Syllabus

DEPARTMENT OF EDUCATION

Bachelor of Science-Bachelor of Education (B.Sc- B. Ed.)

Four Year Integrated Regular Programme

"A" Grade by NAAC & "A" Category by MHRD

Jain Vishva Bharati Institute

(Deemed to be University under section 3 of UGC Act, 1956)

Ladnun-341306 (Raj.)

2017 **Price: Rs.**

DEPARTMENT OF EDUCATION

JAIN VISHVA BHARATI INSTITUTE, LADNUN

Bachelor of Science-Bachelor of Education (B.Sc- B. Ed.)

Four Years Integrated Regular Programme

Jain Vishva Bharati Institute has launched a Bachelor of Education programme recognized by NCTE. The first session started from July 2005 and B.Sc-B.Ed programme has started from October 2016. The programme places specific emphasis on meditation as a tool to enhance learning skills and I.Q. This programme is also the first national teachers training programme to offer study in Education for Sustainable Development. Innovative syllabus and enthusiastic faculty work towards not only training the teachers but also assisting them with campus recruitment. Jain Vishva Bharati Institute is looking forward to train a new class of future generation teachers.

1. Introduction:

Enlightened, emancipated and empowered teachers lead communities and nation towards better and higher quality of life. Teachers are expected to create social cohesion, national integration and learning society. They disseminate knowledge and also generate new knowledge therefore, it becomes essential for any nation to give necessary professional inputs to its teachers. Jain Vishva Bharti Institute pursues the curriculum for its pre-service teacher training programme for women candidates who are far behind but can lead the whole nation. This will is a special programme focussed with a strong foundation in Science of Living. The candidates are encouraged to flourish an environment that promotes value and technology based society.

Duration: The B.Sc -B.Ed programme is full time four years integrated programme.

Eligibility: A candidate who has passed senior secondary from any recognized Board and qualified entrance test conducted as per guideline of State Government.

Objectives:

- To give the subject knowledge of graduation level.
- To develop professionalism in teacher Education Programme.
- To motivate creative thinking and work among teacher trainees.
- To foster moral, social character and spiritual values of trainees.
- To develop Inter-relationship among Department, School and Society.
- To develop cognitive, Affective and Psycho-motor domain of the teacher trainees
- To promote for future Prospective, Employability and Skill based Teacher Training
- To develop Self Evaluation, Positive Attitude and self confidence
- To apply educational innovation and new strategies of the Teacher Education and trainees.

Programme Outcome of B.Sc.-B.Ed. (4 Years Integrated Programme)

The department of education runs the B.Sc.-B.Ed. programme which is recognized by NCTE, New Delhi since 20015. B.Sc. is Bachelor of Science and it is an undergraduate level degree course in the field of science. It has many different specializations like Zoology, Chemistry, Botany, physics Microbiology, Mathematics, and many more. B.Sc. in PCM Physics, Chemistry Mathematics, and CBZ that are Chemistry, Botany, and Zoology, are a combined course which teaches about all the three subjects in detail. Candidates learn about the science of matter in more

specialized manner and learn about its composition, structure, behavior, properties, and the changes it undergoes during any chemical reaction. They also learn about plant biology which includes study about algae, fungi, their growth, reproduction, development, chemical properties, structure, metabolism , etc. as a part of Botany.

The Zoology branch of the course deals with the topics like animal kingdom, their structure, embryology, classification, evolution, etc for both living and extinct animals. Physics: Career Prospects. On successful completion of this course, the candidates are open to working in wide range of employment areas like agriculture research areas, astronomy, aviation industry, colleges, construction firms, cryptography, demolition squads, education firms, hospitals, labs, etc.

Mathematical arguments in a logical manner. and statistics, chosen by the student from the given courses. Understand, formulate and use quantitative models arising in social science, Business and other contexts.

Initially, establishing a study and robust base for scholars in concepts when it comes to the combination of biology and technology manipulation for human benefit. This course consists of implementing the required talent and ability based on sound practical and theoretical expertise that embarks up the development of modern society

Programme Specific Outcomes (PSO) of B.Sc.- B.Ed. (4 Years integrated programme)

1. Professional growth in order to develop and inspire the influence of professional growth.

2. Perceive and identify the analysis and planning of problem solving strategies with the aid of good computation skills.

3. Teaching students to work as a team as it plays an essential role in multidisciplinary dimension.

4. Academic administration to identify and make the scholar ready for new tasks emerging from the development of global society.

5. Developing new and enhancing conversational skills that lead to not only to good communication but also to the excellent drafting abilities linked with technical reports and presentations.

6. Students will develop the basic capability required to evaluate and illustrate basic scientific data.

7. Eventually making the student aware about the skills and qualities indeed required for being a good entrepreneur.

8. Increment in practical knowledge and skills related to the theories of biotechnology subjects.

9. Consciences inspired with legal ethics of professionalism.

Scheme of Examination

1. Hindi/English shall be medium of instruction of examination.
2. Examination shall be conducted at the end of each semester as per the academic/examination calendar notified by the Institute.
3. Each theory paper will be valued as per marks division given in the prospectus which will include semester end theory exam. Practical (wherever applicable) and continuous internal assessment (CIA).
4. CIA will include the following components : (Education Subject)
   - Attendance regularity 10 marks
   - Class Tests 05 marks
   - Assignments 10 marks
   - Class Presentation/Seminar 05 marks

   Total 30 marks

CIA will include the following components - (Only Science Subject)

The CIA comprises of attendance, participation in co-curriculum activities and group discussion etc.

The marks distribution will be as follows-

(1) Attendance - 5 marks

(2) Participation in co-curriculum activities, Prayer, Behavior of candidate, etc.) - 5 marks

(3) Group discussion/Presentation/desk work - 5 marks

Total - 15 Marks

5. Distribution of Marks- (Only Science Subject)
   A. Theory - 60 Marks
   B. Practical - 25 Marks
   C. Continuous Internal Assessment - 15 Marks

   Total = 100 Marks

Paper Patern Only Science Subject :

Type of Questions	Number of Questions	Marks of Each Question	Maximum Marks
Objective type questions	10	½ mark for each question	05
Short answer type questions	4	2 marks for each question	08
Essay type questions	2	3½ marks	07
		Total Marks	20
		Total sum	20X3 = 60

Evaluation Panel:

CIA Concerned Two Subject teacher nominated by the HOD of the Department.

- **Internship Evaluation Panel:** Pre-Internship and Post Internship

  - HOD of the concerned Department
  - Departmental Supervisor/School Head Master/Principal of the School/Nominated School Teacher

Final Lesson Panel: (Two Teaching Subject)

- HOD of the concerned Department * Internal/External Subject Expert
- **EPC Evaluation Panel:** Theory/Practical and viva-voce Examination Panel will be :
- HOD of the concerned Department. * Internal Subject Expert

(B.Sc.-B.Ed)
Semester-I
Distribution of Papers, Marks and Credit

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 101	Childhood and Growing Up	**CC**	**4**	**30**	**70**	**100**
BSE 101	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25 Practical**	
BSE 102	Physics-I	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25 Practical**	
BSE 103	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25 Practical**	
BSE 104	Botany-I	**CE***	**4**	**15**	**20**	**100**
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25 Practical**	
BSE 105	Zoology-I	**CE***		**15**	**20**	**100**

	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical		**4**		**25 Practical**	
JVB 101	Jain Culture and LifeValue	**FC**	**4**	**30**	**70**	**100**
		Total	**20**	**105**	**395**	**500**

*Either BSE 102 & 103 Or BSE 104 & 105

(B.Sc.-B.Ed)
Semester-II

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 201	Assessment for Learning	**CC**	**4**	**30**	**70**	**100**
EDU 202	Learning and Teaching	**CC**	**4**	**30**	**70**	**100**
BSE 201	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25** Practical	
BSE 202	**Physics-I**	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25** Practical	
BSE 203	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25** Practical	
BSE 204	Botany-I	**CE***	**4**	**15**	**20**	**100**
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25** Practical	
BSE 205	Zoology-I	**CE***	**4**	**15**	**20**	**100**
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25** Practical	
		Total	**20**	**105**	**395**	**500**

*Either BSE 202 & 203 Or BSE 204 & 205

(B.Sc.-B.Ed)
Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 301	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25** Practical	
BSE 302	**Physics-I**	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25** Practical	
BSE 303	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25** Practical	
BSE 304	Botany-I	**CE***	**4**	**15**	**20**	**100**
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25** Practical	
BSE 305	Zoology-I	**CE***	**4**	**15**	**20**	**100**
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25** Practical	
EDU 301	Understanding a Discipline and Subject	Any one **CE**	**4**	**30**	**70**	**100**
EDU 302	Innovative Methods					
JVB 301	Critical Understanding of ICT	**FC**	**2**	**15** Practical	**35**	**50**
JVB 302	Yoga and Preksha Meditation	**FC**	**2**	**15** Practical	**35**	**50**
		Total	**20**	**105**	**395**	**500**

*Either BSE 302 & 303 Or BSE 304 & 305

(B.Sc.-B.Ed)
Semester-IV

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 401	Gender , School and Society	**CC**	**4**	**30**	**70**	**100**
EDU 402	Reading and Reflecting on texts (EPC)	**CC**	**2**	**15**	**35 Practical and Viva-Voce**	**50**
EDU 403	Drama and Arts in Education (EPC)	**CC**	**2**	**15**	**35 Practical and Viva-Voce**	**50**
BSE 401	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25 Practical**	
BSE 402	**Physics-I**	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Prcatical				**25 Practical**	
BSE 403	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25 Practical**	
BSE 404	Botany-I	**CE***	**4**	**15**	**20**	**100**
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25 Practical**	
BSE 405	Zoology-I	**CE***	**4**	**15**	**20**	**100**
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25 Practical**	
		Total	**20**	**105**	**395**	**500**

*Either BSE 402 & 403 Or BSE 404 & 405

(B.Sc.-B.Ed)
Semester-V

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 501	General English	**CC**	**4**	**30**	**70**	**100**
EDU 502	Contemporary India and Education	**CC**	**4**	**30**	**70**	**100**
BSE 501	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25** Practical	
BSE 502	Physics-I	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25** Practical	
BSE 503	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25** Practical	
BSE 504	Botany-I	**CE***	**4**	**15**	**20**	**100**
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25** Practical	
BSE 505	Zoology-I	**CE***	**4**	**15**	**20**	**100**
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25** Practical	
		Total	**20**	**105**	**395**	**500**

*Either BSE 502 & 503 Or BSE 504 & 505

(B.Sc.-B.Ed)
Semester-VI

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 601	General Hindi	**CC**	**4**	**30**	**70**	**100**
EDU 602	Pre. Internship	**CC**	**4**	**100** Pre. Internship		**100**
BSE 601	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25** Practical	
BSE 602	Physics-I	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25** Practical	
BSE 603	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25** Practical	
BSE 604	Botany-I	**CE***	**4**	**15**	**20**	**100**
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25** Practical	
BSE 605	Zoology-I	**CE***	**4**	**15**	**20**	**100**
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25** Practical	
		Total	**20**	**75**	**425**	**500**

*Either BSE 602 & 603 Or BSE 604 & 605

Semester VII

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 701	Creating and Inclusive Education	**CC**	**4**	**30**	**70**	**100**
EDU 702	Language Across the Curriculum	**CC**	**4**	**30**	**70**	**100**
BSE 701	Chemistry	Pedagogy of a School Subject **Any two CE**	**4**	**30**	**70**	**100**
BSE 702	Physics					
BSE 703	Mathematics					
BSE 704	General Science					
BSE 705	Biology	**CE**	**4**	**30**	**70**	**100**
BSE 706	Optional Course Environmental Education	**Any one EC**	**4**	**30**	**70**	**100**
BSE 707	Health and Physical Education					
BSE 708	Guidance and Counseling					
BSE 709	Distance Education					
BSE 710	Additional Course (Any one) 5.1 Chemistry					
	5.2 Physics					
	5.3 Mathematics					
	5.4 General Science					
	5.5 Biology					
		Total	**20**	**150**	**350**	**500**

Semester VIII

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU-801	Knowledge and Curriculum (Part-A)	**CC** Any one	**4**	**30**	**70**	**100**
EDU-802	Knowledge and Curriculum (Part-B)					
EDU-803	Post Internship	**CC**	**16**	**160 Internship+ 120+120=240 Practical (Two Subjects final lesson)**		**400**
		Total	**20**	**30**	**470**	**500**

Semester I

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU101	Childhood and Growing Up	**CC**	**4**	**30**	**70**	**100**

Objectives:

- Teacher tainees can aware about concept, methods & applications of Educational Psychology.
- To aware the trainees about concept and developmental dimensions of childhood.
- Trainees got informed about imagination, creativity & interests at school level.
- To know the related problems of Adolescence & remedies through Guidance & Counselling services.
- To aware about the process of human development
- To build sensitivity towards childrens' needs and capabilities within their socio-cultural context

Course Contents:

UNIT-I Educational Psychology and Development

a) Educational Psychology : Concept, Methods & Applications
b) Implications of Educational Psychology:Teachers, Curriculum, Class-room Situations
c) Indian Psychology : Concept and its implication
d) Growth & Development
e) Cognitive development:- Piaget & Bruner

UNIT-II Childhood and Its Development

a) Childhood : Its concept & characteristics
b) Childhood : Physical, Mental, Emotional, Social & Moral Development
c) Childhood : Dimensions to fostering Imagination, Memory & Creativity
d) Childhood : Activities for Personality Development
e) Childhood : Language Development

UNIT-III Adolescence and Its Development

a) Adolescence : Its Meaning & Characteristics
b) Adolescence : Physical, Emotional, Social, Spiritual & Moral Development
c) Adolescence : Fostering Thinking, Reasoning & Problem- solving abilities
d) Adolescence : Activities for Personality Development
e) Adolescence : Related Problems & Remedies
f) Guidance & Counselling services in schools

