



**Maharaja Surajmal Brij University**

**Bharatpur (Raj.)**

**SYLLABUS**

**Faculty of Education**

**B.Sc. B.Ed. Integrated Programme (Four Year)**

**Session 2021-22**

**Part II**

**Only For Session  
2020-21**

**Session 2020-21**

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**NOTICE**

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

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भरतपुर (राज.)



**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:**

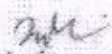
- To promote capabilities for inculcating national values and goals as mentioned in the constitution of India.
- To act as agents of modernization and social change.
- To promote social cohesion, international understanding and protection of human rights and right of the child.
- To acquire competencies 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 foster growth and development.
4. Ability to use-
5. Individualized instruction
6. Dynamic methods in large classes.
7. Ability to examine pupil's progress and effectiveness of their own teaching through the use of proper evaluation techniques.
8. Equipment for diagnosing pupil progress and effectiveness of their own teachings through the use of proper evaluation techniques.
9. Readiness to spot talented and gifted children and capacity to meet their needs.

Opt: **Dr. Prabhat Kumar**

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10. Ability to organize various school programmes, activities for pupil.
11. Developing guidance point of view in educational, personal and vocational matters.
12. Ability to assess the all round development of pupils and to maintain a cumulative record.
13. Developing certain practical skill such as:
- Black board work
  - Preparing improvised apparatus
  - 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**

- First Year B.Sc.B.Ed.
- Second Year B.Sc.B.Ed.
- Third Year B.Sc.B.Ed.
- Final Year B.Sc.B.Ed.

**Duration of the Course - Four Years**

**Examination after each session in theory papers**

Scheme of Examination against each subject separately.

**Compulsory Papers:**

Year	Paper
Ist Year	Gen. English
2nd Year	Gen. Hindi
3rd Year	Elementary Computer Application (ICT)
4th Year	Year Environmental Studies

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

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**Group - A: - Subject Specialisation :**

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

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

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

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

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

- ❖ In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IInd Year, 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 05, 06, 07 (G-III) will carry 150 marks, (With practical part). Distribution of marks in mathematics is according to their marking scheme in page no.7.

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

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

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**Four Years Integrated Course  
Scheme of B.Sc.-B.Ed, 1st Year**

Sl. No.	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
01	B.Sc.-B.Ed.-01	Gen. English Compulsory*	100	-	-	100
02	B.Sc.-B.Ed.-02	Childhood and Growing Up	80	20	-	100
03	B.Sc.-B.Ed.-03	Contemporary Indian and Education	80	20	-	100
04	B.Sc.-B.Ed.-04	Instructional System & Educational Evaluation	80	20	-	100
	B.Sc.-B.Ed-05	Conical (PCB & PCM Group) (Select any Three)				
05	06	1. Chemistry (I, II, III)	33+33+34		50	150
06	07	2. Botany (I, II, III)	33+33+34		50	150
07		3. Zoology (I, II, III)	33+33+34		50	150
08		4. Physics (I, II, III)	33+33+34		50	150
09		5. Mathematics (I, II, III)	40+40+40		30	150
						750

\*100% MERIT CRITERIAN ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

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

Subject	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
08	B.Sc.-B.Ed. 08	Gen. Hindi (Compulsory)*	100	-	-	100
09	B.Sc.-B.Ed. 09	Knowledge and Curriculum	80	20	-	100
10	B.Sc.-B.Ed. 10	Learning and Teaching	80	20	-	100
11	B.Sc.-B.Ed. 11	Peace Education	80	20	-	100
12(a), (b), (c), (d), (e)	B.Sc.-B.Ed. (I, II, III, IV)	<b>Content:</b>				
		<b>(PCB &amp; PCM Group)</b>				
		<b>(Select any Three)</b>				
		1. Chemistry (I, II, III)	33+33+34		50	150
		2. Botany (I, II, III)	33+33+34		50	150
		3. Zoology (I, II, III)	33+33+34		50	150
4. Physics (I, II, III)	33+33+34		50	150		
5. Mathematics (I, II, III)	40+40+40		50	150		
13	B.Sc.-B.Ed. (Practical)	<b>OPEN AIR / SUPW CAMP</b>				
Practical 13		i. Community Service		25		100
		ii. Survey (Based on social and educational aspects)		25		
		iii. Co-Curricular Activities		25		
		iv. Health and Social awareness programme		25		
(MANSIONER MANAGEMENT AND CLEANNESS)						
750+100						

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

Subject	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
16	B.Sc.-B.Ed. 16	Information & Communication (ICT) (Compulsory)	100			100
17	B.Sc.- B.Ed.17	Language Across the Curriculum	80	20		100
18	B.Sc.-B.Ed. 18	Guidance and Counselling in School	80	20		100
19 20 21 22	B.Sc.-B.Ed. 19,20,21 22	<b>Content</b> (PCB & PCM Group) (Select any Three) 1. Chemistry(I,II,III) 2. Botany(I,II,III) 3. Zoology(I,II,III) 4. Physics(I,II,III) 5. Mathematics(I,II,III)	33/33/34 33/33/34 33/33/34 33/33/34 40/40/40		50 50 50 50 30	150 150 150 150 150
23	B.Sc.-B.Ed. 23	Pedagogy of a School Subject (candidate shall be required to offer any one paper from the following) 1. Mathematics 2. Physics 3. Chemistry 4. Biology 5. General Science	80	20		100
Practical- 24	B.Sc.-B.Ed. 24	Special Training Programme • Micro Teaching • Practice Lesson • Observational Lesson • Technology Based Lesson • Children Lesson • Attendance Record • Workshop			10 50 55 45 20 10	100
25	B.Sc.-B.Ed. 25	Final Lesson	100			100
Total						700(100+100)

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

Subject	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
25	B.Sc. -B.Ed. 25	Environmental Education (Compulsory)*	80	20	-	100
26	B.Sc. -B.Ed. 26	Creating and redesigning school	80	20	-	100
27	B.Sc. -B.Ed. 27	Understanding Disciplines and Subject	80	20	-	100
28	B.Sc. -B.Ed. 28	Physical Education & Yoga	80	20	-	100
29	B.Sc. -B.Ed. 29	Gender, School and Society	80	20	-	100
30	B.Sc. -B.Ed. 30	Assessment for Learning	80	20	-	100
31	B.Sc. -B.Ed. 31	Pedagogy of a School Subject (candidate shall be required to offer any one papers from the following) 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20	-	100
Practical 32	B.Sc. -B.Ed. 32	1. Practice teaching 2. Block Teaching (Participation in School Activities Social Participation in Group) 3. Report of my future of school / case study/action research 4. Criticism Lesson		50 20 10 20		100
33	B.Sc. -B.Ed. 33	Final Lesson	100			100
						1000/1000
						1000

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

**Compulsory subjects**

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

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

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

Chemistry
Botany
Zoology
Physics
Mathematics

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


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

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

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

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**PART II**  
**Practical Work**

**Objectives:**

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

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

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

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

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

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

**Notes :**

- I. Teaching subject means a subject offered by the candidate at his/her running B.A B.Ed. course either as a compulsory subject or as an optional subject provided that the candidate studied it for at least two years. Thus the qualifying subjects like General English, General Hindi, General Education, History of Indian Civilization and Culture. Prescribed for running B.A.-B.Ed. course of the University or a subject dropped by candidates at the part I stage of the degree course shall not be treated as teaching subjects.
- II. Only such candidate shall be allowed to offer Social Studies for the B.A-B.Ed. Examination as have taken their running B.A- B.Ed. course with any two subjects out of History, Political Science/Public Administration, Economics, Geography, Sociology, Philosophy / Psychology.
- III. A candidate who has offered Political Science or Public Administration at his Bachelor's or the Master's Degree Examination shall be deemed eligible to offer Civics as a teaching subject in the Integrated B.A.-B.Ed. Examination.

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

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महलपुर (राज.)



O.324 The examination for Integrated B.A.-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.A-B.Ed examination in part 1 or/ part 2 the theory of education may present themselves for re-examination there in at a subsequent examination without attending a further course at an affiliated training college.

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

O.326 Candidates who fail in the Integrated B.A-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.A-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.A-B.Ed programme shall be of duration of four academic years, which can be completed in a maximum of five years from the date of admission to the integrated B.A.-B.Ed. Degree.

