination in *Drosophila* and man.

8. Genetic disorders: Down's. Turner's, Kleinfelter's syndromes; sexed linked and sex limited diseases.

PAPER – III: Z-103
DEVELOPMENTAL BIOLOGY

Total teaching Hrs. - 60

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 10 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part,*i.e.,* three from each unit /section out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks.

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

Section –A   (Teaching hours: 20)
Developmental Biology: Scope and Early Events
1. Historical review, types and scope of embryology.
2. Gametogenesis:
   (i)   Formation of ova and sperm.
   (ii) Vitellogenesis.
3. Fertilization: Activation of ovum, essence of activation: Changes in the organization of the egg cytoplasm.
4. Parthenogensis.

Section –B   (Teaching hours: 20)
Developmental Biology: Pattern and Processes
1. Cleavage. Definition, planes and patterns among non-chordates and chordates, significance of cleavage, blastulation and morulation.
2. Fate maps, gastrulation, morphogenetic cell movements, significance of gastrulation.
3. Embryonic induction, primary organizer, differentiation and competence.
4. Development of chick up to 24 hours stage.
5. Embryonic adaptations:
   (i)   Extra embryonic membranes in chick, their development and functions.
   (ii) Placentation in Mammals: Definition, types, classification on the basis of morphology and histology, functions of placenta.
   (iii) Paedogenesisandneoteny.

Section –C   (Teaching hours: 20)
Developmental Biology:Dimensions
   . Regeneration.
2. Various types of stem cells and their applications.
3. Cloning of animals:
   (i)   Nuclear transfer technique.
   (ii) Embryo transfer technique.
4. Teratogenesis(Genetic and Induced).
5. Biology of aging.
6. Cell death.

Syllabus: B.Sc. Part-I (Pass Course)

Zoology Practical

Min. Marks: 09   **4 Hrs. / Week**   **Max. Marks: 25**

I.   **Microscopic Techniques:**
1. Organization and working of Optical Microscope: Dissecting and compound microscopes.
2. General methods of microscopic slide preparations; narcotization; fixing and preservation; washing; staining; destaining; dehydration; clearing and mounting; general idea of composition, preparation and use of:
    (i)   **Fixatives:** Formalin, Bouin's fluid.
    (ii) **Stains:** Aceto-carmine, Aceto-orcein, Haematoxylin-Eosin, Giemsa.
    (iii) **Common reagents:** Normal saline, Acidwater, 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, Planaria, 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: *Amoeba, Euglena, Trypanosoma, Giardia, Entamoeba, Elphidium (Polystomella), Foraminiferous shells, Monocystis, Plasmodium, Paramecium, Paramecium* showing binary fission and conjugation, *Opalina, Nyctotherus, Balantidium, Vorticella.*

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

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

Ctennophora: Any Ctenophore.

Platyhelminthes: *Taenia, Planaria, Fasciola* (W.M.), Miracidium, Sporocyst, Redia, Cercaria and Metacercarialarvae of *Fasciola*; Scolex, T. S. mature proglottid of *Taenia,* Cysticercus larva.

Aschelminthes: *Ascaris, Wuchereria, Dracunculus.*

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

प्रसार अधिकारी
विज्ञान-त्तान

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 and Medusa; Parapodium of *Nereis* and Heteronereis.

V. **Exercises in Cell Biology:**
1. Squash preparation for the study of mitosis in onion root tip.
2. Squash preparation for the study of meiosis in grasshopper or cockroach testes.
3. Study of giant chromosomes in salivary glands of *Chironomous* larvae or *Drosophila*
4. Study of cell permeability using mammalian R.B.Cs.
5. Permanent slides of mitosis and meiosis (all stages).