UNIT-IV Learner : Psychological Dimensions & New Trends

a) Personality : Concept, Types & Measurement
b) Intelligence & Multiple Intelligence : Meaning, Theories & Measurement
c) Creativity : Meaning, Development & Measurement
d) Adjustment : Concept, Process & Mechanism
e) Mental Health : Concept, Components & Scope

Assignment & Practical Works: (Any Two)

- Prepare a short term project to enhance Imagination, Creativity and Memory for school level students
- Prepare, administer and interpret a Case study/ Questionnaire related to problems of adolescence
- One term paper related to topics in above unit
- Organize various Guidance and Counseling campaign for secondary level students
- Administer, Score and interpret a standardized psychological test related to personality/Intelligence/ Creativity/ Mental Health/Adjustment
- Prepare a Survey report related to various psychological dimension, problems and related remedies for school students

Learning Outcomes: After completion of this course students would able to:

- ❖ Utilize the knowledge of Educational Psychology for school education.
- ❖ Apply the concept of Growth & Development in teaching field.
- ❖ Plan various activities to fostering imagination, creativity & interests at school level.
- ❖ Know about various aspects related to Cognitive, Emotional & Social development of learner.
- ❖ Diagnose related problems of Adolescence & remedies through Guidance & Counselling services

Suggested Readings:

1. Backett Chris (2004), Human Growth & Development, Sage Publication
2. Das, J. P. (1998), The Working Mind : An Introduction to Psychology, Sage Publication.
3. Chomskey, N. (1968), Language and Mind, Harcourt Brace, Jovanobich.
4. Singh Indramani & Parasuraman, Raja (1998) Human Cognition - A Multi Disciplinary Perspective, Sage Publication.
5. Baddeley, A. D. (1996) Human Memory : Theory and Practice, Washington, DC : Psychology Press.
6. Gruneberg, M. M.; Marris, P.E. & Skyes, R.N. (1998) (Eds) Practical aspects of memory; Current research and issues (Vol.2) John Wiley, New York.
7. Brown J. (1976), Recall and recognition, London.
8. Piaget, J. (1970), Science of Education and The Psychology of child, New York : Orion Press.
9. Hurlock, Elizabeth B. (2007), Child Development, Tata Mc Grow-Hill Publishing Company Ltd. New Delhi
10. गुप्ता, एस.पी., गुप्ता, अलका, (2007), उच्चतर शिक्षा मनोविज्ञान, शारदा पुस्तक भवन, इलाहाबाद
11. पाठक, पी.डी., (2007), शिक्षा मनोविज्ञान, विनोद पुस्तक मंदिर, आगरा
12. मंगल, एस.के.,(2008),शिक्षा मनोविज्ञान, प्रिंटिस हॉल ऑफ इण्डिया प्राइवेट लिमिटेड,नई दिल्ली
13. मूरजानी जानकी, नारंग, दर्शन कौर एवं मणिका मोहन, बाल विकास का मनोविज्ञान, अपोलो प्रकाशन, जयपुर
14. यादव, सियाराम, (2008),अधिगमकर्ता का विकास एवं शिक्षण अधिगम प्रक्रिया, शारदा पुस्तक भवन, इलाहाबाद
15. शर्मा, जे.डी., (2008), मनोविज्ञान की पद्धतियाँ एवं सिद्धान्त, विनोद पुस्तक मंदिर, आगरा
16. श्रीवास्तव, प्रमिला, (2008), बाल विकास एवं शिक्षा संदर्शिका, कनिष्क पब्लिशर्स, नई दिल्ली

Semester-I

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 101	Chemistry-I	Any Three CC	4	15	20	100
	Chemistry-II				20	
	Chemistry-III				20	
	Chemistry Practical				25 Practical	

Chemistry-Paper-I : Inorganic chemistry

Objectives:

- To understand about shape of s,p,d,f orbitals and atomic structure.
- To develop critical understanding about comparative study of differet elements on the basis of periodicity .
- To promote awareness about principles related to atomic structure and chemical bonding.
- To know about molecular orbital theory of homo and heteronuclear compounds.

Unit 1 : Atomic structure

Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, quantum number, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configuration of the elements, effective nuclear charge.

Unit2 : Periodicity of p- block elements & Chemistry of noble gases

Comparative study of p-block elements: group trends, electronic configuration, atomic and ionic radii, ionization energy, electron affinity, electronegativity, oxidation states, inert pair effect.

Introduction of noble gases,Chemical properties of the noble gases, compounds of noble gases, chemistry of xenon, stucture and bonding of xenon compounds.

Unit 3 : Chemical Bonding Part I

Introduction of chemical bonding, properties of covalent bond, valence bond theory and its limitations, directional characteristics of covalent bond, hybridization, energetics of hybridisation and shapes of different molecules and ions, Valence shell electron pair repulsion (VSEPR) theory to $SnCl_2$, H_3O^+, NH_3, H_2O, $TeCl_4$, ClF_3, ICl_2^-

Unit 4 : Chemical Bonding Part II

Linear combination of atomic orbitals, types of molecular orbitals, MO theory for homonuclear molecules and ions (H_2^+ to Ne_2), molecular orbital theory for heteronuclear molecules (CO, NO) multicentre bonding in electron deficient molecules, bond strength and bond energy, dipole moment, percentage ionic character from dipole moment and electronegativity difference.

Learning Outcomes: After complition the course student would able to:

- Explain the principles related to atomic structure, periodicity & chemical bonding.
- Plot and interpret probability distribution curves, electronic configuration, shapes of molecules and bonding structures.

- ❖ Identifies the relationship among periodicity of various elements and properties of chemical bonding.
- ❖ Classify the elements on the basis of atomic structure, periodicity and their basic properties.

Chemistry-Paper-II : Organic chemistry

Objectives:

- ❖ To understand about reaction mechanism of organic compounds.
- ❖ To aware about different types ofchemical reactions.
- ❖ To provide information about nomenclature of alkane and cycloalkane .
- ❖ To know about synthesis of alkenes and cycloalkenes .
- ❖ To acquaint about nomenclature and classification of Dienes and alkyns.

Unit-I : Mechanism of organic reaction

Homolytic and heterolytic bond breaking, Types of reagents , electrofiles and nucleofiles. Types of organic reactions, energy considerations, reactive intermediates-Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes with examples. Assigning formal charges on intermediates and other ionic species. Method of determination of reaction mechanism (product analysis, intermediates, isotope effect, kinetic and stereo chemical studies)

Unit-II : Alkanes & Cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes. The alkyl group. Isomerism in alkanes sources, methods of formation (with special reference of Wurtz reaction, Kolbe reaction, Corey House reaction and decarboxylation of carboxylic acids.) Physical properties and chemical reactions of alkanes, Mechanism of free radical halogenations of alkanes, orientation, reactivity and selectivity.

Nomenclature, method of formation, chemical reactions, Baeyer strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings.

Unit-III : Alkenes & Cycloalkenes

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenatio n of alkyl halides, regioselectivity in alcohol dehydrations. The Saytzeff rule, Hofmann elimination. Physical properties and relative stabilities of alkenes. Chemical reactions of alkenes—mechanism involved in hydrogenations, Markownikoffs rule, hydroboration –oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$, polymerization of alkenes. Subsititution at the allylic and vinylic position of alkenes. Industrial applications of ethylene and propene.

Method of formation, conformation and chemical reactions of cycloalkenes.

Unit-IV Dienes & Alkynes

Nomenclature and classification of dienes, isolated, conjugated and cumulated dienes, Structure of allenes and butadiene, methods of formation, polymerization, chemical reactions, 1,2and 1,4- additions, Diels-Alder reaction.

Nomenclature, structure and bonding in alkynes, methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrofilic and nucleofilic addition reactions, Hydroboration-oxidation, metal – ammonia reduction, oxidation and polymerisation.

Learning Outcomes: After complition the course student would able to:

- ❖ Explain about reaction mechanism of organic compound.

- ❖ Know about synthesis of alkane and cycloalkanes .
- ❖ Classify various derivatives on the basis of isomerism, rules of reacitivity and theories.
- ❖ Apply the mechanism of chemical reaction for explaning chemical bonding, nomenclature of various compounds.

Chemistry-Paper-III : Physical chemistry

Objectives:

- ❖ To develop curiosity about mathematical concept and use of computer .
- ❖ To provide information about various laws and their implications .
- ❖ To aware about different states, Vander Waals equation and their derivations.
- ❖ To understand about liquid stage and classification of liquid crystals.

Unit I : Mathematical Concepts and Computer

Logarithmic relations, curve sketching, linear graphs and slopes **,**Differentiations of functions like k^x, e^x, x^n, sin x, log x: maxima and minima**,** Integration of some useful relevant functions: Permutations and combinations**,** Factorials and Probability **,**Application of computers in physical chemistry

Unit II : Gaseous States 1

Gaseous laws and their derivations, postulate of kinetic theory of gases and its derivation, deviation from ideal behavior, (with respect to pressure and volume), Vander Waals equation of state

Unit-III : Gaseous States 2

Critical phenomenon : PV isotherm of real gases, continuity of state, the isotherms of Vander Waals equation, relationship between critical constant and Vander- Waals constant, the law of corresponding states, reduced equation of state.

Root mean square, average and most probable velocity. Qualitative discussion of the Maxwell`s distribution of molecular velocities, collision number, mean free path and collision diameter. Liquification of gases.

Unit-IV : Liquid state

Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solid, liquid and gases. Liquid crystals: difference between liquid crystal, solid and liquid. Classification, structure and application of liquid crystal.

Learning Outcomes: After complition the course student would able to:

- ❖ Plot and interpret various graphs, probability curves and structures of gaseous and liquid states.
- ❖ Explain logarithmic relations, root mean square and laws of corresponding liquid and gaseous states.
- ❖ Measure and calculate the differentiations of functions, collision number and probability to define various behavior of different states.

PRACTICALS

Inorganic chemistry

Qualitative Analysis: Semi microanalysis; separation and identification of three cations and three anions in the given inorganic mixture, specific tests for some typical combination of acid radicals.

Physical chemistry

Viscosity, Surface Tension

1. To determine the percentage composition of a given mixture (non-interacting systems) by viscosity method.
2. To determine the relative viscosity of given unknown organic liquid by viscometer.
3. To determine the relative surface tension of given unknown organic liquid by stalagmometer.
4. To determine the percentage composition of a given binary mixture by surface tension method.

Viva-Voce and Record

Suggested Reading:

1. कार्बनिक रसायन, सुरेश आमेटा, एच.के. पाण्डे, एच.एस. शर्मा, पींकी बी. पंजाबी एवं भूपेन्द्र शर्मा हिमांशु पब्लिकेशन्स, उदयपुर
2. अकार्बनिक रसायन, ओझा, भोजक, कोठारी, चतुर्वेदी, एवं वी.के. स्वामी, रमेश बुक डिपो, जयपुर
3. प्रायोगिक रसायन, भार्गव, लवानिया, ओझा, रमेश बुक डिपो, जयपुर
4. भौतिक रसायन, शर्मा, भार्गव, गुप्ता, रमेश बुक डिपो, जयपुर
5. कार्बनिक रसायन, विजयश्री मनोज छंगाणी, अल्का पब्लिकेशन, अजमेर
6. अकार्बनिक रसायन, विजयश्री कोठारी छंगाणी, अल्का पब्लिकेशन, अजमेर
7. प्रायोगिक रसायन, छंगाणी, विजयश्री, खण्डेलवाल, अल्का पब्लिकेशन, अजमेर
8. अकार्बनिक रसायन, जी.के. रस्तोगी, यशपाल सिंह, कॉलेज बुक हाऊस, जयपुर
9. भौतिक रसायन, वी.के. गोयल, आर.एस. पीतलिया, कॉलेज बुक हाऊस, जयपुर
10. प्रायोगिक रसायन, वी.के. गोयल, आर.एस. पीतलिया, कॉलेज बुक हाऊस, जयपुर
11. अकार्बनिक रसायन, लवानिया, गुप्ता, ओझा, बंसल, रमेश बुक डिपो, जयपुर

Semester-I

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 102	Physics-I	CE*	4	15	**20**	100
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25 Practical**	

Physics-Paper-I : MECHANICS – I

Objectives:

- To understand the physical laws and frames of reference.
- To aware the concept of special theory of relativity.
- To develop knowledge about conservation law.
- To give information about rigid body dynamics.

UNIT-I Physical Laws and Frames of Reference:

Inertial and non-inertial frames, examples. Transformation of displacement, velocity and acceleration betweendifferent frames of reference involving translation. Galilean transformation and invariance of Newton's law. Noninertial frames, fictitous or pseudo forces, Transformation of displacement, velocity

and acceleration between rotating co-ordinate systems, centrifugal acceleration, Coriolis force and its applications, Motion relative to earth. Foucault's pendulum

UNIT-II Special Theory of Relativity:

Postulates of special theory of relativity. Lorentz transformations, Addition of velocities and acceleration, Time dilation and length contraction. Variation of mass with velocity, Relativistic energy and mass energy relation.

UNIT-III Conservation Laws:

Conservative forces. Potential energy. Potential energy in gravitational and electrostatic field. Rectilinear motion under conservation forces. Discussion of potential energy curves and motion of a particle. Conservation of angular momentum about an arbitrary point, Precessional motion of spinning top, Spin precession in constant magnetic field.

UNIT-IV Rigid Body Dynamics:

Equation of motion of a rotating body, inertial coefficients, case of J not parallel to w, kinetic energy of rotation and idea of principle axis. Calculation of moment of inertia of a disc, spherical shell, hollow and solid spheres and cylindrical objects (cylindrical shell, solid cylinder) about their symmetric axis through centre of mass.