**Regulation 42:**

**Scheme of Integrated B.A-B.Ed Four Year Examination**

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

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

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

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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.A.-B.Ed Four Year Examination obtaining total marks will be classified in three divisions and shall be assigned separately in theory and school internship Practice of teaching as follows:

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

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

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# 1

## सामान्य हिन्दी

प्रश्न : चलो

प्रश्न : निम्नलिखित वाक्यों में उचित शब्दों को चुनकर वाक्यों को पूरा करें।  
प्रश्न : मैंने अपने दोस्त को बहुत अच्छे से जाना है। इस प्रकार-प्रकार में प्रश्न उत्तरों को पूरा करें।  
प्रश्न : मैंने अपने दोस्त को बहुत अच्छे से जाना है। इस प्रकार-प्रकार में प्रश्न उत्तरों को पूरा करें।

1. मैंने अपने दोस्त को बहुत अच्छे से जाना है।	50 अंक
2. मैंने अपने दोस्त को बहुत अच्छे से जाना है।	50 अंक
3. मैंने अपने दोस्त को बहुत अच्छे से जाना है।	50 अंक
4. मैंने अपने दोस्त को बहुत अच्छे से जाना है।	50 अंक

### सामान्य हिन्दी का प्रश्न

1. सामान्य हिन्दी का प्रश्न	20 अंक
2. सामान्य हिन्दी का प्रश्न	20 अंक
3. सामान्य हिन्दी का प्रश्न	20 अंक
4. सामान्य हिन्दी का प्रश्न	20 अंक
5. सामान्य हिन्दी का प्रश्न	20 अंक
6. सामान्य हिन्दी का प्रश्न	20 अंक
7. सामान्य हिन्दी का प्रश्न	20 अंक
8. सामान्य हिन्दी का प्रश्न	20 अंक
9. सामान्य हिन्दी का प्रश्न	20 अंक
10. सामान्य हिन्दी का प्रश्न	20 अंक

सहित चलो - प्रश्न उत्तर की में मिले प्रकार  
प्रश्न उत्तर - प्रश्न उत्तर का प्रकार है -

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सहित चलो - प्रश्न उत्तर का प्रकार है -  
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प्रश्न उत्तर - प्रश्न उत्तर का प्रकार है -

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 प्रश्न उत्तर - प्रश्न उत्तर का प्रकार है -



1. कक्षा के छात्रों को प्रोत्साहित करना  
2. छात्रों को प्रोत्साहित करना

उत्तर

- 1. छात्रों को प्रोत्साहित करना
- 2. छात्रों को प्रोत्साहित करना
- 3. छात्रों को प्रोत्साहित करना
- 4. छात्रों को प्रोत्साहित करना
- 5. छात्रों को प्रोत्साहित करना

उत्तर

- 1. छात्रों को प्रोत्साहित करना
- 2. छात्रों को प्रोत्साहित करना

उत्तर

1. छात्रों को प्रोत्साहित करना

उत्तर

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1. छात्रों को प्रोत्साहित करना

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 नया दिल्ली



**B.Sc.-B.Ed. 2<sup>nd</sup> Year**

**Knowledge and curriculum**

Marks-100

**Objectives**

1. To create excellence in the educational system for facing the knowledge of challenges of the twenty first century.
2. To encourage the application of knowledge skills in the Indian educational institutions.
3. To enhance the quality of pre-service and in-service teacher training.
4. To realize the importance of curriculum modification.
5. To provide awareness and understanding of social environment.
6. To transform teacher-pupils in to a vibrant knowledge – based society.

**Unit-1: Concept of knowledge & child's construction of knowledge**

- Meaning and nature of knowledge.
- Sources of attainment of knowledge in school with special references of society, culture and modernity.
- Distinctions between – knowledge and skill, knowledge and information, reason and belief.
- Sources of knowledge: Empirical knowledge Vs Revealed knowledge.
- Different kinds of knowledge:
  - (a) Disciplinary knowledge: Concept and Alternative concepts.
  - (b) Course content knowledge: Criteria of selection and concerns.
  - (c) Indigenous knowledge Vs Global knowledge.
  - (d) Scientific knowledge Vs Religious knowledge.
- Concepts of Belief, Information, Knowledge and Understanding.

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 बलूर (बलूर)



**Unit II Facts of Knowledge-**

Different facets of knowledge and relationship such as

Local and Universal

Concrete and Abstract

Theoretical and Practical

School and Out of School

(With an emphasis on understanding special attributes of school knowledge)


**Unit III : Concept of curriculum**

- Meaning, Nature and Objectives of Curriculum, Need for curriculum in schools.
- Philosophical, Psychological, Sociological and Scientific basis of Education with reference of Gandhi, Tagore, Dewey and Plato.
- Difference between curriculum and syllabus.
- Factors Influencing curriculum.
- Various types of curriculum- Subject centered, Experience centered, Activity centered, Child centered, and Craft centered.

**Unit IV Curriculum Planning and Transaction**

- Construction of Curriculum
- Models of Curriculum Development given by Franklin Bobbit, Ralph Tyler, Hilda Taba and Philip Jackson
- Curriculum Transaction: Role of a teacher in knowledge Construction through Dialogue, Challenge and Feedback as a Critical Pedagogue.

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 अहमदनगर (जिल्हा)



### Unit-V School: The Site of Curriculum Engagement

- Role of School Philosophy, Administration (and organization) in creating a context for transacting the curriculum effectively.
- Role of Infrastructural support in Teaching and Learning: Classroom seating Arrangement, Library, Laboratory, Playground, Canteen etc.
- School Culture and Organizational ethos as the context for Teachers' Work.
- Teacher's role and Support is "Developing Curriculum, Transacting Curriculum and Researching Curriculum": Realities and expectations.

#### Test and Assignment:-

1. Class Test 10 Marks

2. Project (Any one of the following) 10 Marks

- Seminars, discussions, movie appraisals, group work, field works,
- Projects and the close reading of articles, policies, documents from key practitioners in the area of Curriculum Studies in Education.

- How does school knowledge get reflected in the form of curriculum, syllabus and textbooks?
- Review of a text book of any school subject.
- Prepare a children's literature handbook.

#### References-

1. Agarwal, J.C. (2008). Knowledge Commission -2006: Major Observations and Recommendations, Educational Reforms in India for the 21<sup>st</sup> Century. New Delhi, Shree Publication.

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 पुणे



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2. Lax, R.B. and Palod S. (2015). Policy Framework and Issues in Education. Delhi- Delhi, R.Lal Book Depot.
3. Meenaday, M. and Ravishankar, S. ( ). Curriculum Development and E-Learning and Technology. New Delhi, Sterling Publisher P. Ltd.
4. McFarley, J. (2003). Modern Trends in Education Technology. (Reprint Edition 2013)
5. Prasad, Anardani and Kumar, Vijay (1997). Advanced Curriculum Reconstruction, New Delhi, Kanchan Publication.
6. Prasad, Shukla (2005). Dictionary of Education (2005). New Delhi, A.P.E. Publishing Corporation.
7. Sen and Sharma, A. (2014). Eminent Educational Thinkers of India. Agra, R.S.A. International Publisher, Agra.
8. [www.knowledgecommission.gov.in](http://www.knowledgecommission.gov.in)
9. [www.nerf.ac.in](http://www.nerf.ac.in)
10. [www.instituteglobal.org/express/article.html?id=178](http://www.instituteglobal.org/express/article.html?id=178)

### Learning and Teaching


MARKS -100

**Objectives:**

After completing the course the students will be able:-

1. To get acquainted with the concept, principles and nature of teaching and learning
2. To understand the different learning styles based on the difference of learners.
3. To study the relationship between teaching and learning and the factors which influence learning
4. To make use of modern information and communication technology to improve teaching-learning process.

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- 3. To understand learning as a process of communication and be aware of various resources available for making it effective.
- 6. To study and analyze the socio cultural factors influencing cognition and learning.
- 7. To study and understand learning in constructivist perspective.
- 8. To get acquainted with professional ethics of teaching profession.
- 9. To study the new trends and innovations involved in teaching learning process with professional ethics.

**Unit I - Learning and Teaching Process**

- Teaching: Meaning, Nature, Principle, Levels, Phases and missions of teaching; Difference of training and instruction from teaching.
- Learning: Meaning, Nature, Factors affecting learning and types of learning.
- Relationship between teaching and learning, Resource and their development for promoting teaching learning process.
- Tradition and changes in view of the learning process a shift from teaching and learning.

**Unit II - Source of Effective Teaching Learning**

- Effective teaching: Meaning, component and parameters of effective teaching, classroom instruction strategies, Teacher behavior and classroom climate. (Lantieri's interaction analysis system)
- Instructional objectives in terms of bloom's taxonomy.
- Programming Learning: Concept, principles and types of programme learning.
- Concept of micro teaching, various teaching skills.

**Unit III - Educational Technology**

- Educational Technology: Meaning, Importance and Approaches.
- Model of teaching: Meaning, Assumptions and Fundamental elements of a model of a teaching schman's inquiry training model.
- Communication: Concept, Elements and Communication skills, Teaching Learning process as the communication.

**Unit IV - New Trends in teaching learning due to technological innovation**

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- Analysis and organisation learning in diverse class room: issues and concerns.
- Learning Teaching: Panel discussion, Conference, Symposium, Workshop, Cooperative learning, Group discussion, Brain storming- issues and concerns with respect to organise teaching and learning process in a classroom. such as ability, habitus, self learning, learning skills, interest, ability, giftedness with respect to socio economic background.