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

VII. **Developmental Biology:**
1. **Study of development of frog/toad with the help of Charts/Slides/Models:**
   (i) Eggs, cleavage, blastula, gastrula, neurula, tail-bud, hatching, mature tadpole larvae, metamorphic stages, toadlet / froglet.
   (ii) Histological slides: Cleavage, blastula, gastrula, neurula and tail-bud stage.
2. **Study of development of chick with the help of whole mounts/ Charts/Slides/Models**
   (i) 18 hrs, 21 hrs, 24 hrs, 33 hrs, 48 hrs, 72 hrs and 96 hrs of incubation.
   (ii) Primitive streak stage in living embryo, if possible, after removal of the blastoderm from the egg.
   (iii) Study of the embryo at various stages of incubation *in vivo* by making a window in the egg-shell.
   (iv) Study of various foetal membranes in a 10-12 day old chick embryo.

प्रभारी अधिकारी
अकादमिक-प्रथम

B. Ed.

B.Sc. Part – I

Scheme of Practical Examination and Distribution of Marks

Time: 4 Hrs.   Min Pass Marks: 09   Max. Marks: 25

		Regular	Ex. /N.C. Students
1.	Anatomy (any system)	$1\frac{1}{2}$	$1\frac{1}{2}$
2.	Permanent Preparation	$2\frac{1}{2}$	$3\frac{1}{2}$
3.	Cell Biology and Genetics	$2\frac{1}{2}+2\frac{1}{2}$	$3+3$
4.	Developmental Biology	3	$3\frac{1}{2}$
5.	Identification and comments on Spots (1 to 8)	8	8
6.	Viva Voce	$2\frac{1}{2}$	$2\frac{1}{2}$
7.	Class Record	$2\frac{1}{2}$	-
		25	25
	Internal	25	

Notes:

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 dissections / charts/models /CD-ROMs / multimedia computer based simulations including computer assisted learning (CAL) and other softwares.
2. With reference to permanent preparations and microscopic 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.
6. It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.

Recommended Books:

1. Balinsky B. I. and Fabain BC: Introduction to Embryology. CENGAGE Learning 2012

2. Barrington EJW: The Biology of Hemichordata and Protochordata. Oliver & Boyd, London 1965.

3. Berril N J: Development Biology. Tata McGraw Hill. 1971.

4. Colbert EH: Evolution of the Vertebrates. 2nd edition John Wiley & Sons, New York 1969

5. Colbert EH, Morales M, Minkoff EC. Colberts' Evolution of the Vertebrates: A History of the Backboned Animals Through Time. 5th edition Wiley Liss 2001.

6. Costanzo LS: Physiology 4th edition Saunders Inc. 2009.

7. Davenport R: An Outline of Animal Development. Addison-Wesley Longman Inc. 1979

8. De Roberts EDP and De Robertis Jr EMF: Cell and Molecular Biology 8th edition Lippincot Williams & Wilkins. 2006

9. Gasque CD Manual of Laboratory Experiences Cell Biology. Mc Graw-Hill Professional Publishing 1989.

10. Gilbert SF and Singer SR: Development Biology. Sinauer Associates; 9th edition 2010

11. Lodish H, Berk A, Kaiser CA, Krieger M, Scott MP, Bretscher A, Ploegh H, Matsudaira P. Molecular Cell Biology. 6th edition W.H Freeman and Company, New York 2008.

12. Lodish H, Berk A, Kaiser CA, Krieger M, Bertscher A, Ploegh H, Amon A, Scott M P. Molecular Cell Biology. 7th edition Mac Millian High Education (International edition) England, 2013.

13. Lodish H, Berk A, Matsudaira P, Kaiser CA, Krieger M, Scott MP, Zipursky SL, Darnell J. Molecular Cell Biology. 5th edition W.H. Freeman and Company, New York, 2004.