Learning Outcomes: On completion of the course students would able to:

- Applies relative motion Property.
- Discuss on the Parameters defining the motion of mechanical systems.
- Classify the interaction of forces between solids in mechanical systems.
- Describe the rigid body dynamics.
- Calculate the moment of inertia about symmetric axis & CM.

Suggested Readings :

1. Berkeley Physics Course Vol. 1, Mechanics (Mc Graw-Hill)
2. The Feynman Lecures on Physics, Vol. 1, R.P. Feynman R.B. Ligton and M.Sands (Narosa Publishing House)
3. P.Khandelwal - Oscillation and Waves, (Himalaya Publishing House, Mumbai)
4. R.S. Gambhir - Mechanics (CBS Publishers and Distributors, New Delhi)
5. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, 2015–16, यांत्रिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली

Physics-Paper-II : MECHANICS – II

Objectives:

- To understand the centre of mass frame.
- To aware the concept of motion under central forces.
- To develop knowledge about elasticity-I .
- To give information about elasticity-II and its examples.

UNIT-I Centre of mass frame:

Centre of mass, Two particle System, motion of centre of mass and concept of reduced mass, Conservation of energy and linear momentum, Collision of two particles in one and two dimensions (elastic and inelastic), Analysis of collision in centre of mass frame. Slowing down of neutrons in moderator. System with varying mass. Angular momentum and charged particle scattering by a nucleus as an example.

UNIT-II Motion under central forces:

Motion under central force, Gravitational interaction, Inertial and gravitational mass. General solution undern gravitational interaction. Rutherford scattering. Discussion of trajectories. Cases of elliptical and circular orbits. Kepler's laws,

UNIT-III Elasticity-I:

Elasticity, Small deformations, Young's modulus, Bulk modulus and Modulus of rigidity for an isotropic solid, Poisson's ratio, relation between elastic constants. Elastic theorems.

UNIT-IV Elasticity-II:

Theory of bending of beams and Cantilever, Torsion of a cylinder, Bending moments and Shearing forces. Experimental determination of elastic constants by bending of beam.

Suggested Readings :

1. Berkeley Physics Course Vol. 1, Mechanics (Mc Graw-Hill)
2. The Feynman Lecures on Physics, Vol. 1, R.P. Feynman R.B. Ligton and M.Sands (Narosa Publishing House)
3. P.Khandelwal - Oscillation and Waves, (Himalaya Publishing House, Mumbai)
4. R.S. Gambhir - Mechanics (CBS Publishers and Distributors, New Delhi)
5. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, 2015–16, यांत्रिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली

Learning Outcomes: After complition the course student would able to:

- Describe center of mass.
- Applies the vector theorems of mechanics.
- Classify the analytical mechanics.
- Use of theory of bending of beam & cantilever to determine the deformation. Differentiating various elastic coefficients.

Physics-Paper-III: ELECTROMAGNETISM – I

Objectives:

- To understand the vector field and vector theory.
- To aware the concept of curl and the field of stationary charge.
- To develop knowledge about the field of moving charge.
- To give information about the magnetic field.

UNIT -I Vector Fields:

Partial derivative. Gradient of a scalar function. Line integral of a vector field. Divergence of a vector field. Divergence in the Cartesian coordinates, Concept of solid angle. Gauss divergence theorem, Gauss law in differential form, Gauss law from inverse square law, physical meaning of divergence of a vector, The Laplacian operator. Possion's and Laplace equations.

UNIT -II Curl and the Field of Stationary Charge:

Curl of a vector field, curl in Cartesian coordinates, Stoke's theorem, physical meaning of curl. Potential difference and potential function. Potential energy of a system. Application: energy required to build a uniformly charged sphere. Classical radius of the electron, potential and field due to a short dipole, torque and force on a dipole in a Z external field.

UNIT -III The Field of Moving Charge:

Magnetic force, Measurement of charge in motion, Invariance of charge. Electric field measured in different frames of reference, Field of a point charge moving with constant velocity, Force on a moving charge, Interaction between a moving charge and other moving charges.

UNIT – IV The Magnetic Field:

The definition of magnetic field, properties of the magnetic field. Ampere's circuital law with applications. Ampere's Law in the differential form. Vector potential. Poissions equation for vector potential. Field of any current carrying wire and deduction of Bio-Savart law.

Learning Outcomes: After complition the course student would able to:

- ❖ Describe the basic mathematical concepts related to electromagnetic vector fields.
- ❖ Discuss about the principles of electrostatics.
- ❖ Applies the principles of magneto statics.
- ❖ Differentiation between electric field and electric potential.
- ❖ Calculate boundary conditions.

Suggested Readings :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, 2015–16, विद्युत चुम्बकत्व, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली

Physics Practical: I

1. To study the variation of power transfer to different loads by a D.C. source and to verify maximum power transfer theorem.
2. To study the variation of charge and current in a RC Circuits with different time constant (using a DC source).
3. To study the behaviour of an RC Circuits 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 the decay of current in an LR circuit with a source of constant emf.
5. To study the voltage and current behavior of an LR circuit with an AC power source. Also, determine power factor, impedance and phase relations.
6. To study the characteristics of a semiconductor junction diode and determine forward and reverse resistances.
7. To study the magnetic field along the axis of a current carrying circular coil. Plot the necessary graph and hence find the radius of the circular coil.
8. To determine the specific resistance of a materials and determine difference between two small resistance using Carey Foster's bridge.
9. To convert galvanometer into an ammeter of a given range.
10. To convert galvanometer into a voltmeter of a given range.
11. Any experiment according to theory paper.

Suggested Readings :

1. प्रभा दशोरा, 2015, प्रथम वर्ष प्रायोगिक भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली

Semester-I

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 103	Mathematics-I	CE*	4	15	**20**	100
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25 Practical**	

Mathematics -Paper-I : Discrete Mathematics-I

Objectives:

- Discuss about the set, Relation and function-Binary Relation.
- To aware about the Boolean Algebra- Lattices and Algebraic Structure.
- Understand the Logic and Propositional Calculation.
- To discuss about duality.

Unit 1 : Sets, Cardinality, Principal of inclusion and exclusion, Mathematical induction. Relations and Functions- Binary relations, Equivalence relations and Partitions, Partial ordered relations and Lattices, Chains and Antichains, Pigeon Hole principle.

Unit 2: Boolean Algebras- Lattices and Algebraic structure, Duality, Distributive and Complemented Lattices. Boolean Lattices, Boolean functions and expressions.

Unit 3 ; Fundamental theorem of arithmetic, divisibility in Z, Congruences, Chinese Remainder Theorem, Euler's function, primitive roots.

Unit 4: Logic and Propositional Calculus, Propositions, Simple and compound, Basic Logial _,--eperations, Truth tables, Tautolo ies and contradictions Propositional Functions. quantifiers.

Learning Outcomes: After complition the course student would able to:

- Classify the terms set, Relation and function-Binary Relation.
- Interpret the Boolean Algebra- Lattices and Algebraic Structure.
- Solve the Fundamental Theorem of Arithmetic, Euler's Function.
- Calculate the Logic Problem.
- Describe the duality property.

Suggested Reading :

1. V.K.Balakrishnan, Introductory Discrete Mathematics, Prentice-Hall, 1996.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1995.
3. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, 1986.
4. Kenneth H. Roson, Discrete Mathematics and Its Applications, Tata Mc-Graw Hiils, New Delhi, 2003.

5. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड़, जितेन्द्र सैनी, विविक्त गणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
6. जी.सी. गौखरू सैनी, विविक्त गणित, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics -Paper-II : Differential Calculus

Objectives:

- To understand the series and type of series.
- To aware the concept of curvature.
- To develop knowledge about the partial differentiation.
- To give information about the conic section.

Unit I: 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.

Unit 2: Derivative of the length of an arc. Pedal equations. Curvature — Various formulae, Centre of curvature and Chord of curvature.

Unit 3 Partial differentiation. Euler's theorem for homogeneous functions. Chain rule of partial differentiation. Total differentiation, Differentiation of implicit functions.

Unit 4: Envelopes and evolutes, Maxima and Minima of functions of two variables. Lagrange's method of undetermined 'multipliers. Asymptotes. Multiple poants. Curve tracing of standard curves (Cartesian and Polar curves).

Learning Outcomes: After complition the course student would able to:

- Identify the Test of convergence of a series.
- Calculate the Derivative of the Length of an Arc, Pedal Equation.
- Classify the Partial Differentiation.
- Use of theory of Envelopes and Evaluate Maxima & Minima of Functions of Two Variables.
- Calculate the Euler Theorem for Homogeneous Functions.

Suggested Reading:

1. Chandrika Prasad and Gorakh Prasad, A Text Book on Differential Calculus, Pothishala Pvt. Ltd., Allahabad, 1992.
2. Slituiti Narayan and P.K. Mittal, Differential Calculus, S. Chand & Co., N. D., 2013.
3. H.S.Dhami, Differential Calculus, Age Int. Ltd., New Delhi, 2012.
4. M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
5. H. Anton, 1. Bivens and S. Davis, Calculus (7th Edition), John Wiley and sons (Asia), Pt Ltd., Singapore, 2002.
6. G.B. Thomas, R. L. Finney, M. D. Weir, Calculus and Analytic Geometry, Pearson Education Ltd, 2003.

7. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड़, जितेन्द्र सैनी, अवकलन गणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
8. जी. सी. गौखरू सैनी, अवकलन गणित, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics -Paper-III : Analytic Geometry I

Objectives:

- To understand the polar equation of conics.
- To aware the concept of circle of conics.
- To develop knowledge about the sphere and cone.
- To give information about the cylinder.

Unit I : Polar equation of conics, Polar equation of tangent, normal and asymptotes,

Unit 2 chord of contact, auxiliary circle, director circle of conics

Unit 3: Sphere, Cone,

Unit 4 ; Cylinder

Learning Outcomes: After complition the course student would able to:

- Discuss on the Concept of Polar Equation of Conics.
- To understand the 2-D & 3-D Geometry of Sphere and Cone.
- To identify the Polar Equation of Tangent.
- To understand the 2-D & 3-D Geometry of cylinder

Suggested Reading :

1. N.Saran and R.S.Gupta, Analytical geometry of Three Dimenssions, Pothishala Pvt. Ltd., Allahabad, 1992.
2. P.K. Jain and Khalil Ahmed, A Text Book of Analytical geometry of Three Dimenssions, Wiley-Eastern Ltd., 2000.
3. बी.एल. चौरसिया, संजीव त्यागी, अनिल शर्मा, बी. एल. जांगीड़, जितेन्द्र सैनी,एनालिटिक ज्यामिती, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
4. जी.सी. गौखरू सैनी,, एनालिटिक ज्यामिती, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Semester-I

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 104	Botany-I	CE*	4	15	**20**	100
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25 Practical**	

Botany -Paper-I : MICROBIOLOGY

Objectives:

- To learn about the history, discovery, concept and applications of microbiology.
- To understand the ultra structures and classification of bacteria
- To know the structural component, cycle of life, reproduction of viruses with their diseases.
- To comprehend the basic concept of food spoilage and food preservation

- To aware the economic importance of bacteria and viruses

UNIT I: History and development of Microbiology

History and development of Microbiology; contribution of eminent scientists (Antony Van Leeuwenhoek, Louis Pasteur, Robert Koch, Elie Metchnikoff, Paul Ehrlich, Alexander Flemming, Selman A. Waksman, Edward Janner), spontaneous generation, biogenesis, germ theory of disease, vaccination and discovery of antibiotics, concept of quorum sensing and biofilms, microbial nutrition and scope of microbiology

UNIT II: Bacteria .

General characteristics, occurrence, classification, ultra structure of Bacterial cell: morphology (structure and shapes), flagella, capsule, nutritional types, chromatin material. Reproduction-vegetative, asexual and sexual (transformation, conjugation and transduction), Comparison of Archaebacteria and Eubacteria, Gram positive and Gram negative Bacteria, Cyanobacteria: Cell structure, reproduction and life history of *Nostoc*.

UNIT III: Viruse and Mycoplasma

Discovery, classification and structural component of Viruses, replication, lytic and lysogenic cycle, Bacteriophages, Structure and reproductive cycle of TMV and Pox virus, Transmission of viruses, Mycoplasma: Occurrence, morphology, reproduction and importance.

UNIT IV: Economic importance of bacteria and Viruses

Economic importance of bacteria with special reference to their role in agriculture, industry, waste management and biocontrol. Economic importance of viruses with special reference to vaccine production, role in research and medicine. Probiotics. Basic concept of food spoilage and food preservation.

Learning Outcomes: After complition the course student would able to

- Understand the ultra structures and classification of bacteria
- Describe the structural component, cycle of life, reproduction of viruses with their diseases.
- Discuss the history, discovery, concept and applications of microbiology.
- Comprehend the basic concept of food spoilage and food preservation
- Explain the economic importance of bacteria and viruses

Suggested Readings:

- Agrawal, K. and Sharma, J. 2014. A Text book of Mycology, Microbiology and Plant Pathology. CBH publisher, Jaipur.
- Aneja, K. R. 2003. Experiment in Microbiology, Plant Pathology and Biotechnology. New age international (P) Ltd. Publishers, New Delhi.
- Biswas, S. B. and Biswas, A. 2000. An introduction of Viruses. Vikas publications, New Delhi.
- Dubey, R. C. and Maheshwari, D. K., 2002. A Text Book of Microbiology. S. Chand and Co., New Delhi.
- Kumar, H. D. and Kumar, S. 1998. Modern Concepts of Microbiology. Vikas publishing house Pvt. Ltd., New Delhi.
- Madahar, C. L. 2001. Introduction of Bacteria. Mc Graw Hill Edu. Pvt. Ltd., London.
- Mckane, L. and Judy, K. 1996. Microbiology: Essentials and Applications**.** McGraw Hill, New York.
- Pandey, S. N. and Trivedi, P. C. 2005. A text book of Fungi, Bacteria and Virus. Vikas Publishing House, New Delhi.
- Pelczar, M.J. Microbiology. *5th edition***,** Tata Mc Graw-Hill Co., New Delhi.
- Presscott, L., Harley, J. and Klein, D. 2005. Microbiology**.** 6th edition**,** Tata Mc Graw-Hill Co., New Delhi.
- Purohit, S. S. 2002. Microbiology. Agro. Bot. Publication, Jodhpur.
- Sharma, P. D. 2003. Microbiology and Pathology. Rastogi Publication, Meerut.
- Singh, V. and Srivastava, V. 1998. Introduction of Bacteria. Vikas Publication, New Delhi.
- Singh, R. P. 2010. Microbiology. Kalyani Publishers, New Delhi.