**Unit V Teaching as profession:**

- Ethics of teaching, professional growth of a teacher
- Teacher as a professional practitioner, identification of the performance, competency and commitment area for teacher.
- Need of Professional enrichment of teachers
- Professional ethics and its development

**Test and Assignment:-**

1. Class Test 10 MARKS
2. Assign Date 10 MARKS

- Preparation and practical implication of at least two technical learning resources (transparencies, Power Point Slides, Animated Videos)
- Identify the learning needs of the learner in diverse class room with regard to their abilities, learning styles, socio cultural difference, learning difficulties and their implication for class room teaching.
- Identify the professional skills for teachers and report any two programmes for professional development of teaching organized by the school/ training college/ any other agencies.
- Conduct and Interview of any two students with multilingual background and face the problems in teaching learning process.

**REFERENCES:**

1. Agarwal J.C.I (2008). " Educational Psychology", Vikas Publishing House Pvt. Ltd, New Delhi.
2. Berg Laura (2007). " Child Development", Prentice Hall of India, New Delhi.

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2. Buzan Tony (2003), "Brain Child", Thorsons, An imprint of Harper Collins, London.
3. Coleman Margaret (1996), "Emotional and Behavioral Disorders", Allen and Unwin, London.
4. Crockett Maria (1967), "The Mentally Retarded Child in the classroom", The Macmillan company
5. Coleman Daniel (1995), "Emotional Intelligence", Bantam Books, N.Y.
6. Coleman Daniel (2007), "Social Intelligence", Arrow Books, London.
7. Henson Kenneth (1999), "Educational Psychology For Effective Teaching", Wadsworth Publishing Co Belmont, California.
8. Khanchavala Pradip (1988), "Fourth Eye", A. H. Wheeler, Allahabad.
9. Khosla S.K. (1993), "Advanced Educational Psychology" Prentice Hall of India Pvt. Ltd., New Delhi.
10. National Curriculum Framework 2005, N.C.E.R.T, New Delhi.
11. Dixon Alex (1971), "Your Creative Power", Saint Paul Society, Allahabad, India.
12. Singh M.K. and Varma V.P.(Ed) (1974), "Advances in Educational Psychology" University & London Press, London.
13. Sturges David (1999), "Social and Personality Development" Wadsworth Thomson Learning, U.S.A.
14. Sharma Taru Chandra (2005), "Reading Problems of Learners", Sarup and Sons, New Delhi.
15. Sousa David (2001), "How The Brain Learns", Corwin Press, Inc. A Sage Publication Company, California.

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## PEACE EDUCATION

### OBJECTIVES:-

MARKS-100

The course will enable the student teachers to--

- To understand the concept of peace education.
- To acquire the knowledge about peaceful mind makes peaceful world.
- To understand the theory and practice of peace education
- To understand the philosophical thoughts for peace.
- To promote awareness about the existence of Conflicting relationships between people, within and between nations and between nature and humanity.
- To create frameworks for achieving Peaceful and Nonviolent societies.

### UNIT 1 Concept of Peace

- Negative peace and Positive peace.
- Negative Peace - Peace as absence of war and abolition of war, as the minimization and elimination of violence, as removal of structural violence, Peace with Justice, Peace and Nonviolent liberation technique (Satyagraha) and Disarmament.
- Positive peace: Peace as Love, Mutual Aid, Positive Interpersonal relations, Peaceful resolution of Conflict, Peace and Development, Alternative defense, living with nature and preserving Life and Eco system and Holistic Inner and Outer Peace.

### Unit 2: Introduction of Peace Education


- Meaning, Concept and need of Peace Education.
- A universal value
- Aims and Objectives of Peace Education
- Role of Social Agencies: Family, Religion, Mass Media, Community, School, NGO's, Government Agencies in promoting peace education.
- Current Status of Peace Education at Global Scenario.

### Unit 3- Basis of Peace Education

- Becoming peace teacher-acquisition of knowledge, values and attitudes.
- Life Skills required for Peace Education (WHO)
- Areas of Peace Education: Conflict management, Conservation of environment

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- Challenges to Peace- Stress, Conflict, Crimes, Terrorism, Violence and Modernization.
- Strategies and Methods of teaching Peace Education- Meditation, Yoga, Dramatization, Debate and etc.

**UNIT 4. Effective Teaching of Peace**

- Peace Education for Life and Life long education, Peace Education and Removing the Bias towards Violence - Correcting Distortions.
- Model of integrated Learning - Transactional Modalities - Cooperative Learning, Group Discussion, Project Work, Role Play, Story Telling, Rational Analytical Method - Case Analysis and Situation analysis.
- Peace Research, International classroom, International Parliament, Peace Awards, Creating Models for Peace technology - development of new tools, techniques, mechanisms and institutions for building up peace and Engaging students in Peace Process.

**Unit 5- Transacting Peace Education & Role of Social Agencies:**


- Integration of Peace Education through curricular and co-curricular activities
- Role of mass media in Peace Education
- Programmes for Promoting Peace Education - UNESCO
- Addressing challenges to peace in Multicultural Society.
- Role of Religion in propagation of Peace. Nelson Mandela Mother- Teresa, Vivekananda, Gandhian Philosophy in promoting Peace Education. Role of Great personalities in promoting Peace.

**Tasks and Assignments**

- 1. Class Test 10 marks
- 2. Any one 10 Marks

- Prepare a Role Play of Great Personalities who worked/ contributed towards Peace.
- Organize an activity in schools to promote Peace.
- Write a report on Gandhi and Peace.

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 मुंबई (महाराष्ट्र)



- Write about the contribution of any two Noble prize winners for Peace.
- Prepare an album of Indian Philosophers and write their thoughts on peace.

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2. Aber, J.L. Brown, J.L.A. Heinrich, C.C.(1999) Teaching Conflict Resolution: An Alternative.
3. Dr.Haseen Taj (2005) National Concerns and Education, Neelkamal Publications, pvt Ltd
4. Dr.Haseen Taj (2005) Current challeges in Education, Neelkamal Publications, pvt Ltd
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**B.Sc. Part II, Session 2020-21**  
**Chemistry**

**Scheme:**

**Max Marks: 150**

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

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

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

**Unit-I**

**Chemistry of Element of first Transition Series:**

Characteristic properties of d-block elements. Properties of the elements of the first transition series. Their binary compounds and complexes illustrating relative stability of their oxidation -states. Coordination number and geometry.

**Unit-II**

**Coordination Compounds:**

Werner's coordination theory and effective atomic number concept chelates. Nomenclature of coordination compounds. Isomerism in coordination compounds.

**Unit-III**

**Chemistry of Lanthanide and Actinide Elements:**

Electronic structure. Oxidation states. Ionic radii and lanthanide contraction. Complex formation

General features. Electronic configuration oxidation states magnetic properties. Complexation behavior, comparison of lanthanides and actinides. super heavy elements.

**Unit IV**

**Oxidation and Reduction:**

Analysis of redox cycle. Redox stability in water, first <sup>1</sup> Latimer <sup>Diagram</sup> Application of redox data in the extraction of elements.

**Unit -V**

**Acids and Bases:**

Theories : Arrhenius, Bronsted- Lowry, Lux-Flood, Solvent system concept and Lewis concept of acids and bases.



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**Non-aqueous Solvents:**

Physical properties of a solvent, types of solvents and their general characteristics, reactions in nonaqueous solvents with reference to liquid NH<sub>3</sub>.

**CH-202 Paper-II: Organic Chemistry**

(2 hrs. or 3 periods/week)

**Unit-I**

**Electromagnetic Spectrum : An introduction**

**Absorption Spectroscopy**

**Ultraviolet (UV) spectroscopy-** Absorption laws (Beer- Lambert law', molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions. Effect of solvents on transitions.

**Infrared (IR) spectroscopy -** Molecular vibrations, Hook's law selection rules, intensity and position of IR bands. Measurement of IR spectrum, fingerprint region.

**Unit-II**

**Alcohols - Classification and nomenclature.**

**Monohydric alcohols-** Methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature, Reactions of alcohol with mechanism. Dihydric alcohols - methods of formations. Chemical reactions of vicinal glycols, oxidative, Trihydric alcohols method of formation. Chemical reactions of glycerol.

**Phenols-** Nomenclature structure and bonding Preparation of Phenols Physical properties and acidic character, comparative acidic strength of alcohols and phenols. Reactions of phenols electrophilic aromatic substitution. Acylation and carboxylation Mechanism of Fries rearrangement. Claisen rearrangement Gatterman synthesis. Hauben reaction, Lederer-Manske reaction and reimer-Tiemann reaction.

**Unit- III**

**Aldehydes and Ketones : Structure of the carbonyl group. Syntheses of aldehydes from acid chlorides synthesis of aldehydes and ketones using 1,3-dithianes and Physical properties.**

**Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives Wittig reaction, Mannich reaction. Oxidation of aldehydes, Baeyer - Villiger oxidation of ketones, Cannizzaro reactions MPV (Meerwein, Ponderf -Verlay), Clemmensen, reductions.**

**Unit-IV**

**Carboxylic Acids**

**Structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength, preparation of carboxylic acids. Reactions of carboxylic acids, Hellö- Volhard - Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation.**

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Methods of formations and chemical reactions of halo acids. Hydroxy acids- malic tartaric and citric acids.