14. Lodish H, Berk A, Zipursky SL, Matsudaira P, Baltimore D. Darnell J: Molecular Cell Biology. 4th edition WH Freeman & Company, New York, 2000

15. Morgan DD: The Cell Cycle: Principles of Control. Sinauer /Panima Books, 2007.

16. Petsko GA and Ringe D: Protein Structure and Function. Sinauer/Panima Books, 2004

17. Rao KV: Development Biology: A Modern Synthesis. Oxford and IBH Publishing. 1994

18. Rastogi VB: Animal Distribution, Evolution and Development Biology. Kedar Nath Ram Nath Educational Publishers.

19. Rastogi VB: Evolutionary Biology. Kedar Nath Ram Nath Education Publisher.

20. Singh SP and Tomar BS: Cell Biology 10th edition Rastogi Publications, Meerut, New Delhi 2014

21. Snustad DP and Simmons MJ: Principles of Genetics. 4th edition John Wiley & Sons, Inc., 2005

22. Verma PS. A Manual of Practical Zoology: Invertebrates. S. Chand & Co. Ltd. New Delhi 197

23. Verma PS and Agarwal VK: Chordate Embryology: Development Biology. S. Chand & Company Ltd. 2012

24. Verma PS and Agarwal VK: Cell Biology. Genetics, Molecular Biology, Evolution and Ecology. 14th edition, S. Chand 2004.

25. Winchester AM: An Introduction to Genetics. Barners & Noble, Canada, 2002.

26. Winchester AM: Genetics: A Survey of Principles of Heredity. Oxford & IBH Publishing Co.. 1967.

27. Winchester AM: Human Genetics. Ohio Charles E. Merrill Publishing Co., 1971.

प्रभारी अधिकारी

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

B.Ed

B.Sc Part-I

PHYSICS

Scheme:

Paper	Exam. Duration	Minimum Pass Marks	Maximum Marks
Paper-I	3 Hours	12	33
Paper-II	3 Hours	12	33
Paper-III	3 Hours	12	34
Practical Exam	4 Hours	09	25
Internal		09	25

Paper – I (MECHANICS)

Work load: Two hours lecture per week.   Examination Duration: Three Hours

Note:- Total Five questions to be attempted. First question will consist of 09 short answer type questions and is compulsory. Four questions will be from four units, one from each unit with internal choice. 40% weightage will be given to problems and numerical. The candidates will be required to attempt all the five questions. First question is of 09 marks).

Remaining 04 Questions will be of 06 marks each,

UNIT-I

Physical law and frame of reference

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

(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 force, motion relative to earth, Focult's Pendulum
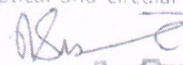
UNIT-II

Centre of Mass: Introduction about centre of mass, Centre of Mass Frame: Collision of two particles in one and two dimensions (elastic and inelastic), Slowing down of neutron 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 motion of a rotating body, Inertial Coefficient, Case of J not parallel to ω, Kinetic energy of rotation and idea of principal axes, Processional motion of a spinning top.

Conservation of Forces: Introduction about conservation and non-conservation Forces, Rectilinear motion under conservation forces, Discussion of potential energy curve and motion of a particle.

Unit-III

Motion under Central Force: Introduction about Central Forces, Motion under central forces, Gravitational interaction, Inertia and gravitational mass, General solution under gravitational interaction, Kepler's laws, Discussion of trajectories, Cases of elliptical and circular orbits, Rutherford scattering.

प्रभारी अधिकारी
महाविद्यालय प्रथम

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

Unit –IV

Driven Harmonic oscillations: Driven Harmonic oscillator with damping, Frequency response, Phase relation, Quality factor, Resonance, 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 behaviour, Dynamics of a number of oscillators with neighbour interactions.

Reference Books:

1. Mechanics Berkeley Physics Course Vol-I, Charles Kittel
2. Mechanics H S Hans and S P Puri, Tata McGraw Hill
3. The Physics of Waves and 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

Note:- Total Five questions to be attempted. First question will consist of 09 short answer type questions and is compulsory. Four questions will be from four units, one from each unit with internal choice. 40% weightage will be given to problems and numerical. The candidates will be required to attempt all the five questions. All ~~first~~ *first* question is of 09 marks).
Remaining 04 Questions will be of 06 marks each.