Botany -Paper-II : ALGAE AND LICHENS

Objectives:

- To know the characteristics, structure, habitat, types and evolution of algae
- To understand various aspects of photosynthetic pigments with special reference to chlorophyll and xanthophylls.
- To learn about the characteristics with reference of examples of phaeophyceae and Rhodophyceae
- To get aware the economic importance of algae
- To get knowledge about the life cycle and economic importance of lichens.

UNIT I: **Basics of algae**

General characters, classification of algae (Fritsch, Smith), diversity in habitat, range of vegetative thallus organization, cell structure photosynthetic pigments and reserve food material, Reproduction: vegetative, asexual and sexual, evolution of sex in algae**,** types of life cycles.

UNIT II: Chlorophyceae and Xanthophyceae

Chlorophyceae: General characteristics, thallus organization, cell structure, reproduction and life cycle of *Chlamydomonas, Volvox, Chara.*

Xanthophyceae: General characteristics, *Vaucheria*: Thallus organization, cell structure, reproduction and life cycle.

UNIT III: Phaeophycae and Rhodophyceae:

Phaeophycee: General characteristics, *Ectocarpus*: Thallus organisation, cell structure, reproduction and life cycle.

Rhodophyceae: General characteristics, *Polysiphonia*: Thallus organisation, cell structure, reproduction and life cycle.

UNIT IV: Lichens

Economic importance of algae, isolation and culture of algae. Lichens: General characters, types, structure, multiplication, reproduction and economic importance, its importance as colonizers and indicators of environment.

Learning Outcomes: After complition the course student would able to:

- Describe various aspects of photosynthetic pigments with special reference to chlorophyll and xanthophylls.
- Differentiate the characteristics of phaeophyceae and Rhodophyceae
- Explain characteristics, structure, habitat, types and evolution of algae
- Interpret the economic importance of algae
- Comprehend the life cycle and importance of lichens

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Suggested Readings:

1. Bold, H. C. and Wayne, M. J. 1996. Introduction to Algae. 2nd Edition. Prentice Hall, Inc. Englewood Cliffs, New Jersey.
2. Ghemawat, M. S., Kapoor, J. N. and Narayan, H. S. 1976. A Text book of Algae. Ramesh Book Depot., Jaipur.
3. Gilbart, M. S. 1985. Cryptpogamic Botany. Vol. I and II second edition. Tata McGra Hill Publishing Co. Ltd., New Delhi.
4. Kumar, H. D. 1998. Introductory Phycology. Affiliated East-West Press Ltd., New York.
5. Lee, R.E. 2008. Phycology. Fourth Edition, Cambridge University Press, USA.
6. Sambamurthy, A.V.S.S. 2006. A Textbook of Algae**.** I. K. International Pvt. Ltd., New Delhi.

7. Singh.V., Pandey, P. C. and Jain, D. K. 2001. A Text book of Botany. Rastogi Publication, Meerut.
8. Thakur, A. and Bassi, S., 2007. Diversity of microbes and Cryptogams. S. Chand and Co., New Delhi.
9. Van den Hoek, C., Mann, D.J. and Jahns, H.M. 1995. Algae: An introduction to Phycology**.** Cambridge Univ. Press., England.
10. Vashitha, B. R. 2002. Botany for degree students (Algae and Bryophytes). S. Chand and Co. Ltd., New Delhi.

Botany -Paper-III: Mycology and Plant Pathology

Objectives:

- To understand general characteristics, classification, structure, reproduction of fungi.
- To learn about general diseases caused by fungi, bacteria, viruses in plants
- To know general characteristics of oomycetes, zygomycetes
- To gain knowledge about other classes i.e. ascomycetes, basidiomycetes and deuteromycetes with examples.
- To understand the general characteristics of deuteromycetes

UNIT I:

Fungi : General characteristics, classification (Alexopoulus and Mims's), thallus, cell structure, nutrition, asexual, sexual reproduction, homothallism, heterothallism and heterokaryosis.

Plant disease:Biotic and abiotic diseases,important symptoms caused by fungi, bacteria,virus andMLOs(Blight,mildew,Downy mildew and green ear, rust, smut, canker ,mosaic, little leaf, gall) etc.

UNIT II:

General account of class chytridiomycetes, general characteristics, structure and life cycles/disease cycles of members of oomycetes and zygomycetes with special reference to the genera: *Albugo* (white rust disease) , *Sclerospora* (Downey mildew/Green ear disease) .

UNIT III:

General characteristics, structure and life history/disease cycle of class Ascomycetes Basidiomycetes and Deuteromycetes with special reference to the genera: *Aspergillus, Claviceps(ergot disease), Peziza, Puccinia (rust disease) and Agaricus.*

UNIT IV:

General characteristics and structure and life cycle of class Deuteromycetes with special references to *Alterneria (early blight of potato disease),* sex degeneration in fungi and economic importance of fungi.

Learning Outcomes: After complition the course student would able to:

- Understand general characteristics, classification, structure, reproduction of fungi.
- Discuss general characteristics of oomycetes, zygomycetes
- Get knowledge about other classes i.e. ascomycetes, basidiomycetes and deuteromycetes .
- Larn about general diseases caused by fungi, bacteria, viruses in plants
- Classify the division Fungi.

Suggested Readings:

- Alexopoulos, C.J. and Mims, C.V. 1988. Introductory Mycology. John Wiley and Sons, New York.
- Dubey, H.C. 1989. Fungi. Rastogi publication, Meerut.
- Pandey, S. N. and Trivedi, P. S. 1994. A text book of Fungi, Bacteria and Virus. Vikas Publishing House, New Delhi.
- Sarabhai, R.C. and Saxena, R.C. 1990. A textbook of Botany. Rastogi publication, Meerut.
- Vashishta, B. R. 2001. Botany for degree student's Fungi. S. Chand and company, New Delhi.

- Webster, J. and Weber, R. 2007. Introduction to Fungi. 3rd edition, Cambridge University Press, Cambridge.

PRACTICAL I

1. Introduction of handling and maintenance of laboratory equipments.
2. The components, use and care of compound microscope.
3. Study of the types of bacteria from temporary/permanent slides.
4. Introduction of techniques of slide preparation, stain preparation and staining.
5. Gram's staining of bacteria from curd.
6. Preparation of microbiological culture media (potato dextrose agar, nutrient agar).
7. Isolation of bacteria from soil..
8. Study of vegetative and reproductive structures of: *Nostoc*, *Chlamydomonas Volvox*, *Chara*, *Voucheria, Ectocapus, Polysiphonia.*
9. Study of different types of lichens.
10. Nuclear staining of filamentous fungi.
11. Preparation of slides and study of following genera through temporary mounts and permanent slides:
12. *Albugo, Aspergillus, Claviceps, Peziza, Puccinia, Agaricus Alternaria* .
13. Study of plant diseased specimens caused by fungi, viruses, bacteria and mycoplasma.
14. Measurement of fungal extracellular enzymes..
15. Collection, identification and submission of minimum 3 diseased specimens.

Semester-I

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 105	Zoology-I	CE*	4	15	**20**	100
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25 Practical**	

Zoology- Paper-I: Life and Diversity of animals - Nonchordata-I

Objectives:

- To discuss the animal kingdom.
- To understand the general characteristics and Classification of Phylum protozoa.
- To develop the general characteristics and Classification of Phylum porifera.
- To understand the general characteristics and Classification of Phylum platy helminthes
- To understand the external features and life cycle of fasciola.

Unit I: Principles of Taxonomy:

1.1 Nomenclature system, Binomial nomenclature, Trinomial nomenclature, Rules of nomenclature

1.2 Concept of five kingdoms, Levels of Organisation, Basis of classification (Number of Cells, Symmetry, Coelom, Embryogeny, Segmentation)

Unit II:

2.1 Phylum Protozoa

Salient features and classification of Protozoa up to Class

Type study – Paramecium (Salient Features, Locomotion, Nutrition and Reproduction)

2.2 Phylum Porifera

Salient features and classification of Porifera up to Class

Type study- Sycon Canal system of Sponges Skeletal System

Unit III

3.1 Phylum Coelenterata

Salient features and classification of Coelenterata up to Class

Type study – Obelia (External Features, Nutrition, Excretion, Reproduction)

Polymorphism in Coelenterates

UNIT IV

4.1 Phylum Platyhelminthes

Salient features and classification of Platyhelminthes up to Class Type study- Taenia (External features and life cycle)

Type study- Fasciola (External Features and Life Cycle)

Learning Outcomes: After complition the course student would able to:

- Understand general taxonomic rules on animal classification, the principles and methods of taxonomy, the Levels of structural organization and the Basis of Classification -Coelom, symmetry, segmentation and its types.
- Classify the phylum Protozoa, Porifera & Coelenterata using examples, Understand the Locomotion in Protozoa, canal system of sponges, Coral and coral reefs & economical importance of Protozoa, Porifera.
- Clarify the external features and life cycle of fasciala.
- Discuss the sycom canal sysem of sponges skeletal system.
- Describe salient features & classification of coelenterate up to class

Zoology- Paper-II: Life & Diversity of Animals Nonchordata- II

Objectives:

- To discuss the general characteristics and Classification of Phylum Annelida .
- To understand the general characteristics and Classification of Phylum Arthropod.
- To understand the general characteristics and Classification of Phylum Echinodermata.
- To understand the general characteristics and Classification of Phylum Hemichordate.
- To classify the general characteristics and classification of Phylum Mollusa.

Unit I:

1.1 Annelida:

General characters and outline classification up to classes with examples.

Type-study: Morphology, Digestive, Excretory, & Reproductive systems of leech

1.2 Arthropoda:

General characters and outline classification up to classes with examples.

Type Study: Palemon: - Morphology, Digestive, Excretory, & Reproductive systems.

Unit II:

2.2 Mollusca:

General characters and outline classification up to classes with examples.

Type Study: Pila: External characters, Skeletal, Digestive, Respiration, & Reproductive systems.

Unit III:

3.1Echinodermata:

General characters and outline classification up to classes with examples.

Type Study: Asterias (External characters, Skeletal, Digestive, Respiration, & Reproductive systems)

Unit IV:

4.1 Hemichordata:

General characters and outline classification up to classes with examples.
Salient features of Balanoglossus

Learning Outcomes: After complition the course student would able to:

- Classify Phylum Annelida with taxonomic keys, and a basic idea of parasitic adaptations.
- Write down the classification and characteristics of Phylum Arthropoda,
- Write down the classification and characteristics of Phylum Mollusca Echinodermata & Hemichordata and Understand the process of pearl formation and water vascular system of star fish.
- Describe in the productive system of Leech.
- Classifiy in salient features of banlanoglessus

Zoology- Paper-III: Cell Biology

Objectives

- To understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
- To understand how these cellular components are used to generate and utilize energy in cells
- To understand the cellular components underlying mitotic cell division.
- To develop the structure an function of mitochondria
- To identify the lysosome structure polymorphism and function

Unit – I

1.1 Introduction to cell: Size, shape, ultra structure and characteristics of prokaryotic and eukaryotic cell, Cell theory

1.2 Endoplasmic reticulum: Types, Ultra structure and functions

1.3 Golgi complex: Ultra structure and functions

Unit – II

2.1 Structure and Function of mitochondria;

2.2 Lysosome: Structure, polymorphism and functions

Unit – III

3.1 Cytoskeleton: Organization and functions of Centrosome, Cilia and Flagella

3.2 Cell- communication: types of Cell Junctions

3.3. Cell proliferation: Events in different phases of cell cycle

Unit – IV

4.1 Ribosome: Structure, Types, Lake's model and functions

4.2 Mitosis (Different Phases and Significance)

4.3 Meiosis (different phases and significance)

Learning Outcomes: After complition the course student would able to:

- Develop an understanding of the cytoskeleton and cell membrane
- The cell cycle, structure of mitochondria and types of cell divisions.
- Students are able to discuss the cell, structure of ribosome, lysosome and golgi complex.
- Students are able to discuss the endoplasmic recticulum structure .
- Studetns are able to classify in structure and function of mitochondria

Practical

Zoology: PRACTICAL Based on paper I, II and III

Notes:

1. With reference to whole mounts and museum specimens, in case of unavailability of certain animal types, diagrams, photographs, models and digital techniques etc. should be substituted. Study will include classification (up to orders) with diagnostic characters and comments.
2. Candidates will keep a record of all work done in the practical class.

Paper-I: Life and Diversity of Animals- Nonchordata – I (Protozoa to Aschelminthes)

I. Microscopic Techniques : Organisation and working of optical microscopes: Dissecting and Compound Microscope:

II. Study of museum specimens (Classification of animals up to orders)

I. Protozoa: Euglena, Volvox, Elphidium (Polystomella), Foraminiferous shell, Monocystis, Opalina, Paramoecium, Paramoecium showing Binary fission, Parameciun Conjugation, Balantidium, Nyctotherus, Vorticella
II. Porifera: Sycon, Leucosolenia, Hyalonema, Euplectella, Spongilla
III. Coelenterata : Obelia Colony & Medusa, Millepora, Physalia, Vellela, Aurelia, Alcyonium, Gorgonia, Pennatula, Metridium, Stone Corals
V. Ascheliminthes : Ascaris, Drancunculus, Ancylostoma, Wuchereria

2. Study of Permanent Slides

I. Porifera: Sponge gemmules, Sponge spicules,V.S. Sycon, T.S. Sycon,
II. Coelenterata: Obelia medusa, Obelia Colony
III. Platyhelminthes: Miracidium, Sporocyst, Redia and Cercaria, Metacercaria larvae of Fasciola, Hexacanth and Onchosphere larvaa of Taenia solium, Scolex ofTaenia, Mature and gravid proglottids ofTaenia solium.