**Unit V**

**Organic compounds of Nitrogen**

Preparation of nitroalkanes and nitroarenes. Chemical reaction of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid.

Amines structure nomenclature and preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles) reductive amination of aldehydic and ketonic compounds. Physical properties stereochemistry of amines.

**CH-203 Paper III : Physical Chemistry**  
(2 hrs. or 3 periods/week)

**Thermodynamics-I**

**First Law of Thermodynamics:** Statement definition of internal energy and enthalpy, heat capacity. Heat capacities at constant volume and pressure and their relationship. Joule's law, Joule-Thomson coefficient and inversion temperature. Calculation of  $w, q, \Delta u$  &  $\Delta h$  for the expansion of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchoff's equation.

**Unit -II**

**Thermodynamics-II**

**Second Law of Thermodynamics :** Need for the law, different statements of the law. Cannot cycle and its efficiency, Carnot- Theorem. Thermodynamic scale of temperature.

**Concept of Entropy:** Entropy as a state function. Entropy as a function of V&T, entropy as a function of P&T. entropy change in physical change. Clausius inequality and entropy as criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

**Third Law of Thermodynamics :** Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities.

**Unit -III**

**Phase Equilibrium:** Statement and meaning of the terms: phase component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system -water, CO<sub>2</sub>, and Sulphur systems.

**Liquid- Liquid mixtures:** Ideal liquid mixture. Raoult's and Henry's Law, Non ideal system azeotropes HCl-H<sub>2</sub>O and ethanol -water systems. Partially miscible liquids : phenol-water, lower distribution law thermodynamic derivation. Application.

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**Unit IV**

**Electrochemistry-I**

Electrical transport- conduction in metals and in electrolyte solutions, Specific conductance and equivalent conductance, measurement of equivalent conductance. Variation of equivalent and specific conductance with dilution.

Migration of ions and Kohlrausch law. Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes (elementary treatment only). Transport number, definition and determination by moving boundary method.

**Unit- V**

**Electrochemistry- II**

Types of reversible electrodes : Gas- metal- ion, metal - insoluble salt anion and redox electrode. potential, standard hydrogen electrode, reference electrodes of cell E.M.F. and single electrode potential. standard hydrogen electrode, reference electrodes standard electrode potential, sign conventions, electrochemical series and its significance.

Electrolytic and Galvanic cells - reversible and irreversible cells conventional representation of electrochemical cells.

EMF of a cell and its measurements. Computations of cells EMF. Calculation of thermodynamic quantities of cell reactions ( $\Delta G$ ,  $\Delta H$  and  $K$ ). Polarization, over potential and hydrogen over voltage.

Concentration cell with and without transport, liquid junction potential.

**Suggested Books:**

1. Principles of Physical Chemistry : B.R. Puri, Sharma and M.S. Pathania
2. A Text Book of Physical Chemistry : A.S. Negi and S.C. Anand.
3. A Text Book of Physical Chemistry : Kundu and Jain
4. The elements of Physical Chemistry . P.W. Atkins Oxford.
5. University General Chemistry : C.N.R. Rao, Mac Millen

**CH-204 Chemistry Practical ( Pass Course), Laboratory Course-II**

(Instructions to the Examiner )

B.Sc. Part II

**CH-204 Chemistry Practical (Pass Course )**

Max.Marks: 50

Duration of Exam : 5 hrs.

Min. Pass Marks: 18

Inorganic Chemistry

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**Ex.1 Volumetric Analysis**

Or

Gravimetric Analysis as mentioned in the syllabus

**Organic Chemistry**

Ex.2 Identification of two organic compounds (one solid and one liquid) through the functional group analysis, determination of melting point, boiling point and preparation of suitable derivative

Or

Perform one experiment out of the experiments on thin layer and paper chromatography given in syllabus.

**Physical Chemistry**

Ex.3 Perform one of the physical chemistry experiments as mentioned in the syllabus

Ex. 4 Viva - voce

Ex.5 Record

18  
13  
12  
5  
5  
50

**Books Suggested (Theory Course)**

1. Basic Inorganic Chemistry F.A. Cotton: G.Wilkinson and P.L. Caus Wiley.
2. Concise Inorganic Chemistry J.D.Lee. ELBS
3. Concepts Inorganic Chemistry B. Doughts. D. Mc Denial and J. Alexander
4. Inorganic Chemistry. D.F. Shriver P.W. Atkins and C.H. Langford. Oxford.
5. Inorganic chemistry. W.W. Porterfield Addison Wesley
6. Inorganic Chemistry. A.G. Sharpe ELBS
7. Inorganic Chemistry. G.I. Miessler and D.A. Tarr. Prentice Hall
8. Organic Chemistry. Morrison and Boyd. Prentice Hall
9. Organic Chemistry. L.G. Wade jr Prentice Hall
10. Fundamental of Organic Chemistry. Solomons. John Wiley.
11. Organic chemistry Vol. I,II,III S.M. Mukherji, S.P. Singh, and R.P. Kapoor, Wiley Eastern Ltd. (New Age International)
12. Organic Chemistry, F.A. Carey. McGraw Hill, Inc.
13. Introduction to Organic Chemistry, Streitwieser. Heathcock and Kosover, Macmillan
14. Physical Chemistry.G.M. Barrow. International Student Edition, McGraw Hill
15. Basic Programming with Application, V.K. Jain Tata McGraw Hill

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### **SCHEME OF EXAMINATION**

#### **B.Sc. (Pass Course) Part-II**

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in theory part as well as the practical part of a subject paper, wherever prescribed, separately. Classification of successful candidates shall be as follows.

First Division	60%	Of the aggregate prescribed at (a) part First Examination excluding those obtained in the Compulsory subject (b) part second Examination Taken together.
Second Division	48%	

All the rest will be declared to have passed the examination, if they obtain a minimum pass mark in each subject viz 36%. No division shall be awarded at the Part I and Part II Examinations.

#### **I. B.Sc. Part II Physics**

Paper I	Exam. 3 Hours Duration	Max. Marks 33	Min. Pass Marks 12
Paper II	Exam. 3 Hours Duration	Max. Marks 33	Min. Pass Marks 12
Paper III	Exam. 3 Hours Duration	Max. Marks 33	Min. Pass Marks 12
Practical	Exam. 5 Hours Duration	Max. Marks 50	Min. Pass Marks 18

#### **Paper-I Thermodynamics and Statistical Physics**

**Work Load: 2 hrs. Lecture /week**

**Examination Duration: 3 Hrs.**

**Scheme of Examination:** Five questions shall be set and all are compulsory. First question shall contain 12 short answer type questions (3 questions from each unit) of one mark each with answer to each question not exceeding 50 words. Candidates have to attempt any 9 questions out of these 12 questions. Remaining four questions will be of 6 marks each and will be set with one question from each unit. Second to fifth questions will have 100% internal choice.

#### **Unit-I**

**Thermal and adiabatic interactions:** Thermal interaction. Zeroth law of thermodynamics. System in thermal contact with a heat reservoir (canonical distribution). Energy fluctuations. Entropy of a system in a heat bath. Helmholtz free energy. Gibbs free energy. Phase transitions. Clausius Clapeyron equation. Vapour pressure curve; Heat engine and efficiency of engine. Carnot's Cycle, Thermodynamic scale as an absolute scale, Maxwell relation and their applications.

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**Unit-2**

**Production of low temperatures and applications:** Joule Thomson expansion and JT coefficients for ideal as well as Vander Waal's gas, porous plug experiment, temperature inversion, Regenerative cooling, Cooling by adiabatic expansion and demagnetization, Liquid Helium He I and He II, superfluidity, Refrigeration through Helium dilution.

**The distribution of molecular velocities:** Distribution law of molecular velocities, most probable, average and r.m.s velocities. Energy distribution function: effusion and molecular beam, the principle of equal partition of energy.

**Unit -3**

**Transport phenomena :** Mean free path, distribution of free path, coefficients of viscosity, thermal conductivity diffusion and their interaction

**Classical Statistics :** Validity of Classical approximation micro and macro states, Thermodynamic probability, relation between entropy and thermodynamic probability, Monoatomic ideal gas, Barometric equation.

**Unit - 4**

**Quantum Statistics:** Bose-Einstein statistics and its distribution function: Planck distribution function and radiation formula, Fermi-Dirac statistics and its distribution function, contact potential thermionic emission.

**Reference Books:**

1. Treatise on heat by Shah & Srivastava.
2. Thermodynamics by DP Khandelwal.
3. Heat & Thermodynamics - Brijlal Subramaniam

**Paper-II: Mathematical Physics and Special Theory of Relativity**

**Work Load: 2 hrs. Lecture/week**

**Examination Duration: 3 Hrs.**

**Scheme of Examination:** Five questions shall be set and all are compulsory First question shall contain 12 short answer type questions (3 questions from each unit) of one mark each with answer to each question not exceeding 50 words. Candidates have to attempt any 9 questions out of these 12 questions. Remaining four questions will be of 6 marks each and will be set with one question from each unit. Second to fifth questions will have 100% internal choice

**UNIT-I**

Orthogonal curvilinear coordinate system, scale factors, expression for gradient, divergence, curl and their application to Cartesian, circular cylindrical and spherical polar Coordinate.