Unit –I

Scalar and Vector Field: Concept of field ,Scalar and vector fields, Gradient of scalar field, Physical significance and formalism of gradient, Divergence and curl of vector field in Cartesian coordinates system, Problems based on Divergence and curl operators

Concept of solid angle, Gauss divergence and Stoke's theorem, Gauss law from inverse square law. Differential form of Gauss law

Unit-II

Field of stationary and moving charges: Potential energy of system of (i) Discrete N-charges (ii) Continuous charge distributions. Energy required to build a uniformly charged sphere, classical radius of electron, Electric field due to short electric dipole, Interaction of electric dipole with external Uniform and non-uniform electric field, Potential due to a uniformly charged spherical shell.

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

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

Unit-III

Electric field in matter: Multipole expansion, definition of moments of charge distribution, Dielectrics, Induced dipole moments, polar and non-polar molecules, Free and bound charges, Polarization, Atomic polarizability, electric displacement vector, electric susceptibility, dielectric constant relation between them.

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

प्रभारी अधिष्ठाता
उप कुलसचिव

Unit–IV

Magneto statics and Magnetic field in a matter: Lorentz force, properties of magnetic field, Ampere's law, Field due to a current carrying solid conducting cylinder(a) Outside(b) At the surface and (c) Inside the cylinder, Ampere's law in different form, Introduction of magnetic vector potential, Possion's equation for vector potential, Deduction of Bio Savart's law using Magnetic vector potential, Differential form of Ampere's law

Atomic magnet, Gyromagnetic ratio, Bohr Magneton, Larmour frequency, induced magnetic moment and diamagnetism, spin magnetic moment, Para and Ferro magnetism, Intensity of magnetization, Magnetic permeability and susceptibility, free and bound current densities, Magnetic field due to a uniformly magnetized material and non-uniform magnetized material.

Reference Books:

1. Electricity and Mangnetism, A S Mahajan and Abbas A Rangwalam Tata McGraw Hill
2. Introduction to Electrodynamics, David J Griffith, Prentice Hass
3. Berkley Physics Course – Vol II
4. Fundamental University Physics Vol II, Fields and Wave, M Alonso and E J Finn, Addison Wesley Publishing Company.

Paper – III (OPTICS)

Work load: Two hours lecture per week.   Examination Duration: Three Hours

Note:- Total Five questions to be attempted. First question will consist of 10 short answer type questions and is compulsory Four questions will be from four units, one from each unit with internal choice. 40% weightage will be given to problems and numerical. The candidates will be required to attempt all the five questions. A~ _____ First question is of 10 marks).

Remaining 04 Questions will be of 06 marks each.

Unit-I

Interference: Concept of spatial and temporal coherence, Coherence length, coherence time, Propagation of wave front, Huygens principal of Secondary wavelets, Young double slit experiment, types of interference, interference by division of wave fronts, Fresnel's Bi-prism, Measurement of wavelength and thickness of thin transparent sheet. Interference by division of amplitude: Interference in thin film of constant thickness in transmitted in reflected waves, Interference produced by wedge shaped film, Newton's ring, Determination of wavelength and refractive index by Newton's ring , Fringes of equal inclination (Haidinger fringes) and equal thickness(Fizeau fringes), Michelson's Interferometer, shape of fringes, Measurement of wavelength, difference between two spectral lines and thickness of a thin transparent sheet.

Unit II

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

Unit –III

Polarization: Plane, circular and elliptically Polarized light, Polarization by reflection, Double refraction and Huygen's explanation of double refraction, Production and deduction of Plane, Circular and

प्रभारी अधिकारी
अकादमिकी-प्रथम

Elliptically polarized light, Quarter and half wave plates, optical activity, Specific rotation Biquartz and half shade Polarimeter and their comparison .

ii) Laser: Spontaneous and stimulated emission, Einstein's A&B coefficients, Energy density of radiation As a result of stimulated emission and absorption, population inversion, Methods of optical pumping, Energy level schemes, He-Ne, Ruby, CO_2 lasers.

iii) Holography: Basic concept of holography, Principle, theory, Construction and reconstruction of image, Application of holography.