3. External features and Anatomy through audio visual presentation

I. Cockroach: External features, Mouth parts, Digestive, nervous and reproductive system
II. Earthworm: External Features, Digestive, nervous and reproductive system

Paper-II : Life and Diversity of Animals – (Annelida to Hemichordata)

1. Study of museum specimens (Classification of animals up to orders)

I. Annelida: Nereis, Heteronereis, Aphrodite, Chaetopterus, Arenicola,
I. Arthropoda: Peripatus, Lepus, Palemon, Eupagurus (hermit Crab), Carcinus (Crab), Scolopendra, Julus, Scorpion, Spider, Limulus, Cysticerca/Locust, Dragonfly, Queen Termite, Cymax, Moth/ Butterfly,

II. Mollusca : Chiton, Dentalium, Cyprea, Pila, Aplysia, Mytilus, Pincteda, Loligo, Sepia, Octopus, Nautilus
III. Echinodermata: Antedon, Asterias, Ophiothrix, Echinus, Holothuria
IV. Hemichordata: Balanoglossus

2. Study of permanent slides

I. Annelida: Parapodia of Nereis, T.S. of Leech through Buccal Cavity and Crop II. Arthropoda: Crustacean Larvae- Nauplius, Zoea, Metazoea, Megalopa, Mysis III. Mollusca: Veliger and Glochidium larvae, T.S. of Unio Shell
IV. Echinodermata: T.S. of arm of star fish
V. Hemichordata: Balanoglossus through collar and proboscis

3. Audiovisual demonstration

I. Prawn: Appendages, digestive, Nervous and Reproductive system, Statocyst, Hastate Plate
ii. Pila: Nervous system, Osphradium, Gills, Radula

Paper III: Cell Biology

1. Study of pictures of ultra structure of prokaryotic cell & eukaryotic cell
2. Demonstration of mitosis cell division in onion root tips by squash method
3. Demonstration of meiosis through audio visual Presentation
4. Study of mitochondria in Buccal Epitheli

Suggested Reading:

Life and Diversity of Animals – Non Chordates-I & II

1. Barnes, R. (1981). Invertebrate zoology. *W. B. Saunders Co*
2. Barrington, E. W. J. (1969). Invertebrate structure and function. *ELBS*
3. Barradaile L.A. & Potts F.A.The Invertebrate
4. Jordan, E. L. & Verma, P. S. Invertebrate Zoology. *S. Chand & Co*.
5. Kotpal, Agrawal&Khetrapal. Modern Text Book of Zoology - Invertebrates,
6. Puranik P.G. & Thakur R.S.Invertebrate Zoology
7. Majupuria T.C. Invertebrate Zoology
8. Dhami & Dhami. Invertebrate Zoology
9. Parker & Hashwell, Textbook of Zoology Vol. I (Invertebrates) A.Z.T.B.S. Publishers
10. R.L. Kotpal, 2007, Phylum Protozoa to Echinodermata (series), Rastogi and Publication, Meerut
11. Vidyarthi – Text Book of Zoology, Agrasia Publishers, Agra
12. Marshal & Williams. Text book of zoology.
13. Boolotin & Stiles. College zoology. MacMillan
14. Kohli, Triguranayati, 2007, Invertebrate, R.B.D. Publishing House, Jaipur

Practical Books

15. A manual of Practical Zoology Invertebrates – P. S. Verma
16. Dr. S.S. Lal Practical Zoology Invertebrates 9th edition,Rastogi Publication Meerut & Distributors, New Delhi

Suggested Reading: Cell Biology:

1. Alberts et al (2001). Molecular biology of the cell. Garland publications.
2. De Robertis, E. D. P. & De Robertis, E. M. F. (1987). Cell and molecular biology. Lea & Febiger Intl. ed.
3. Powar, C. B. (1986). Cell biology. Himalaya Publ.
4. Burke, J. D. C. (1970). Cell biology. *William & Wilkins Co*
5. Dr. S.P. Singh, Dr. B.S. Tomar., Cell Biology 9th revised edition, Rastogi Publication, Meerut
6. Gupta P.K., Cell and Molecular Biology, Rastogi Publication, Meerut
7. Veer Bala Rastogi. Introduction to Cell Biology, Rastogi Publication, Meerut
8. Verma and Agrawal .Concepts of Cell Biology
9. Narendra Jain, Maya Singh, Shikha Patni, S.K. Singh, 2016, Cell Biology and Genetices, College Book Center, Jaipur
10. K.C. Soni, 2008, Cell Biology and Genetices, College Book Center, Jaipur
11.

Semester-I

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
JVB 101	Jain Culture and LifeValue	**FC**	**4**	**30**	**70**	**100**

Objectives:

- To describe the concept of Jain Culture
- To list the different types of Jain Life Values

Unit I: Jain History and Culture

- Antiquity of Jainism
- Teerthankar Lord Rishabha and Mahavira
- Jain Religious Schools, Orders and Sects
- Characteristics of Jain Culture

Unit II: Jain Ethics and Metaphysics

- Three Jewels (Ratnatraya)
- Code of Conduct of Ascetics (Shramanachar) and Householder (Shravakachar)
- Jain way of Life
- The Nine Truths
- Six Substances
- Cosmology : Jain Perspective

Unit III: Science of Living and Value Development

- Science of Living a new way of Education
- Seven Parts of Science of Living
- Science of Living and Value Development
- Non-violence and its training
- Non-absolutism and its application
- Anuvrat Movement and Morality

Unit IV: Preksha Meditation and Management

- Aim and Objective of Preksha Meditation
- Time Management
- Goal Management
- Health Management
- Stress Management
- Addiction Free Management

Outcomes:

- The students would develop on non- absolute approach.
- Can apply the knowledge of Jain life values into scientific research.
- Shastri Nemichandra, Tirthankara Mahaveer aura Unki Acharya Parampara, Vol.-I., Prachya Shramana Bharati, Mujaffar Nagar, U.P.
- Jain itihas aura sanskriti,By Dr Samani Riju Prajna, JVBU, Ladnun
- Jain Tattva mimansa aura Achara Mimansa, By Dr Samani Riju Prajna, JVBU, Ladnun

Semester-II

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 201	Assessment for Learning	**CC**	**4**	**30**	**70**	**100**

Objectives:

- ❖ To describe the role of assessment in education.
- ❖ To distinguish among measurement, assessment and evaluation.
- ❖ To explain different forms of assessment that aid student learning.
- ❖ To use wide range of assessment tools, techniques and construct these appropriately.
- ❖ To evolve realistic, comprehensive and dynamic assessment procedures.
- ❖ To calculate item difficulty and discrimination power of a test item.
- ❖ To prepare a good achievement test on any school subject.
- ❖ To realize the importance of continuous and comprehensive evaluation in the process of students learning.

Course contents:

Unit I - Assessment and Evaluation in Education

a) Concept of measurement, assessment and evaluation
b) Types,Need, scope and relevance of evaluation
c) Principles of assessment and evaluation
d) Test, scale and measurement
e) Types of scale : nominal, ordinal, interval and ratio

Unit II -Tools and Techniques of Assessment and Evaluation

a) Characteristics of a good measuring instrument
b) Achievement test: steps of construction of achievement test – Teacher made and Standardized test
c) Types of test items and its construction : subjective test items and objectives test item
d) Diagnostic test construction and preparation of remedial materials
e) Analysis of test items – item difficulty level and item discrimination power

Unit III -Trends in Assessment

a) Continuous and Comprehensive Evaluation
b) Marking system vs Grading system
c) Semester system (C B C S) Chioce Based Credit System
d) Open book examination and question bank

Unit IV - Basic Statistics in Evaluation

a) Measure of Central Tendency:
    - Mean
    - Median
    - Mode
b) Measure of variability
    - Range
    - Quartile Deviation
    - Average Deviation
    - Standard Deviation

Assignment & Practical Works: (Any Two)

- Prepare an achievement test of any school subject of secondary school.
- Write one term paper with in the content
- Construct a remedial material for school students in any content problems.
- Select, analyses and try- out a sample tool/test with item discrimination power.

Learning Outcomes: After completion of this course students would able to:

- ❖ Describe the role of assessment in education.
- ❖ Distinguish measurement, assessment and evaluation.
- ❖ Explain different forms of assessment that aid student learning.
- ❖ Use wide range of assessment tools, techniques and construct these appropriately.
- ❖ Evolve realistic, comprehensive and dynamic assessment procedures.
- ❖ Calculate item difficulty and discrimination power of a test item.
- ❖ Prepare a good achievement test on any school subject.
- ❖ Realize the importance of continuous and comprehensive evaluation in the process of students learning

Suggested Readings:

1. Agrawal, J C. (1997), Essential of Examination System, Evaluation, Test and Measuremrnt. New Delhi: Vikas Publishing House Pvt. Lt..
2. Banks, S.R. (2005), Classroom Assessment: Issues and Practices. Boston: Allyn & Bacon.
3. Blooms, B.S. (1956), Taxonomy of Educational Objective. New York: Longman Green and Company.
4. Cooper, D. (2007), Talk About Assessment, Strategy and Tools to Improve Learning. Toronto: Thomson Nelson.
5. Earl, L.M. (2006), Assessment of Learning: Using Classroom Assessment to Maximize Student Learning. Thousand Oaks, Clifornia: Corwin Press.
6. Gronlund, N.E. (2003), Assessment of Student Achievement. Boston: Allyn & Bacon.
7. Kaplan, R.M. & SaccuzzoD.P. (2000), Psychological Testing, Principles, Application& Issues. California: Wordsworth.
8. Linn, R.L. & Gronlund, N.E. (2000), Measurement and Assessment in Teaching. London: Merrill Prentice Hall.
9. Noll, N.H. S cannell, D.P. & Craig, RC. (1979), Introduction to Educational Measurement. Boston: Houghton Miffin.
10. Macmillan, J.H. (1997), Classroom Assessment, Principles and Practice for Effective Instruction. Boston: Allyn and Bacon.
11. Hopkins, KD. (1998). Educational and Psychological Measurement and Evolution. Boston: Allyn and Bacon.
12. Chohen, R.J., Swerdlik, M.E., & Phillips, S.M. (1996), Psychological testing and Assessment. An Introduction to the Test and Measurement. California: Mayfield Publishing Co.
13. National Council of Educational Research and Training (2005), National Curriculum Framework, New Delhi: NCERT
14. National Council of Educational Research and Training (2006). Position paper: Examination Reform. New Delhi: NCERT
15. National Council of Educational Research and Training (2008). Source Book on Assessment for class I-V: Social Science. New Delhi: NCERT

Semester-II

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 202	Learning and Teaching	**CC**	**4**	**30**	**70**	**100**

Objectives:

- To acquire the basic knowledge of learning and Teaching.
- To understand the implications of educaiton.
- To develop various methods of teaching.
- To understand the various application of educaiton.

Course Contents:

Unit -I Basics of Learning

a) Learning : concept, Nature and characteristics.
b) Factors Affecting Learning.
c) Laws and Types of Learning.
d) cognitive Learning- Peaget, Bruner.
e) Transfer of Learning

Unit-II : Theories of Learning and their Educational Implications.

a) Trial and Error theory.
b) Classical conditioning theory.
c) Operant conditioning theory.
d) Insight theory of Learning.
e) Social Learning theroy (Bandura)

Unit-III Concept variables and models of Teaching

a) Teaching : concept, Nature and characteristers.
b) Variables of Teaching and their functions.
c) Factors Affecting Teaching and Teaching process.
d) Relationship between teaching and Learining.
e) Teaching model- concept, functions, sources and elements.

Unit-IV Theories and Application of Teaching

a) Levels of Teaching - memory, understanding and Reflective.
b) Teaching theories-concept, need, types and utility.
c) Analyzing Teaching in Deverse classrooms.
d) Teaching as a complex activity.
e) Teaching as a profession.

Assignment & Practical Works:

- One term paper on any topic related with above Unit.
- One Practical on any topic related with above Unit.

Learning Outcomes: After completion of this course students would able to:

- ❖ Acquire knowledge and understanding of learning and Teaching.
- ❖ Understand the theories of learning.
- ❖ Develop the skill of active engagement of students in teaching learning activity.
- ❖ Investigate differences and connections between learning in school and learning outside school.
- ❖ Inculcate the knowledge of teaching and its process.
- ❖ Understand learners, learning process and school.