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Dr. J. K. Singh



Coordinate transformation and Jacobian, transformation of covariant, contravariant and mixed tensor, Addition, multiplication and contraction of tensors, Dirac delta function and its properties.

**UNIT-2**

Lorentz transformation and rotation in space-time.

Four vector formulation, energy momentum four vector, relativistic equation of motion invariance of rest mass, orthogonality of four force and four velocity. Lorentz force as an example of four force.

Four momentum conservation, kinematics of decay products of unstable particles and reaction thresholds: Pair production, inelastic collision of two particles, Compton Effect.

**UNIT - 3**

(A) transformation of electric and magnetic fields between two inertial frames.

(B) The second order linear differential equation with variable coefficient and singular points: series solution method and its application to the Legendre's differential equations. Basic properties like orthogonality, recurrence relation, graphical representation and generating function of Associated Legendre function (simple applications).

**UNIT-4**

Techniques of separation of variables and its application to following boundary value problems (I) Laplace equation in three dimensional Cartesian coordinate system - line charge between two earthed parallel plates (II) Wave equation in spherical polar coordinates the vibrations of a Circular membrane, (III) Laplace equation in spherical coordinate system-electric potential around a spherical surface.

**Reference Books:**

1. Mathematical Physics - Satyaprakash.
2. Mathematics for physics & Engg Pipes & Horwill.
3. Mathematical Physics - H S Rajput

**Paper III: Electronics and Solid State Devices**

**Work Load:** 2 hrs. Lecture/week

**Examination Duration:** 3 Hrs

**Scheme of Examination:** Five questions shall be set and all are compulsory First question shall contain 12 short answer type questions (3 questions from each unit) of one mark each with answer to each question not exceeding 50 words Candidates



have to attempt any ten questions out of these 12 questions Remaining four questions will be of 6 marks each and will best with one question from each unit Second to fifth questions will have 100% internal choice

**Unit 1**

**Circuit analysis and PN junctions**

Circuit analysis Networks- some important definitions, loop and nodal equation based on DC and A C circuits (Kirchhoff's Laws). Four terminal network Ampere volt conventions, open, close and hybrid parameters of any four terminal network. Various circuit theorems. Superposition, Thevenin Norton, reciprocity. Compensation, maximum power transfer. PN junction: Charge densities in N and P materials conduction by drift and diffusion of charge carriers PN diode equation.

**Unit 2**

**Rectifiers and transistors**

**Rectifiers:** Half-wave, full wave and bridge rectifier calculation of ripple factor, efficiency and regulation. Filters series inductor, shunt capacitor L-section and T-section filters. Voltage regulation: Voltage regulation and voltage stabilization by Zener diode, voltage multiplier.

**Transistors:** Notitions and volt- ampere characteristics for bipolar Junctions transistor. Concept of load line and operating point Hybrid parameters. CB, CE, CC configurations Junction field effect transistor (JEFT) and metal oxide semiconductor filed effect transistor (MOSFET).

**Unit 3**

**Transistor biasing and amplifiers**

**Transistor biasing:** Need of bias and stability of Q point, stability factors, and various types of bias circuits for thermal bias stability fixed bias, collector to base feedback bias and four Resistor bias.

**Amplifiers:** Analysis of transistor amplifiers using hybrid parameters and its gain-frequency response, Cascade amplifiers, basis idea of direct coupled and RC coupled amplifiers, Differential amplifiers, Amplifier with feedback: Concept of feedback, positive and negative.

Voltage and current feedback circuits. Advantage of negative feedback: Stabilization of gain, effect of negative feedback on output and input resistance, reduction on nonlinear distortion, effect on gain-frequency response.

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### Unit 4

#### Oscillators and Logic Circuits

**Oscillators:** criteria for self-excited and self-sustained oscillation, circuit requirement for buildup of oscillation, basic transistor oscillator circuit and its analysis, Colpitt's and Hartely Oscillator, RC Oscillators.

**Logic circuits:** Logic fundamentals AND, OR, NOT, NOR, NAND, XOR gates, Boolean algebra, De Morgan's theorem, positive and negative logic, logic gates circuit realization using DTL and TTL logic, simplification of Boolean expressions.

#### Reference Books:

1. John D. Ryder. Electronic Fundamentals and Applications, Prentice Hall of India Pvt. Ltd, New Delhi
2. John D. Ryder. Engineering Electronics, McGraw Hill Book Company, New Delhi.
3. Jacob Millman and Christose Halkias, Integrated \* Electronics. Analog and Digital. Circuits and systems McGraw Hill Ltd:(1972).
4. Albert Paul Malvino, Digital Computer Electronics. TataMcGraw- Hill-Pub. Co. Ltd., New Delhi (1983).
5. Kumar & Gupta Hand book of Electronics,
6. GK. Mithal, Hand Book of Electronics.
7. GK Mithall Electronics Devices and Applications:
8. RP Jain. Digital Electronics.

### PRACTICAL

Teaching 1 hrs/week

Examination Duration. 5hrs.

Min Pass Marks. 18

Max Pass Marks: 50

**Note:** Total number of experiment to be performed by the students during the session should be 16 selecting any 8 from each section.

(Perform any Six experiments for the session 2020-21).

#### Section-A

1. Study of dependence of velocity of wave propagation on line parameter using torsional wave apparatus.
2. Study of variation or reflection coefficient of nature of termination using-torsional wave apparatus.
3. Using platinum resistance thermometer find the melting point of a given substance.

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4. Using Newton's rings method find out the wave length of a monochromatic source and find the refractive index of liquid.
5. Using Michelson's interferometer find out the Wavelength of given monochromatic source (Sodium Light)
6. To determine dispersive power of prism.
7. To determine wavelength of sodium light using grating.
8. To determine wavelength of sodium light using Biprism.
9. Determine the thermodynamic constant  $\gamma = C_p/C_v$  using Clement's & Desorme's method.
10. To determine thermal conductivity of a bad conductor by Lee's method.
11. Determination of ballistic constant of ballistic galvanometer.
12. Study of variation of total thermal radiation with temperature.

**Section B**


1. Plot thermo emf versus temperature graph and find the neutral temperature (Use sand bath).
2. Study of Power supply using Two diodes/bridge rectifier with various filter circuits.
3. Study of half wave rectifier using single diode & application of L and/or section filters.
4. To study characteristics of a given transistor PNP/NPN (common emitter, common base and common collector configurations).
5. Determination of band gap using a junction diode.
6. Determination of power factor (cos  $\theta$ ) of a given coil using CRO.
7. Study of single stage transistor audio amplifier variation of gain with frequency).
8. To determine e/m by Thomson's method.
9. Determination of velocity of sound in air by standing wave method using speaker, microphone and CRO.
10. Measurement of inductance of a coil by Anderson's bridge.
11. Measurement of capacitance and dielectric constant of a liquid and gang condenser by de-Sauty bridge.

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 महाराष्ट्र शासन, उच्च शिक्षण विभाग  
 मुंबई (२०२१)



Blue print for setting question paper I & II for B.Sc. part I Physics Examination - 2018

First question is compulsory and is of 10 marks. This question contains 12 short answer type questions of one mark each. Candidates have to attempt any 10 questions with answer not more than 50 words. Second to fifth questions are of six marks each with internal choice.

प्रथम प्रश्न अनिवार्य है और यह 10 अंक का है। इस प्रश्न के अन्तर्गत 12 लघुत्तरात्मक प्रश्न हैं जिनमें से कोई भी 10 प्रश्न हल करने हैं जिनका उत्तर 50 शब्दों से अधिक न हो। प्रश्न संख्या 2 से 5 तक प्रत्येक प्रश्न 6 अंक का है जिसमें आन्तरिक विकल्प है।

1. पचास शब्द सीमा में नीचे भागों के उत्तर दीजिए।

- |      |      |       |        |
|------|------|-------|--------|
| (i)  | (ii) | (iii) | (iv)   |
| (v)  | (vi) | (vii) | (viii) |
| (ix) | (x)  | (xi)  | (xii)  |

Unit - I प्रथम इकाई

2. (a)  
(b)

Or/अथवा

- (a)  
(b)

Unit - II द्वितीय इकाई

3. (a)  
(b)

Or/अथवा

- (a)  
(b)

Unit - III तृतीय इकाई

4. (a)  
(b)

Or/अथवा

- (a)  
(b)

Unit - IV चतुर्थ इकाई

5. (a)  
(b)

Or/अथवा

- (a)  
(b)

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मुख्य अतिरिक्त प्राध्यापक, दिल्ली विश्वविद्यालय



### B. A./B. Sc. Part II Examination-2022

### MATHEMATICS

Teaching : 3 hours per week per theory paper  
2 hours per week per batch for practical  
(20 candidates in each batch)

#### Examination Scheme :

	Min. Pass Marks		Max. Pass Marks
Science	54		150
Arts	72		200

	Duration	Max Marks
Paper - I Real Analysis	3 hrs.	40 (Science) 53 (Arts)
Paper - II Differential Equations	3 hrs	40 (Science) 53 (Arts)
Paper - III Numerical Analysis and Optimization Techniques	3 hrs	40 (Science) 54 (Arts)
Practicals	2 hrs	30 (Science) 40 (Arts)

#### Note :-

01. Syllabus of each of the three papers is divided into FIVE units.
02. Each paper is divided into THREE sections A, B, & C.
03. Section-A : TEN short answer type questions will be set taking two questions from each unit. Each question will carry 1 mark for Science and 1.5 mark for Arts. All questions will be compulsory.
04. Section-B : TEN questions will be set taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt ONE question from each unit.