Unit-IV

Wave motion: 1D and 3 D wave equation, Transverse waves in a stretched string, elastic wave 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 of waves, Electromagnetic waves, Energy density of Electromagnetic waves, Electromagnetic waves in a 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. Principles of optics by B K Mathur
4. Introduction to Modern Optics by A K Ghatak
5. An introduction to Modern Optics by G R Fowels
6. Essential of Lasers by Allen

PRACTICALS

Work Load: Four hours laboratory work per week.

Examination Duration : Four Hours

Minimum Experiments: Total sixteen taking eight from each section.

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

Marking Scheme:

	For Regular	
Two Experiments	08 marks each	
Record	04	
Viva-voice	05	

Section – A
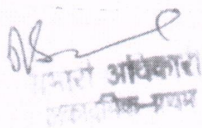
1. To study the variation of power transfer by two different loads by a DC source and to verify maximum power transfer theorem.

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 magnetic field along the axis of a current carrying circular coil. Plot the necessary graph and hence find radius of the circular coil.
7. To determine the specific resistance of a material and determine difference between two small resistance using Carey Fosters Bridge.
8. To convert a galvanometer into a ammeter of a given range.
9. To convert a galvanometer into a voltmeter of a given range.
10. To determine the resolving power of a Telescope.
11. To determine the resolving power of a Grating.
12. To determine the dispersive power of a Prism.

Section – B

1. To study the random decay and determine the decay constant using the statistical board
2. Using compound pendulum study the variation of time period with amplitude in large angle oscillations.
3. To study the damping using compound pendulum.
4. To study the excitation of normal modes and measure frequency splitting using two coupled oscillators.
5. To study the frequency of energy transfer as a function of coupling strength using coupled oscillators.
6. To study the viscous fluid damping of a compound pendulum and determining damping coefficient and Q of the oscillator.
7. To study the electromagnetic damping of a compound pendulum and to find the variation of damping coefficient with the assistance of a conducting lamina.
8. To find J by Callender and Barn's Method.
9. To determine Young's modulus by bending of beam.
10. To determine Y, σ and η by Searle's method.
11. To determine modulus of rigidity of a wire using Maxwell's needle.
12. 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.
13. To study the specific-rotation of sugar solution by polarimeter.

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

MATHEMATICS

Appendix-I

B.A./B.Sc. Part – I – 2017-2018 and ownwards
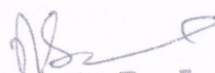
Teaching : 3 Hours per Week per Theory Paper.
     2 Hours per Week per Batch for Practical
     (20 candidates in each batch)

Examination:

Scheme:	Min.Pass Marks Science – 54		Max. Marks 150	
		Duration	Max.Marks	Min. marks
Paper – I	Discrete Mathematics	3 hrs.	33 (Science)	12
Paper – II	Calculus	3 hrs.	33 (Science)	12
Paper – III	Three Dimensional Geometry and Optimization Theory	3 hrs.	34 (Science)	12
Practical	Optimization Techniques	2 hrs.	25 (Science)	09
Internal			25	09

Note:

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

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

3. An Internal/external examiner can conduct Practical Examination of not more than 100 (Hundred) Candidates (20 Candidates in one batch).

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

प्रभारी अधिकारी
अकादमिक–प्रथम

Paper – I: Discrete Mathematics
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours

Max. Marks: 33 (Science)

Note: Syllabus of this paper is divided into five units. This paper contains 11 questions. Candidates are required to attempt only 9 questions. Question no. 1 to 6 are compulsory and any three questions from question no. 7 to 11. First question contain ten parts of very short answer type, two parts from each unit. Each part carries one mark. Questions no. 2 to 6 (five short answer type question) one from each unit. Each carries one mark. Questions no. 7 to 11 are five big questions, one from each unit. Each carries 6 marks.