Suggested Readings:

1. Baron, R.A., and Byrne D., (2002), Social Psychology, (10th Ed.), Prentice Hall of India Private Limited, New Delhi.
2. Beckett Chris (2004) Human Growth & Development, Sage Publications.
3. Browne, J.D. (1970), Development of Educational Technology in college of Education, councils in Education Press.
4. Cooper, I.M. (1960), Classroom Teaching Skills, D.C. Heathco, Toronto, 1960.
5. Coulson, J. E. (1962), Programme Learning and Computer Based Instruction, Wiley, New York.
6. Domain Book - I (1956), McKay, New York.
7. Gross, Richard (2003), Key studies in Psychology (IV Ed.), Hedder & Stoughton.
8. Khanna, S.D. and etal. (1984), Technology of Teaching and Teacher Behaviour, Vth edition, Doaba house, Delhi.
9. Kulkarni, S.S. (1986), Introduction to Educational Technology, Oxford and IBH publishing co.
10. Kumar, K.L. (1997), Educational Technology, New Age International, Pub., New Delhi.
11. Lindzey, G. & Aronson, E. (Eds.) (1969). Handbook of Social psychology, Addison Wesley, New York.
12. Mohanthy Jagannath; Educational Technology, Deep and Deep Pub., New Delhi.
13. Rai and Rai, Effective Communication, Himalaya Pub., Delhi 2001.
14. Rajaraman, V, Computer programming in pascal, Prentice Hall of India, New Delhi.
15. Rajaraman, V; Computer programming in Fortran, Prentice Hall of India, New Delhi.
16. Rao, Usha, Educational Technology, Himalaya Pub. House, Bombay, 1994.
17. Sarafino Edward P., (1994), Health Psychology, Biopsychosocial Interactions
18. Saraswathi, T. (2003) –Cross-cultural Perspective in Human Development, Sage Publication
19. गुप्ता, एस.पी. गुप्ता अलका, (2007), उच्चतर शिक्षा मनोविज्ञान, शारदा पुस्तक भवन, इलाहाबाद
20. पाठक, पी.डी., (2007), शिक्षा मनोविज्ञान, विनोद पुस्तक मंदिर, आगरा
21. मंगल, एस.के., (2008), शिक्षा मनोविज्ञान, प्रिंटिर्स हॉल ऑफ इण्डिया प्राइवेट, नई दिल्ली.
22. वर्मा, प्रीति, श्रीवास्तव डी.एन., (2008), आधुनिक सामान्य मनोविज्ञान, अग्रवाल पब्लिकेशन, आगरा.
23. यादव, सियाराम, (2008), अधिगमकर्ता का विकास एवं शिक्षण अधिगम प्रक्रिया, शारदा पुस्तक भवन, इलाहाबाद
24. शर्मा गणपतराम, व्यास हरिश्चन्द्र, (2007), अधिगम–शिक्षण और मनोसामाजिक आधार, राजस्थान ग्रन्थ अकादमी, जयपुर.
25. शर्मा, जे.डी. (2008), मनोविज्ञान की पद्धतियां एवं सिद्धान्त, विनोद पुस्तक मंदिर, आगरा
26. सुरेश भटनागर, (2008), शिक्षा मनोविज्ञान तथा शिक्षण शास्त्र,, विनोद पुस्तक मन्दिर, आगरा,

Semester-II

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 201	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25** Practical	

Chemistry-Paper-I : Inorganic chemistry

Objectives:

- To give knowledge about the mathematical concepts of ionic solid structure and packing.
- To aware about metallic bond and weak interactions among molecules.
- To provide information about various properties of s & p-block elements and their correlations.
- To develop their concept about structural principles of silicates and their applications.

Unit-I : **Ionic Solids**

Ionic structures (AB and AB_2 type), packing of ions, Radius ratio and coordination number, calculation of limiting radius ratio for tetrahedral, octahedral and cubic crystal structure, limitations of radius ratio rules, Polarizing power and polarisability of ions, Fajans rule, lattice energy and born lande equation, Born Haber cycle and its applications, solvation energy and solubility of ionic solids.

Unit-II : Metallic Bond & Weak interactions

Introduction of metallic bond, properties of metals, theories of Metallic bond- old electron free theory, valance bond theory, limitations of valence bond theory, molecular orbital or band theory, lattice defects in ionic solids, semiconductors.

Hydrogen bonding and Vander Waals forces.

Unit-III : s-Block Elements

Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems and introduction to alkyls and aryls.

Unit-IV : Some important compounds of p- block elements

Hydrides of boron, diborane and higher boranes, borazines, borohydrides, fullerenes, carbides, flurocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

Learning Outcomes: After complition the course student would able to:

- Explain the mathematical concepts of ionic solid structure and packing.
- Plot and interpret shapes of ions and bonding structures.
- Identifies the relationship among properties of metals on the basis of various theories of bonding.
- Classify the s & p block elements like hydrides and halogens on the basis of atomic structure, periodicity and their basic properties.

Chemistry-Paper-II : Organic chemistry

Objectives:

- To understand isomerism in organic compounds
- To develop their knowledge about geometric isomerism, aromaticity and halogen compounds.
- To aware them about nomenclature, mechanism and application of organic compounds.
- To develop conceptual knowledge about various principles relaed to geometrical structure, reactions and configuration of various compounds.

Unit I : Stereochemistry of organic compounds

Concept of isomerism, type of isomerism. Optical isomerism; elements of symmetry, molecular chirality-allenes and biphenyl, Enantiomers, stereogenic centre, optical activity, properties of enantiomers. Chiral and achiral molecules with two stereogenic centres, distereomers Threo, and erythro diastereomers, meso compounds. Resolution of enantiomers , inversion, retention and racemisation. Relative and absolute configuration, sequence rule, D&L and R&S system of nomenclature.

Unit-II : Geometrical, Conformational isomerism & Arenes

Determination of configuration of geometric isomers, E&Z- system of nomenclature, geometric isomerism in oximes and in cyclic compounds.

Conformational analysis of ethane and n-butane. Newman projection and Sawhorse formulae. Fischer and flying wedge formula. Difference between configuration and conformation

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 length of benzene, resonance structure, MO picture.

Unit-III : **Aromaticity & Aromatic electrofilic substitution**

The Huckel's rule, aromatic ions.

General pattern of the mechanism, role of sigma and pi complexes. Mechanism of nitration, halogenations, sulphonation, mercuration and Friedel Craft reaction with energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.

Unit-IV : Alkyl and aryl halides & Poly halogen compounds

Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanism of nucleofilic substitution, reaction of alkyl halides, $SN^1$and SN^2 reaction with energy profile diagram.

Chloroform, carbon tetra chloride. Methods of formation of aryl halides, nuclear and side chain reaction. The addition-elimination and the elimination addition mechanism of nucleofilic aromatic substitution reaction. Relative reactivities of alkyl halides v/s allyl, vinyl and aryl halides. Synthesis and uses of DDT and BHC.

Learning Outcomes: After complition the course student would able to:

- Explain about elememts of symmetry, profile and methods of formation of organic compounds.
- Apply various mechanism rules to define chain reactions, configuration and formation of arenes, halogen compounds.
- Classify various derivatives on the basis of isomerism, configuration and energy profile.
- Describe various rules and reactions about stereochemistry, aromaticity and orientation related to chemical compounds.

Chemistry-Paper-III : Physical chemistry

Objectives:

- To develop curiosity about laws of crystallography and chemical kinetics. .
- To provide information about derivation of equations, order and preparation of energy profile .
- To aware about the scope, factors and theories of chemical kinetics.
- To give information about colloidal state, their prepation and determinants.

Unit I :Solid state

Definition of space lattice, Unit cell. Law of crystallography (i)law of constancy of interfacial angles (ii) law of rationality of indices (iii)law of symmetry. Symmetry elements in crystals. X ray diffraction by crystals. Derivation of Braggs equation, Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method)**.**

Unit II : Colloidal state

Definition of colloids, classification of colloids. Solids in liquids (sols): properties- kinetics, optical and electrical. Stability of colloids, protective action, Hardy Schulze law. Gold number. Liquids in solids (gels): classification, preparation and properties, inhibition, general application of collides. Liquid in liquid (emulsions): types of emulsions, preparation, Emulsifiers.

Unit-III : Chemical Kinetics

Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction, Concentration dependence of rates, mathematical characteristics of simple chemical reaction- zero order, first order, second order, pseudo order, half life and mean life.

Determinations of the order of reaction- differential method, method of integration, method of half-life period and isolation method. Theories of chemical kinetics, Effect of temperature on the rate reaction, Arrhenius concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects.

Unit-IV : Solutions, Dilute solutions & Colligative properties

ideal and non ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient.

Raoult`s law, relative lowering of vapour pressure, molecular weight determination. Osmosis law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure, Elevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation of boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass degree of dissociation and association of solutes.

Learning Outcomes: After complition the course student would able to:

- Draw and interpret symmertries and structures of crystalsand colloids.
- Compare among various forms of crystals, order and trainsition state of compounds.
- Measure and calculate the mathematical characteristics simple chemical reactions and determinants.

Practical's

Inorganic chemistry:

Quantitative analysis: Volumetric analysis

(a) Determination of acetic acid in commertial vinegar using NaOH.
(b) Determination of alkali content ant acid tablet using HCl.
(c) Estimation of calcium content in chalk as calcium oxalate by permanganometery.
(d) Estimation of hardness of water by EDTA.
(e) Estimation of ferrous and ferric by dichromate method.
(f) Estimation of copper using thiosulphate.

Organic chemistry:

(A) Laboratory techniques

(a) Determination of m. p. of naphthalene, benzoic acid, urea etc. OR
(b) Determination of b. p. of ethanol , methanol, cyclohexane, etc

(B) Qualitative analysis

(a) Detection of extra elements (N, S. and halogens) and functional groups e.g. (phenolic, alcoholic, carboxylic, carbonyl, ester, carbohydrate, amine, amide and nitro) in simple organic compounds

Viva voce and record

Suggested Reading:

1. कार्बनिक रसायन, सुरेश आमेटा, एच.के. पाण्डे, एच.एस. शर्मा, हिमांशु पब्लिकेशन्स, उदयपुर
2. अकार्बनिक रसायन, ओझा, भोजक, कोठारी, चतुर्वेदी, रमेश बुक डिपो, जयपुर
3. प्रायोगिक रसायन, भार्गव, लवानिया, ओझा, रमेश बुक डिपो, जयपुर
4. भौतिक रसायन, शर्मा, भार्गव, गुप्ता, रमेश बुक डिपो, जयपुर
5. कार्बनिक रसायन, विजयश्री मनोज छंगाणी, अल्का पब्लिकेशन, अजमेर
6. अकार्बनिक रसायन, विजयश्री कोठारी छंगाणी, अल्का पब्लिकेशन, अजमेर
7. प्रायोगिक रसायन, छंगाणी, विजयश्री, खण्डेलवाल, अल्का पब्लिकेशन, अजमेर
8. भौतिक रसायन, वी.के. गोयल, आर.एस. पीतलिया, कॉलेज बुक हाउस, जयपुर
9. अकार्बनिक रसायन, जी.के. रस्तोगी, यशपाल सिंह, कॉलेज बुक हाउस, जयपुर
10. प्रायोगिक रसायन, वी.के. गोयल, आर.एस. पीतलिया, कॉलेज बुक हाउस, जयपुर

Semester-II

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 202	Physics-I	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25** Practical	

Physics-Paper-I : ELECTROMAGNETISM – II

Objectives:

- To aware about the of concepts related to Faraday‘s law, induced emf.
- To give information about Maxwell‘s equations to solutions of problems relating to transmission lines.
- To develop knowledge about the transient behavior of R-C circuit.
- To aware about the transient behavior of R-L circuit.

UNIT – I Magnetic Fields in Matter:

Electric current due to orbital electron, the field of current loop, Bohr magneton. Orbital gyro magnetic ratio Electron spin and magnetic moment. Magnetic susceptibility, magnetic field caused by magnetized matter. Magnetization current. Free current and the field H.

UNIT –II Electric Field in Matter:

The moment of a charge distribution. Atomic and molecular dipoles. Atomic polarizability. Permanent dipole moment, dielectrics. The Capacitor filled with a dielectric. The potential and field due to a polarized sphere.

UNIT –III Dielectric:

Dielectric. Dielectric sphere placed in a uniform field. The field of charge in dielectric medium and Gauss's law. The connection between electric susceptibility and atomic polarizability. Polarization in changing field. The bound charge (polarization) current.

UNIT -IV Transient behavior and Maxwell's Equations:

Transient behaviour of an R-C circuit. Electromagnetic Induction and Maxwell's Equations, Faraday's law in differential form. Mutual inductance, Self inductance Transient behaviour of an L-R circuit, the displacement current, Maxwell's equations in differential and integral forms.

Learning Outcomes: After complition the course student would able to:

- Understand the concepts related to Faraday's law, induced emf, maxwell's equations, transit behavior, electric field in matter, atomic & molecular dipoles.
- Applies Maxwell's equations to solutions of problems relating to transmission lines, uniform plane wave propagation, magnetic field in matter.
- Understand the transient behavior of R-C circuit & L-R circuit.
- Classify the moment of a charge distribution.
- Discuss on the magnetic susceptibility and free current.

Suggested Readings:

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना,, विद्युत चुम्बकत्व, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics-Paper-II: OSCILLATIONS AND WAVES –I

Objectives:

- To aware about the concepts of mechanics,
- To give information about physical characteristics of SHM
- To calculate logarithmic decrement relaxation factor and quality factor.
- To aware acoustics and the properties of matter.
- To develop knowledge about obtaining solution of the oscillator.

UNIT -I Oscillations:

Oscillations in an arbitrary potential well, Simple harmonic motion, examples-spring mass system, mass on a spring, torsional oscillator, LC circuit, energy of the oscillator,

UNIT -II Damped Oscillator:

Damping of oscillator, viscous and solid friction damping. Power dissipation. Anharmonic oscillator, simple pendulum as an example.

UNIT -III Driven Oscillator:

Driven harmonic oscillator with viscous damping. Frequency response, phase relations. Quality factor, Resonance. Introduction of j operator concept in Electrical oscillations, series and parallel LCR circuit. Electro-mechanical system-Ballistic Galvanometer Effect of damping.

UNIT – IV Coupled Oscillator:

Equation of motion of two coupled S.H Oscillators. Normal modes, motion in mixed modes. Transient behaviour. Effect of coupling in mechanical systems. Electrically coupled circuits, frequency response. Reflected impedance. Effect of coupling and resistive load.

Learning Outcomes: After complition the course student would able to:

- Discuss on the simple harmonic motion and its equation.
- Differentiate between damped oscillator and driven oscillator.
- Interpret the term frequency response and phase relation.
- Applies the concept of Ballistic galvanometer.
- Identify the coupled oscillator and some electrically coupled oscillators.