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05. **Section-C** : FIVE questions will be set taking one questions from each unit. Each question will carry 5 marks for Science in all three papers and 6 marks for Arts in paper I & II and 6.33 marks in paper III. Student has to attempt ANY THREE Questions.
06. Common paper will set for Faculty of Science and Faculty of Social Science. Each candidate is required to appear in the practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the principal in consultation with the head, department of Mathematics in the college.
08. An internal/external examiner can conduct practical examination of not more than 100 (one hundred) candidates (20 candidates in each batch).
09. Each candidate has to pass in theory and practical examinations separately.

**Paper - 1 Real Analysis**

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks 40 (Science)

53 (Arts)

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

**Unit - I :** The set of real numbers as a complete ordered field, Incompleteness of  $\mathbb{Q}$ , Archimedean and dense properties of  $\mathbb{R}$ , Absolute value of real numbers, Intervals, Limit point of a set, Bolzano-Weierstrass theorem, open and closed sets

**Unit - II :** Real sequences, Bounded and unbounded sequences, Monotonic sequence, Limit point and limit of a sequence, Convergence of sequences, Necessary and sufficient condition for convergence, Continuity of a function, Cauchy's and Heine's definition of continuity, Types of discontinuity, Properties of continuous functions on closed intervals.

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**Unit - III: Differentiability**- Darboux theorem, Rolle's theorem, Algebraic and geometric interpretation of Rolle's theorem, Lagrange's and Cauchy's mean value theorems. Improper Integrals and their convergence, Comparison test,  $\mu$ -test, Abel's test and Dirichlet's test.

**Unit - IV: Riemann Integration** - partition of an interval, Darboux sums, Lower and Upper Riemann Integrals, Definition of Riemann Integration, Integrability of continuous, discontinuous and monotonic functions. Fundamental theorem of integral calculus, Mean value theorems.

**Unit - V : Uniform convergence of sequence and series of functions**, Cauchy's criterion for uniform convergence,  $M_n$ -test, Weierstrass M-test, Abel and Dirichlet's tests. **Fourier Series** - Periodic functions, Dirichlet's conditions, Fourier series in the interval  $(a, a+2\pi)$  and particular cases in the interval  $(0, 2\pi)$ ,  $(-\pi, \pi)$ .

### Paper - II Differential Equation

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks 40 (Science)

53 (Arts)

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

**Unit - I :** Order and degree of differential equations. Differential equations of first order and first degree. Method of separation of variables, Homogeneous differential equation, and equations reducible to homogeneous forms. Linear differential equation and equations reducible to linear forms. Exact differential equation. Differential equations of first order but not of first degree- Differential equations solvable for  $x$ ,  $y$  and  $p$ .

**Unit - II :** Linear differential equations with constant coefficients, Complimentary functions and Particular integrals.

**Unit - III :** Homogeneous linear differential equations, Differential equations reducible to homogeneous linear differential equations. Simultaneous differential equations. Differential equations of the form  $dx/P - dy/Q = dz/R$ .

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**Unit - IV :** Linear differential equations of second order- Solution by finding a part of complimentary function, Solution by transformation into Normal form and by changing the independent variable, Factorisation of operators.

**Unit - V :** Partial differential equation of first order and first degree, Lagrange's linear equations, Non-Linear partial differential equations of order one; Charpit's method, Linear partial differential equations with constant coefficient.

### Paper - III Numerical Analysis and Optimization Techniques

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks 40 (Science)

54 (Arts)

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

**Unit - I :** Calculus of Finite Differences- Introduction, Difference Operators, Differences of Polynomials, Factorial notation, Relation between difference and derivative, Separation of symbols, Newton-Gregory's formulae for Forward and Backward interpolation on equal intervals.

**Unit - II :** Central differences- Gauss's central difference interpolation formulae, Stirling and Bessel's interpolation formulae. Numerical integration - General quadrature formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule.

**Unit - III :** Numerical solution of algebraic and transcendental equations - Graphical method, Iterative method, Regula-Falsi method, Newton-Raphson method and their convergences. Solution of system of linear equations - Gauss's elimination method, Gauss-Jordan's elimination method, method of triangularisation of matrices.

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**Unit – IV :** Linear programming problem - feasible solution, optimal solution, Basic solution, Degenerate and non-degenerate basic solution, Convex sets and their properties, Optimality criterion, Simplex algorithm.

**Unit – V :** Duality in linear programming problem - Dual of L.P.P., use of duality to solve L.P.P. - Transportation problem - Basic feasible solution and methods to find it, North-west corner rule, least-cost method, Vogel's approximation method, Optimality criterion.

Practicals

Teaching : 2 Hours per Week

Examination Scheme:

Duration - 2 Hours

	Science	Arts
Maximum Marks	30	40
Minimum Pass Marks	11	14
<b>Distribution of Marks:</b>		
1. Exercises one from each group		
10 marks each =	20 marks	13 marks each = 26 marks
Practical record =	05 marks	07 marks
Viva-voce =	05 marks	07 marks
<b>Total Marks =</b>	<b>30 marks</b>	<b>40 marks</b>

**Group – A :** Numerical solution of algebraic and transcendental equations using Bisection method, Secant method, Newton-Raphson method.

Jacobi's method and Gauss-Seidal method to solve system of linear equations.

**Group – B :** Modelling of industrial and engineering problem into linear programming problem, its dual and their solution by simplex method.

- Note :-
1. Each candidate (Regular/Non-collegiate) has to prepare his/her record.
  2. Students can use Non-programmable Scientific Calculators.
  3. Student must know about all functions and operations of scientific calculator.

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**B.Sc Part-2  
Zoology**

Scheme:  
Max. Marks: 100

Min. Marks: 36

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

**NOTE:**

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

**PAPER - I: Z-201**

**STRUCTURE AND FUNCTION OF INVERTEBRATE TYPES**

**NOTE**

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

**Section-A**

**Structure and Function-I**


Structural and functional organization of vital systems of non-choradates as exemplified by Amoeba, Paramecium, Euglena, Obelia, Sycon, Fasciola, Taenia, Nereis, Hirudinaria, Palaemon, Lamellidens, Pila and Aseterias.

1. Locomotion: Pseudopodial (Amoeba), ciliary (Paramecium), flagellar (Euglena), parapodial (Nereis), pedal-muscular foot (Pila) and tube-foot (Asterias).
2. Skeleton: Endoskeleton (spicules of Sycon), exoskeleton, chitinous (Palaemon), calcareous (Corals, Pila, Lamellidens and Asterias), siliceous (Radiolaria).
3. Nervous System: Sensory and nerve cells (Obelia); brain ring and longitudinal nerves (Fasciola and Taenia); brain and ventral nerve cord (Nereis and Palaemon); nervous system of Pila and Lamellidens.

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अभ्यास-सहायक एवं निदेशिका  
बैंगलूर (का.)



Section - B

Structure and Function - II

1. Food feeding, digestive structures and digestion: Autotrophic (Euglena) : heterotrophic through food vacuole ( Paramecium) and in hydroid and medusoid zooids ( Obelia) : Parasitic ( Fasciola, Taenia); Predatory ( Palaemon)
2. Respiration: Aquatic general body surface (Euglena); dermal bronchial ( Asterias) parapodia (Nereis), gills ( Palaemon); aerial: pulmonary sac (pila), trachea (insect); anaerobic ( Fasciola, Taenia).
3. Excretion: General body surface ( protozoa); Protonephridial system and flame cells (Fasciola, Taenia); nephridia ( Nereis, Hirudinaria); malpighian tubules (insect)
4. Circulation: Cyclosis (Euglena, Paramecium); diffusion ( Sycon, Obelia, Fasciola, Taenia); open circulatory system (Palaemon); closed circulatory system ( Nereis).
5. Reproduction: Asexual (paramecium, Euglena, Sycon); alternation of generation (obelia);

Section - C

Invertebrate Adaptations

1. Evolution of canal system of sponges.
2. Social organization in termites and honey bees.
3. Water vascular system of starfish.
4. Crustacean larvae.