Unit 1: Boolean Algebras- Lattices and Algebraic structure, Duality, Distributive and Complemented Lattices. Boolean Lattices, Boolean functions and expressions. Fundamental theorem of arithmetic, divisibility in Z, Congruences, Chinese Remainder Theorem, Euler's phi-function, primitive roots.

Unit 2: Logic and Propositional Calculus, Propositions, Simple and compound, Basic Logial operations, Truth tables, Tautologies and contradictions, Propositional Functions, quantifiers. Discrete numeric functions and Generating functions. Recurrence relations and Recursive Algorithms – Linear Recurrence relations with constant coefficients. Homogeneous solutions. Particular solution. Total solution. Solution by the method of generating functions.

Unit 3: Graphs – Basic terminology, Multigraphs, Weighted graphs, Paths and circuits, Shortest paths, Eulerian paths and Circuits. Travelling Salesman problem. Union, Join, Product and composition of graphs. Planar graphs and Geometric dual graphs.

Unit 4: Trees – Properties, Spanning tree, Binary and Rooted tree. Digraphs – Simple digraph, Asymmetric digraphs, Symmetric digraphs and complete digraphs. Digraph and Binary relations. Matrix representation of graphs and digraphs.

Unit 5: Numerical ability: Numbers and simplifications, Divisibility, H. C. F and LCM of Number, Average, Percentage, Calender, Clocks, Binary System, Profit and Loss, Ratio and Proportion, Races and Games, Alligation Or Mixture, Time, Time and Work, Speed and Distance, Pipes and Cisterns, Trains, Streams and Boats, Surds and Indices, Fractions, Logarithms.

Paper- II: Calculus
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours

Max. Marks: 33 (Science)

Note: Syllabus of this paper is divided into five units. This paper contains 11 questions. Candidates are required to attempt only 9 questions. Question no. 1 to 6 are compulsory and any three questions from question no. 7 to 11. First question contain ten parts of very short answer type, two parts from each unit. Each part carries one mark. Questions no. 2 to 6 (five short answer type question) one from each unit. Each carries 01 marks. Questions no. 7 to 11 are five big questions, one from each unit. Each carries 6 marks.

प्रभारी अधिकारी
अकादमिक–प्रथम

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

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

Paper-III: Three-Dimensional Geometry and Optimization Theory
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours   **Max. Marks: 34 (Science)**

Note: Syllabus of this paper is divided into five units. This paper contains 11 questions. Candidates are required to attempt only 9 questions. Question no. 1 to 6 are compulsory and any three questions from question no. 7 to 11. First question contain 11 parts of very short answer type, two parts from each unit. Each part carries one mark. Questions no. 2 to 6 (five short answer type question) one from each unit. Each carries 01 marks. Questions no. 7 to 11 are five big questions, one from each unit. Each carries 06 marks.

Unit 1: polar equation of conics, polar equation of tangent, normal and asymptotes, chord of contact, auxiliary circle, directector circle of conics.

Unit 2: Sphere, Cone.

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

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

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

प्रभारी अधिकारी
अकादमिक-प्रथम

Duality. Fundamental theorem of duality, properties and elementary theorems on duality only.

Practical: Optimization Techniques
Teaching: 2 Hours per Week per Batch
(20 Candidates in each Batch)

Examination: **Duration: 2 Hours**
Scheme   Science
Max.Marks   25
Min.Pass Marks   09
Distribution of Marks:
Two Practicals one from each group
    $7\frac{1}{2}$ Marks each   =   15 Marks (~~~~~~~~)
    Practical Record   =   05 Marks
    Viva-voce   =   05 Marks
    Total Marks   =   25 Marks

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
(i)Assignment Problems and (ii) Balanced and unbalanced Transportation Problems. and their solution
Note:
1. Problems will be solved by using Scientific Calculators (non-Programmable)
2. Candidates 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.
5. Non Collegiate candidates are required to take practice certificate of 21 days (2 hours per day.)

प्रभारी अधिकारी
अकादमिक-प्रथम