Suggested Readings:

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, दोलन तथा तरंग, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics-Paper-III: OSCILLATIONS AND WAVES –II

Objectives:

- To aware about the concepts of lattice dynamics.
- To give information about electric transmission line.
- To calculate the wave equation and analysis the fourier series.
- To aware about the electromagnetic wave.

UNIT -I Lattice dynamics:

Dynamics of a number of oscillators with near-neighbour interactions. Equation of motion for one dimensional mono-atomic and diatomic lattice, acoustic and optical modes, dispersion relations. Concept of group and phase velocities.

UNIT – II Electrical Transmission Line:

Electrical transmission line, propagation velocity, losses, characteristic impedance, standing waves, effect of termination.

UNIT –III Wave Motion:

Wave motion – Elastic waves in a solid rod. Pressure waves in a gas column. Transverse waves in a string, waves in three dimensions, spherical waves, Fourier series and Fourier analysis.

UNIT – IV Electromagnetic Wave:

Plane electromagnetic (EM) wave. Energy and momentum of EM wave. Radiation pressure. Radiation resistance of free space. EM waves in dispersive media (normal case). Spectrum of electromagnetic radiations.

Learning Outcomes: After complition the course student would able to:

- ❖ Discuss on the group and phase velocities.
- ❖ Differentiate between 1-D mono atomic & diatomic lattice.
- ❖ Interpret the term propagation velocity and losses.
- ❖ Applies the concept of transverse wave in the string.
- ❖ Identify the spectrum of electromagnetic radiation.

Suggested Readings :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, दोलन तथा तरंग, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics Practical : II

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 damping using Compound pendulum study the damping.
4. To study the excitation of normal modes and measure frequency splitting using two coupled oscillator.
5. To study the frequency of energy transfer as a function of coupling strength using coupled oscillators.
6. (a) To study the viscous fluid damping of a compound pendulum and
   (b) Determing damping coefficient and Q of the oscillator.
7. To find J by Callender and Barne's Method.
8. To determine Youngs modulus by bending of beam.
9. To determine Y. σ and η Searle's method.
10. To measure Curie temperature of Monel alloy.
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 Variation of surface tension with temperature using Jaegger's method.
14. Any experiment according to theory paper.

Suggested Readings :

1. प्रभा दशोरा, प्रायोगिक भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015

Semester-II

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 203	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25** Practical	

Mathematics-Paper-I: Discrete Mathematics II

Objectives:

- To aware the Particular Solutions of Generating Function.
- To give information about the Graph.
- To Interpret the Eulerian and Hamiltonian Graphs.
- To give information about Trees.

Unit 1

Discrete numeric unctions and Generating functions. Recurrence relations and Recursive Algorithms — Linear Recurrence relations with constant coefficients.

Unit 2

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, Introduction to Eulerian and Hamiltonian Graphs. 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.

Learning Outcomes: After complition the course student would able to:

- Applies the Particular Solutions of Generating Function.
- Discuss about the Weighted Graph, Shortest Paths.
- Plot Eulerian and Hamiltonian Graphs.
- Discuss about the Trees Properties.
- Calculate the homogeneous solutions.

Suggested Reading :

1. V.K.Balakrishnan, Introductory Discrete Mathematics, Prentice-Hall, 1996.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1995.
3. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, 1986.
4. Kenneth H. Roson, Discrete Mathematics and Its Applications, Tata Mc-Graw Hiils, New Delhi, 2003.

5. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड़, जितेन्द्र सैनी, विविक्त गणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
6. जी.सी. गौखरू सैनी, विविक्त गणित, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics-Paper-II: Integral Calculus

Objectives:

- To develop knowledge about the concepts Beta and Gamma Function.
- To aware the Concept of Double Integrals in Cartesian and Polar Co-ordinates.
- Calculate Areas and Rectification.
- To give information about the Volumes and Surfaces of Solids of Revolution.

Unit 1: Beta and Gamma functions, Reduction formulae (simple standard formulae),

Unit 2 ; Double integrals in Cartesian and Polar Coordinates, Change of order of integration. Triple integrals. Dirichlet's integral.

Unit 3: Areas, Rectification,

Unit 4 ; Volumes and Surfaces of solids of revolution.

Learning Outcomes: After complition the course student would able to:

- Calculate the concepts Beta and Gamma Function.
- Calculate of Double Integrals in Cartesian and Polar Co-ordinates.
- Calculate Areas and Rectification.
- Discuss the volumes and Surfaces of Solids of Revolution.
- Calculate the dirichlet's integral.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी,, समाकलन गणित, आर. बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, समाकलन गणित, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics-Paper-III: Analytic Geometry II

Objectives:

- To give information about the Central Conicoids.
- To aware tangent line and tangent plans.
- To develop concept generating Lines of Hyperboloid of One Sheet and its Properties.
- To give information about of a General Equation of Second g degree in 3-D to Standard Forms.

Unit 1: Central Conicoids — Ellipsoid, Hyperboloid of one and two sheets,

Unit 2: tangent lines and tangent planes, Direct sphere, Normals.

Unit 3: Generating lines of hyperboloid of one sheet and its properties.

Unit 4: Reduction of a general equation of second degree in three-dimensions to standard forms.

Learning Outcomes: After complition the course student would able to:

- ❖ Classify the Central Conicoids.
- ❖ Discuss the Generating Lines of Hyperboloid of One Sheet and its Properties.
- ❖ Reduction of a General Equation of Second Degree in 3-D to Standard Forms.
- ❖ Discuss the tangent lines and tangent plans.

Suggested Reading :

1. N.Saran and R.S.Gupta, Analytical geometry of Three Dimenssions, Pothishala Pvt. Ltd., Allahabad, 1992.
2. P.K. Jain and Khalil Ahmed, A Text Book of Analytical geometry of Three Dimenssions, Wiley-Eastern Ltd., 2000.
3. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, एनालिटिक ज्यामिती, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
4. जी.सी. गौखरू सैनी,, एनालिटिक ज्यामिती, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Semester-II

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 204	Botany-I	**CE***	**4**	**15**	**20**	**100**
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25** Practical	

Botany-Paper-I : CELL BIOLOGY

Objectives:

- ❖ To distinguish between structure of cell, cell wall and plasma membrane.
- ❖ To understand the concept of cell organelles with their detailed information.
- ❖ To know the ultra structure of Nucleus and chromosome.
- ❖ To compare the different stages of cell division (mitosis and meiosis).
- ❖ To comprehend the structure and composition of chromosomes.

UNIT I: Structure of Cell, Cell wall and Plasma membrane

History of cell and cell theory, microscopy, elementary idea on micrometry and cell fractionation, characteristics of prokaryotic and eukaryotic cell, chemistry, structure and function of cell wall and plasma membrane.

UNIT II: Structure of Cell Orgenells

Ultra structure and function of Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi complex, Peroxisome, Glyoxysome, Ribosome, Vacuoles.

UNIT III: Structure of Nucleus and chromosome

Detailed structure and function of Nucleus, nuclear envelope, nuclear pore complex and nucleolus. Chromatin Structure, morphology and organization of chromosomes. Special types of chromosomes - Sex chromosomes, polytene and lampbrush chromosomes.

UNIT IV: Cell cycle and Cell division

Cell cycle and Cell division: Amitosis, Mitosis: different stages, mitotic spindle and chromosome movement in detail, Meiosis I and II: different stages and its significance, cytokinesis, General account of chiasmata formation, crossing over, linkage and synaptonemal complex.

Learning Outcomes: After complition the course student would able to:

- ❖ Know the ultra structure of Nucleus and chromosome.
- ❖ Distinguish between structure of cell, cell wall and plasma membrane.
- ❖ Understand the concept of cell organelles with their detailed information.
- ❖ Know the different stages of cell division (mitosis and meiosis).
- ❖ Discuss the structure and composition of chromosomes.

Suggested Readings:

- Alberts, B., Johnson, A., Lewis, J., Roff, M., Roberts, K. and Walter, P., 2008. Molecular Biology of the Cell. Garland Publishers, New York.
- De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
- Gupta, P.K. 2009. Cytology, Genetics, Evolution and Plant breeding, Rastogi publication, Meerut.
- Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley and Sons. Inc. New Jersey, USA.
- Lodish, H., Berk, A., Matsudaira, P., Kaiser, C. A., Krieger, M., Scott, P.M., Zipursky, L.and Darnell, J. 2008. Molecular Cell Biology. W. H. Freeman and company, Macmillan publishers, London.
- Roy, S.C. and De, K.K. 1999. Cell biology. New central Book Agency (P) Ltd., Calcutta.
- Verma, P.S. and Agrawal, V.K. 2012. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Co. Ltd., New Delhi.

Botany-Paper-II : GENETICS AND PLANT BREEDING

Objectives:

- ❖ To know the concept of genetic inheritance
- ❖ To study the laws of Mendel
- ❖ To understand the chromosomal theory of inheritance.
- ❖ To learn about the concept of cytoplasmic inheritance.
- ❖ To understand different methods of plant breeding.

UNIT I: Genetic inheritance

Mendel's laws of inheritance- Dominancy, law of segregation, law of independent assortment, deviations from Mendel's laws; interaction of genes, incomplete dominance, codominance, lethal alleles, epistasis, pleotropy, polygenic inheritance (grain color in wheat, corolla length in *Nicotiana tabacum*) and multiple allelism: ABO blood groups in human.

UNIT II: Chromosomal inheritance

Linkage, crossing over and chromosome mapping- interrelationships and importance. Linkage maps, chromosome theory of inheritance, sex determination and sex linked inheritance. Chromosomal aberrations: deletion, duplication, inversion, translocation, aneuploidy and polyploidy. Extra nuclear genome: mitochondrial and chloroplast.

UNIT III: Genes and Mutations

Concept of gene: Neurospora genetics- one gene one enzyme hypothesis. Brief account on fine structure of gene in eukaryotes and prokaryotes. Mutations- types of mutations, point mutation-transition, transversion and frame shift mutation. Physical and chemical mutagens.

Cytoplasmic inheritance: Maternal influence,shell coiling in snail, Kappa particles in Paramaecium.

UNIT IV: Plant breeding

Introduction and objectives of plant breeding , general methods of breeding in-self-pollinated, cross pollinated and vegetative propagated crop plants : Introduction and acclimatization, selections and hybridizations, hybrid vigour and inbreeding depression, green revolution, Role of mutation and polyploidy in plant breeding, national and international agriculture research institute, famous plant breeders and their contribution (Indian and international), Plant breeding work done on wheat and rice in India.

Learning Outcomes: After complition the course student would able to:

- ❖ Undersand the concept of genetic inheritance
- ❖ Study the laws of Mendel
- ❖ Interpret the chromosomal theory of inheritance.
- ❖ Explain the concept of cytoplasmic inheritance.
- ❖ Discuss different methods of plant breeding.

Suggested Readings:

- Brooker, R. J. 1999. Genetics: Analysis and Principles. Addison-Wesley, Boston.
- Choudhary, H. K. 1989. Elementary Principle of Plant Breeding. Oxford and IBM Publishing Co., New Delhi.
- De Robertis, E. D. P. and De Robertis, E. M. F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
- Dnyansagar, V. R. 1986. Cytology and Genetics, Tata Mc Graw - Hill Pub Co. Ltd., New Delhi.
- Gardner, E. J., Simmons, M. J. and Snustad, D. P. 2008. Principles of Genetics. 8th Edition, Wiley India.
- Gupta, P. K. 2009. Cytology, Genetics, Evolution and Plant Breeding, Rastogi Publication, Meerut.
- Miglani, G. S. 2000. Advanced genetics. Narosa Publishing House, New Delhi.
- Shukla, R. S. and Chandel, P. S. 2000. Cytogenetics, Evolution and Plant Breeding, S. Chand and Co. Ltd., New Delhi.
- Singh, R. B. 1999. Text Book of Plant Breeding. Kalyani publishers, Ludhiana.
- Snustad, D. P., Simmons, M. J. 2011. Principles of Genetics. V Edition. John Wiley and Sons Inc. New Jersey USA.

Botany-Paper-III: BRYOPHYTA

Objectives:

- ❖ To acquire knowledge on bryophytes with its classification, habitat and life cycle.
- ❖ To understand habitat, structure, reproduction with life cycle of Riccia and Marchantia.
- ❖ To learn about class anthocerotopsida.
- ❖ To know about the life cycle of funeria.
- ❖ To apply the knowledge of bryophyta in daily life.

UNIT I:

Bryophytes: General characteristic, origin, evolution, classification (Eichler and Proskauer), habitat range, thallus structure, reproduction, alternation of generation and economic importance.

UNIT II:

Habitat, structure, reproduction and life cycle of the following: Hepaticopsida; *Riccia and Marchantia*.

UNIT III:

Habitat, structure, reproduction and life cycle of the following: Anthoceropsida; *Anthoceros*. Phylogenetic relationship with hepaticopsida and Bryopsida.

UNIT IV:

Bryopsida: Habitat, structure, reproduction and life cycle of *Funaria.* Sterilisation of sporogenous tissues in Bryophytes.

Learning Outcomes: After complition the course student would able to:

- ❖ Acquire knowledge on bryophytes with its classification, habitat and cycle.
- ❖ Understand habitat, structure, reproduction with life cycles of Riccia and Marchantia.
- ❖ Describe the class anthocerotopsida.
- ❖ Explain the concept of life cycle of funeria.
- ❖ Interpret the importance of bryophyte.