PAPER - II: Z-282

ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

NOTE:

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

Section - A

Animal Physiology with special reference to mammals

1. Osmoregulation in mammals.
2. Physiology of digestion: Various types of digestive enzymes and their digestive action in the alimentary canal.
3. Physiology of blood circulation: Composition and functions of blood; mechanism of blood clotting; body temperature regulation.
4. Physiology of respiration: Mechanism of breathing; exchange of gases; transportation of oxygen and carbon dioxide in blood.
5. Physiology of excretion: Kinds of nitrogenous excretory end products (ammonotelic, uricotelic and ureotelic); role of liver in the formation of these end products. Functional architecture of mammalian kidney tubule and formation of urine.

Section - B

Regulatory aspects of Animal Physiology

1. Physiology of nerve impulse and reflex action: functional architecture of a neuron, origin and propagation of nerve impulse, synaptic transmission.
2. Physiology of muscle contraction: Functional architecture of skeletal muscles; chemical and biophysical events during contraction and relation of muscle fibers.
3. Types of endocrine glands, their secretions and function. Pituitary, adrenal, thyroid, islets of Langerhan's, testis and ovary.

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संस्थान, दिल्ली-110002







- (i) Gram-Positive
  - a. Cocci: Staphylococci, Streptococci
  - b. Bacilli: Diphtheria, Tetanus
- (ii) Gram-Negative
  - a. Cocci: Gonorrhoea, Meningitis
  - b. Bacilli: Diarrhoea
- (iii) Mycobacteria: Tuberculosis, Leprosy
- 4. AIDS and hepatitis. The causative agents, transmission, pathogenicity, laboratory diagnosis, treatment and prevention (elementary idea only).

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Section - C

Biotechnology

1. Definition, history, scope and application of biotechnology, major areas of biotechnology (microbial, plant and animal biotechnology).
2. Vectors for gene transfer.
3. Basic concepts of animal cell, tissue, organ and embryo culture.
4. Protoplast fusion in prokaryotes and eukaryotes.
5. Recombinant DNA technology: hybridomas and their applications, PCR, DNA finger printing, DNA foot printing, RFLP, RAPD & AFLP, Human genome project, Genomics & Proteomics (Brief idea only).
6. Monoclonal antibodies and their applications.
7. Genetic engineering (outline idea only); Applications of genetic engineering, hazards and regulations.
8. Transgenic animals, their uses.
9. Brief account of cloning: its advantages and disadvantages.

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 अरवि (रासा.)



**Syllabus: B.Sc. Part - II (Pass Course)  
Zoology Practical  
(2016-2017)**

**Min. Marks: 18**

**4 Hrs./ Week**

**Max. Marks: 50**

**I. Study of Museum Specimens:**

- Annelida** : Nereis, Heteronereis, Aphrodite, Chaetoptera, Arenicola, Glossiphonia, Pontobdella, Polygordius.
- Onychophora** : Peripatus
- Arthropoda** : Limulus, Spider, Scorpion, Centipede, Millipede, Lepas, Balanus, Squilla, Eupagurus, Crab, Mantis, Honey-bee, (queen, king, worker) Locust, Silkworm, Moth, Beetle, White grub.
- Mollusca** : Chiton, Aplysia, Cypraea, Mytilus, Pearl Oyster, Dentalium, Loligo, Nautilus.
- Echinodermata** : Pentaceros, Echinus, Ophiothrix, Cucumaria, Astedon.
- Hemichordata** : Balanoglossus

**II. Study of Microscopic Slides:**

- Annelida** : T.S. body of Nereis through various regions.
- Arthropoda** : V.S. of integument (cuticle): Pediculus, Bedbug, Termite and its castes, Cyclops, Daphnia, crustacean larvae ( Nauplius, Zoea, Mysis, Megalopa). Statocyst of prawn.
- Mollusca** : V.S. Shell. T.S. gill of pila: Glochidium larva

**III. Study of the Following Through Permanent Slide Preparation:**

- (i) Trachea, Mosquito larva, Lice, Termites.
- (ii) Differential staining and identification of various types of blood cells.

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**IV. Anatomy:**  
Frogs/Squills

: Study of External features, appendages, alimentary canal and nervous system; Hastate Plate

**Cockroach/Grasshopper**

: Study of External features, Appendages, Alimentary canal, Nervous system and Mouthparts.

**V. Microbiology Immunology and Biotechnology:**

1. Preparation and use of culture media for microbes.
2. Study of microbes in food materials like curd, etc (Lactobacillus, Aspergillum, Mucor, Penicillium).
3. Educational tour to any Microbiology Laboratory, Dairy, Food processing factory and Distillery for first hand study. Collection of material may also be encouraged wherever possible. Candidates are expected to submit a detailed report of such visit.
4. Antigen-antibody reactions-precipitation, agglutination
5. A brief practical idea of fermentation of food, food preservation.

**VI. Animal Physiology:**

1. Counting of red and white blood cells in the given blood sample.
2. Estimation of hemoglobin in the given blood sample.
3. Estimation of haematocrit value (PCV) in the given blood sample.
4. Demonstration of enzyme activity (catalase) in liver.
5. Study of salivary digestion of starch and the effect of heat and alcohol on salivary digestion of starch.
6. Study of histological structure of major endocrine glands of mammals.
7. Demonstration of blind spot in Human-eye.

**VII. Biochemistry:**

1. Detection of protein, carbohydrate and lipid in the animal tissue/food samples.
2. Identification of different kinds of mono-di-and polysaccharides in the given food samples
3. Circular paper chromatography of dyes/amino acids.

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**B.Sc. Part - II**  
**Scheme of Practical Examination Distribution of Marks**

**Time: 4 Hrs.**

**Min. Pass Marks : 18**

**Max. Marks: 50**

	<b>Regular</b>	<b>Ex./N.C. Students</b>
1. Anatomy (any system)	3	3
2. Permanent Preparation Exercise in	4	6
3. Microbiology/ Immunology /Biotechnology	5	6
4. Exercise in Animal Physiology	6	7
5. Exercise in Biochemistry	6	7
6. Identification and comments on Spots (1 to 8)	16	16
7. Viva voce	5	5
8. Class Record	5	-
	<b>50</b>	<b>50</b>

**Notes:**

1. With reference to Anatomy, study of prescribed types (charts/models) candidates must be well versed in the study of various systems. CD ROMs, multimedia computer based simulations including computer assisted learning (CAL) and other soft wares may be used.
2. With reference to permanent preparations and microscopic slides, 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 or Necessary permission from chief wildlife warden be sought.

**Recommended Books:**

1. Barnes R. D: Invertebrate Zoology, W. B. Saunders, 1969.
2. Barrington EJW: Invertebrate Structure and Function, 2nd edition John Wiley & Sons, Inc., 1978.
3. Barrington EJW: The Biology of Hemichordata and Protochordata. Oliver & Boyd, London 1965.
4. Barrett KE, Barman SM, Boctano, S and Brooks HL. Ganongs: Review of Medical Physiology. 24th edition Me Graw Hill Education India Pvt. Ltd., 2012.
5. Berril NJ: The Tunicates. The Roy Society, London.
6. Brusca RG and Brusca GJ: Invertebrates. 2nd edition Sinauer/Panama Books, 2003.
7. Cooper GM and Hausman RE: The Cell: A Molecular Approach. 6th edition ASM Press Washington, DC: Sinauer/Panama Books, 2013.
8. Conn EE, Stumpf PK, Bruening G, Doi, RH: Outline of Biochemistry. 5th edition. John Wiley & Sons, 1987.
9. De Robertis EDP and De Robertis Jr EMF: Cell and Molecular Biology. 8th edition Lippincott Williams & Wilkins, 2006.
10. David R, Burggren Wand French K: Eckert Animal Physiology. 5th edition W H

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Freeman & Company, New York, 2001.

11. Eckert R, Randall D. J, Burggren W, French K: Eckert Animal Physiology and Burggren WW & Co. Ltd., 1997.
12. Fox SI: Human Physiology. 8th edition McGraw Hill Education 2003.
13. Gardner EL, Simmons MJ and Snustad DP: Principles of Genetics 8th edition John Wiley & Sons, Inc., 2006.
14. Giese A. C: Cell Physiology. 4th Edition, Saunders, 1973.
15. Glick BR., Paeternak II: Molecular Biotechnology, 4th edition ASM Press, 2010.
16. Goldsby RA, Kindt TJ and Osborne BA: Kuby Immunology. WH Freeman and Co., New York, 2002.
17. Grant: Biology of Developmental System
18. Gupta PK. Genetics: Classical to Modern. Rastogi Publications, 2007.
19. Hall JE: Guyton and Hall Textbook of Medical Physiology. 12<sup>th</sup> edition Saunders Publications, 2010.
20. Hill RW, Wyse GA, Anderson M: Animal Physiology. 3rd edition Sinauer Associates Inc. USA, 2012.
21. Hyman LH: The Invertebrates, Vol. 6, Mc Graw Hill.
22. Jordan EL and Verma PS: Invertebrate Zoology. S. Chand & Company Ltd., 2012.
23. Karp G: Cell & Molecular Biology: Concepts and Experiments. 7th edition John Wiley & Sons, Inc., 2013.
24. Kotpal RL: Modern Text Book of Zoology: Invertebrates. Rastogi Publications, 2012.
25. Lal SS: Practical Zoology Invertebrate. 11th revised edition Rastogi Publications, 2014.
26. Lehninger AL: Biochemistry. 2nd edition Kalyani Publishers, 1991.
27. Lal SS: Practical Zoology Invertebrate. 11th revised edition, Rastogi Publications, 2014.
28. Lehninger AL: Biochemistry, Kalyani Publisher, 2008.
29. Lodish H, Berk A, Kaiser CA, Krieger M, Bertscher A, Florch H, Azon A, Scott M P. Molecular Cell Biology. 7th edition. Mac Millian High Education (International edition) England, 2013.
30. Meyers R. A: Molecular Biology and Biotechnology (A comprehensive Desk References John Wiley & Sons, 1995.
31. Murphy K: Janeway's Immunology. Garland Science: 5th edition, 2011.
32. Nelson DL and Cox MF: Lehninger Principles of Biochemistry. 5th edition W. H. Freeman, 2008.
33. Nelson DL and Cox MM: Lehninger Principles of Biochemistry. 6th edition W. H. Freeman, 2013.
34. Owen J, Punt J, Stranford S: Kuby Immunology. 7th edition WH Freeman & Co. Ltd., 2013.
35. Old RW and Primrose SB: Principles of Gene Manipulation: An Introduction to Genetic Engineering. University of California, 1980.
36. Sastry KV: Animal Physiology and Biochemistry. 2nd edition Rastogi Publications, 2014-15.
37. Vander AJ, Sheerman J, Luciano D: Human Physiology: The Mechanics of Body Function. Mc Graw Hill Co., New York, 1998.
38. Verma PS and Jordan EL: Invertebrate Zoology. S.Chand & Co. Ltd, New Delhi, 2001.
39. Verma PS, Tyagi BS, Agarwal VK: Animal Physiology. 6th edition S. Chand & Co., 2004.
40. Voet D and Voet JG: Biochemistry. 4th edition, John Wiley & Sons, Inc., 2011.
41. Voet D and Voet JG: Biochemistry. John Wiley & Sons, New York, 1990.
42. Verma PS: A Manual of Practical Zoology: Invertebrates. S. Chand & Co. Ltd. New Delhi, 1971.
43. Voet D and Voet JG: Biochemistry. 4th edition, John Wiley & Sons Inc., 2011.
44. Wake MH: Hyman's Comparative Vertebrate Anatomy. 3rd edition University of Chicago Press Ltd. London, 1992.

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- 45. Trigunayat, M.M : A Manual of Practical Entomology. Scientific Publisher, Jodhpur (Raj.)
- 46. Trigunayat, M.M and Kritika Trigunayat: Prayogic Manual Part-2 Scientific publishers, Jodhpur, Rajasthan.

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**B.Sc. Part-II  
BOTANY**

**Scheme:**

**Min. Pass Marks: 36**

Paper - I

3 Hrs duration

**Max Mark: 100**

Max. Marks 33

Paper - II

3 Hrs duration

Max. Marks 33

Paper - III

3 Hrs duration

Max. Marks 34

Practicals Min. Marks : 18

4 Hrs duration

Max. Marks 50

3 hours

4 hours

Duration of examination of each theory paper

Duration of examination of practicals

**Note:**

1. There will be 5 questions in each paper. All questions are compulsory. Candidate has to answer all questions in the main answer book only
2. Q.No. 1 will have 20 very short answer type Questions (not more than 20 words) of half marks each covering entire syllabus
3. Each paper is divided into four units. There will be one question from each unit. These Q.No. 2 to 5 will have internal choice.

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**B.Sc. PART-II**  
**Paper I : Molecular Biology and Biotechnology**

**UNIT-1**

**Genetic Material:** Biological, chemical and physical nature of hereditary material, structure of DNA and RNAs (mRNA, tRNA and rRNA). Watson and crick model of DNA, Nucleosome model.

**DNA replication:** Meselson-stahl experiment of semiconservative replication of DNA.

**UNIT-2**

**Central dogma of life, Transcription in eukaryotes:** role of promoter, gene, pre mRNA synthesis, pre mRNA processing, capping, splicing and polyadenylation.

**Translation:** genetic code (Codon), initiation, elongation and termination.

**UNIT-3**

**Biotechnology:** Functional definition. Basic aspects of plant tissue culture, basal medium, media preparation and aseptic culture technique. Concept of cellular totipotency, Callusing, Differentiation and Morphogenesis; Micropropagation; Tissue culture and its applications. Basic concept of Protoplast culture, Anther culture, Embryo culture and their applications.

**UNIT-4**

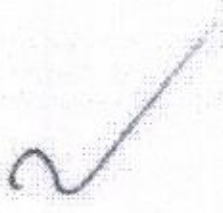
**Recombinant DNA Technology:** Tool and Techniques used in rDNA technology. Restriction enzymes. Vectors for gene transfer, Bacteriophage, plasmids, cosmid and Artificial chromosome. cDNA technology, gene amplification.

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**B.Sc. Part II**  
**Paper- II (Pass Course Syllabus)**  
**Plant Physiology and Biochemistry**

(2 Hrs/week) Max. Marks 33, Duration of examination of theory paper: 3hours

**Unit-1**

**Water** : Absorption and transport of water; Ascent of sap; Transpiration, stomatal factors affecting transpiration; Guttation

**Mineral Nutrition** : Essential micro and macro nutrients; their uptake, hydroponics and nutrient requirement deficiency and toxicity symptoms.

**Unit-2**

**Photosynthesis** : Pigments, Photosynthetic apparatus, Light reaction, photo system I & II,  $Z$  scheme, photophosphorylation, C<sub>3</sub> (Calvin cycle), C<sub>4</sub> Cycle, and factors affecting the photosynthesis.

**Respiration** : Aerobic and anaerobic respiration; RQ (Respiratory Quotient), Krebs' cycle, electron transport system, oxidative phosphorylation and factors affecting the process, Fermentation.

**Unit-3**

**Carbohydrates**: Introduction, importance, nomenclature, classification, molecular structure & function of mono, di and polysaccharides, their properties, glycoside, linkages and glycoprotein.

**Proteins**: Amino acids-structure, electrochemical properties, peptide bonds, chemical bonds and nomenclature, structure and classification of proteins, physical and chemical properties.

**Enzymes**: Structure, nomenclature & classification of enzymes. Characteristics of enzymes, mechanism of action, multi-enzyme system, regulation of enzyme activity.

**Unit-4**

**Photoperiodism & vernalisation**: Physiology and mechanism of action, concept of florigen and phytochrome.

**Plant Hormones**: Auxins, Gibberellins, Cytokinins, Ethylene and ABA: discovery & Physiological effects.

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मार्ग (भा.)



**Exercises:**

1. To determine the osmotic potential of vacuolar sap by plasmolytic method.
2. To study the permeability of plasma membrane using different concentrations of organic solvents.
3. To study the effect of temperature of permeability of plasma membrane.
4. To Separate chloroplast pigments by solvent method.
5. To Separate chloroplast pigments using paper chromatography.
6. To separate amino acids in a mixture by paper chromatography.
7. To prepare the standard curves of protein.
8. To demonstrate the tests for proteins in the unknown samples.
9. To demonstrate the enzyme activity ( amylase, peroxidase and amylase).
10. To demonstrate the tests for different types of carbohydrates and lipids.
11. Bioassay of growth hormone (auxin, cytokinin, gibberic, IAA).
12. Demonstration of phenomenon of osmosis by use of potato osmometer.
13. To demonstrate root pressure.
14. To demonstrate rate of transpiration by use of potometer.
15. Photosynthesis by inverted funnel method. Moill's experiment.
16. To demonstration anaerobic and aerobic respiration.
17. R.Q by Ganong's respirometer.
18. Measurement of growth using auxanometer.

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**B.Sc. Part II**

**Paper- 'II' : Pteridophytes, Gymnosperms And Palaeobotany**

Exam Duration: 3 Hrs.

Maximum Marks: 34

**Unit-I**

General characters of pteridophytes. Distribution and alternation of generation. Steelar system in pteridophytes. Apogamy and Apospory. Economic importance of pteridophytes.

**Unit-II**

Morphology, anatomy and reproduction of Psilotum, Selaginella, Equisetum and Marsilea. Characteristics of Gymnosperms, distribution (K.R.Sporne)

**Unit-III**

Morphology, anatomy, reproduction and life cycle of Cycas, Pinus and Ephedra.

**Unit-IV**

Process of fossilization, types of fossils, techniques of study of fossils. Geological time scale. Primitive land plant: Rhynia, Fossil pteridophytes.

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