Suggested Readings:

- Chopra, R.N. and Kumar, P.K. 1988. Biology of Bryophytes**.** Wiley Eastern Ltd. New Delhi.
- Pandey, S.N., Mishra, S.P. and Trivedi, P.S. 1981. A text book of Botany vol. II, Vikas publishing House Pvt. Ltd, New Delhi.
- Parihar, N.S. 1965. An Introduction to Bryophyta. Central Book Depot, Allhabad.
- Puri, P. 1985. Bryophytes. Atmaram and Sons, Delhi.
- Smith, G.M. 1938. Crytogramic Botany Vol. II. Bryophytes and Pteridophytes. Mc Graw Hill Book Company, London.
- Sporne, K.R. 1967. The Morphology of Bryophytes. Hutchinson University Library, London.
- Tyagi, A.and Saxena, M. 2014. Algae, Lichens and Bryophyta, CBH, Jaipur
- Vashishta, B. R., Sinha, A. K. and Kumar, A. 2011. Botany for degree students, Bryophyta. S. Chand and Co. New Delhi.
- Watson E.V. 1971. The structure and life of Bryophytes. Hutchinson University Library, London.

BOTANY PRACTICAL II

1. Demonstration of the phenomenon of protoplasmic streaming in leaf.
2. To study chloroplast, chromoplast and leucoplast in plant material.
3. Study of Mitosis in root tip and Meiosis in flower bud from temporary and permanent slides.
4. Study the prokaryotic, eukaryotic cell and cell organelles by electron micro photographs.
5. To study the effect of organic solvent on membrane permeability.
6. Genetic problems on monohybrid, dihybrid cross, test cross and back cross.
7. Karyotype preparation.
8. Identification of chromosomes on the basis of their size and centomere position.
9. Pedigree analysis for dormant and recessive autosomal and sex linked traits.

10. Study of Barr body in epithelial cells of females.
11. Study of habit, habitat, vegetative thallus organization and structure, reproductive structures of the following taxa through temporary mounts and permanent slides:
12. *Riccia, Marchantia, Anthocero and Funaria.*

Semester-II

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 205	Zoology-I	**CE***	**4**	**15**	**20**	**100**
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25** Practical	

Zoology-Paper-I : Developmental Biology

Objectives

- To describe how organisms maintain gametic population.
- To understand fertilization process.
- To understand way of cleavage and different patterns to form zygote.
- To understand the fundamental embryonic development.
- To understand the complete process of formation of germ layers.

UNIT-I

1.1 History of embryology and Types

1.2 Gametogenesis: Spermatogenesis, Structure of sperm, Oogenesis, Structure of egg, Types of eggs

UNIT-II

2.1 Fertilization-Type of Fertilization, Process of Fertilization

2.2 Parthenogenesis

2.3 Planes and Patterns of cleavage, Blastulation, Gastrulation,

UNIT-III

3.1 Concept of embryonic induction; Primary organizers differentiation and competence.

3.2 Extra embryonic membranes, Type and physiology of Placenta

3.3 Structure of hen's egg, Development of chick up to 96 hrs stage.

UNIT-IV

4.1Stem cells: Sources, types and their use in human welfare; Cloning

4.2Elementary Idea of Teratogenesis

4.3Ageing and Sencescence, IVF, Embryo transfer-Test tube babies, GIFT, ZIFT and Bioethics

Learning Outcomes: After complition the course student would able to:

- Describe the process of: Gametogenesis, Fertilization and early development, Parthenogenesis
- Understand the concept of embryonic induction: primary organizer and competence, Developmental stages of chick (upto 96 hours).
- Discuss for the extra embryonic membranes.
- Discuss for the placenta
- Describe of stem cell

Zoology-Paper-II : Genetics

Objectives

- To describe how the behavior of chromosomes during meiosis can explain mendal law.
- To understand how inheritance patterns are affected by position on chromosomes.
- To understand the similarities and differences between how genetic information is passed on in prokaryotes and eukaryotes.
- To understand gene interactions.
- To classify the sex determination in human.

Unit – I

1.1 Mendelism: Brief history of Genetics and Mendel's work, Mendelian Laws, their significance and current status

1.2 Genetic Interactions- Epistasis-dominant and recessive, codominance, incomplete dominance, complementary, supplementary, inhibitory, duplicate and Lethal genes

1.3 Multiple Allelic interactions: Inheritance of blood group and Rh factor

Unit –II

2.1 Linkage and crossing over: Basic concept, types and theories, elementary idea of Chromosome mapping

2.2 Sex determination – ZZ, XY, XO, ZW pattern, Sex determination in Human,

Unit – III

3.1 Chromosomes Number, size, shape, type structure, Lampbrush chromosomes,

3.2 Cytoplasm inheritance: Kappa particles in Paramecium, Chloroplast Genetics, Cytoplasmic Inheritance in chlamydomonas

Unit –IV

4.1 Disorders related to chromosomal number- Turner syndrome, Klinefelter's syndrome and Down's syndrome

4.2 Elementary idea of Thalassemia, Sickle Cell Anaemia, Diabetes mellitus

Learning Outcomes: After complition the course student would able to**:**

- Understand the Mendelism & Multiple allelism.
- Understand the concept of gene & gene interaction, and Sex- linked Inheritance.
- Describe the Blood Group, RH Factor .
- Interpret the terms Chromosome , Thalassemia,Sickle cell anemia
- Describe in sex determination in human

Zoology-Paper-III : Molecular Biology

Objectives

- To Understand about the genetic material (Nucleic acids) and DNA replication.
- To Understand about various types of RNA and process of Transcription & Translation.
- To describe the Genetic Code, and protein synthesis.
- 4.To classify the bacterial DNA structure
- To describe the nucleolus structure and function

Unit – I

1.1 Interphase Nucleus: Organization, Ultrastructure and functions of Nucleus, Pore Complex, Nuclear Membrane

1.2 Nucleolus: Structure and functions

1.3 Chromosome: Ultrastructure and types, Chromosomal Organisation: Nucleosome Model, Solenoid Model,
1.4 Giant chromosomes: Lamp-brush and Polytene chromosome

Unit - II

2.1 1DNA: Structure of DNA, Polymorphism of DNA (A, B, C, D and Z)
2.2 RNA: Structure of RNA, types of RNA, RNA as a genetic material

Unit - III

3.1 DNA replication: Meselson and Stahl experiments, Mechanism of replication –origin of replication, concept of replication, directionality of replication, Role of enzymes in replication
3.2 Bacterial DNA Structure
3.3 Replication in Bacterial DNA

Unit IV

4.1 Genetic code: Characteristics of genetic code, Wobble hypothesis
4.2 Protein synthesis: Central Dogma; Transcription Mechanism in Prokaryotes, Transcription in Eukaryotes, Enz of transcription;
4.3 Protein Synthesis: Elementary idea of the mechanism of translation

Learning Outcomes: After complition the course student would able to:

- ❖ Understand about the genetic material (Nucleic acids) and DNA replication.
- ❖ Interpret about various types of RNA and process of Transcription & Translation.
- ❖ Understand the Genetic Code, and protein sysnthesis.
- ❖ Describe the bacterial DNA structure
- ❖ Discuss the nucleolus structure and function

Zoology --Practical Based on paper I, II and III

Paper-I: Developmental Biology

1. Study of development of chick with the help of

a. Whole mounts: 18 Hours (Primitive streak stage), 21 hrs, 24 hours, 33 hrs, 48 hours 72 hours and 96 hours.
b. Study of the embryo at various stages of incubation in vivo by making a window in egg shell.

Paper-II: Genetics

1. Life cycle of Drosophila; Identification of male and female drosophila;. Study of mutants in Drosophila (Bar eye, white eye, yellow body, sepia eye, curled wing, vestigial wing)
2. Identification of blood groups & Rh. Factor

Paper-III: Moleculor Biology

1. Demonstration of salivary gland chromosome in Chironomous larva
2. Use of colchicine in arresting anaphase movement (onion root tips)
3. Study of cell permeability using mammalian RBCs.

Suggested Readings :

1. Genetics; Winchester, A. M.; Oxford and IBH Publishing Co.
2. Cell and Molecular Biology; De Robertis and De Robertis; Saunders College.
3. Genetics; Strickberger W. M.; Prentice Hall of India.
4. Cell Biology; Powar, C.B; Himalayan Publishing House.

5. Principles of Genetics; Gardener, E. J.;Wiley eastern, New Delhi.
6. A Textbook of Genetics; Rastogi, V.B.; Ramnath and Kedarnath
7. Molecular Biology of the gene; Watson, J.D; Benzamin/ Cummings.
8. Biochemistry; Voet &Voet; John Wiley & Sons.
9. Cytology and Genetics. Dyansagar, C.R. Tata McGraw Hill Publ. Co. New Delhi.
10. Cell Biology : Dyson, R.D. Allen and Bacon, New York.
11. Cell Biology. Rastogi S.C. : Tata McGraw Hill Publ. Co. New Delhi.
12. Cell Biology and Genetics. Kohli, S. jain, S. and Ramesh Book Depot. Jaipur.
13. Cytology : Verma, P.S. and Agrawal V.K : S.Chand and Co. New Delhi.
14. Genetics. Verma, P.S. and Agrawal V.K. S.Chand and Co., New Delhi.
15. Cell Biology and Genetics; Kohli, K.S;Ramesh Book Depot
16. Genetics; Winchester, A.M; Oxford and IBH Publishing Co.
17. Cell and Molecular Biology; De Robertis and De Robertis; Saunders College.
18. Genetics; Strickberger; Macmillan, Prentice Hall of India.
19. Cell Biology; Powar, C.B; Himalayan publishing House.
20. Principles of Genetics; Gardener, E,J; Wiley eastern, New Delhi.
21. A Textbook of Genetics; Rastogi, V.B.; Ramnath & Kedarnath.
22. Cell and Molecular Biology; Gerald Karp; John Wiley and Sons,inc
23. Molecular Biology of the cell; Bruce Alberts, Julian Lewis, James D.Watson; Garland Publishings
24. Textbook of Zoology; Shivapuri, Jacob, D. and Vyas, D.K.; Ramesh Book Depot.
25. Zoology: Storer, T.I. and Using, K.L.: Tata McGraw Hill Publishing Co., New Delhi.
26. D. Reinhold, New York (Indian repring : Affiliated East West Press, New Delhi.)
27. Student Text Book of Zoology. Vol.I.II and III. Sedgwick.A.
28. Text book of Zoology. Parker, T.J., Haswell. W.A.Macmillan Co., London.
29. Gilbert, S. T. (2000). Developmental biology, 6th ed. *Sinauer, Sunderland*.
30. Hoar, W. S. (1983). General and comparative physiology. *Prentice Hall*.
31. Prosser, C. L. Comparative animal physiology.
32. Saunders, J. W. Developmental biology: Patterns/Principles/Problems. MacMillan Publ.
33. Wilson, J. A. Principles of animal physiology. Collins MacMillan Publ.
34. Sandhu. T. B. of Embryology
35. Armugam. T. B. of Embryology
36. Pattern. Early Embryology of Chick
37. Verma & Agrawal. Chordate Embryology
38. Tomar. Chordate Embryology
39. Asha Sharma, Chetan K. Sharma, Development Biology, R.B.D. Publishing House, Jaipur
40. K.V. Shastri, Vinita Sukhla, 2014, Development Biology, Rastogi Publication, Meerut, Delhi
41. S.K. Sharma, 2015, Micro Biology & Bio-technology,College Book Center, Jaipur

Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 301	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25** Practical	

Chemistry-Paper-I : inorganic chemistry

Objectives:

- To develop the conceptual knowledge of acid and bases.
- To aware about the classification of acids, non aquous solvents and separation methods.
- To give information about various characteristics & laws realed to hard and soft acid and bases.
- To acquaint the knowledge of principles and purifying process for various solvents.

Unit I : Acids and Bases

Arrhenius (Water- ion system), Bronsted- Lowry (The proton donor acceptor system), The Lux-Flood (oxide ion concept), Lewis concepts of acids and bases (The electron donor acceptor concept) and solvent system and solvolysis, ionic product of solvent, limitations of solvent system.

Unit II : Hard and soft acids and bases (HSAB)

Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid- base strength and hardness and softness, symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness, limitations of HSAB.

Unit III : Non-aqueous solvents

Physical properties of solvent, types of solvent and their general characteristics, reactions in non-aqueous solvents with reference to liq. NH_3 and liq. SO_2

Unit IV : Seperation methods and Analysis Process

Principles and process of solvent extraction, the distribution law and partition coefficient, batch extraction, continuous extraction and counter current distribution, Gravimetric methods, theory of precipitation, co-precipitation, post precipitation, theory of purifying the precipitates.

Learning Outcomes: After complition the course student would able to:

- Differentiate between the various types of acid and bases.
- Describe the rules and principles related to explain the properties of non aqueous solvents.
- Apply the rules of separation and purification to extract various impurities.
- Explain the general characteristics and types of solvents.

Chemistry-Paper-II : Organic chemistry

Objectives:

- To develop knowledge about classification & nomenclature of organic compounds.
- To aware about the chemical reactions, mechanism and properties of alcohol & ethers.
- To develop understading the proper use of various laws related to synthesis and catalyzing process.
- To explain the various reactions on the basis of their mechanism.

Unit I: Alcohols

Classification and nomenclature. Monohydric alcohols- Methods of formation by reduction of aldehyde, ketones, carboxylic acids and esters. Hydrogen bonding, acidic nature, reaction of alcohols. Dihydric alcohols- methods of formation, chemical reactions of vicinal glycols, oxidation cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol- pinacolone rearrangement. Trihydric alcohols- methods of formation, chemical reactions of glycerol.

Unit II : Phenol

Nomenclature, structure and bonding, preparation of phenols, physical properties and acidic character. Comparative acidic strength of alcohols and phenols, resonance stabilization of phenoxide ion, reaction of phenols, electrophilic aromatic substitions, acylations and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement. Gattermann synthesis, Hauben- Hoesch reaction, Lederer Manasse reaction and Reimer Tiemann reaction.

Unit III : Aldehyde and ketones

Nomenclature and structure of the carbonyl group. Synthesis of aldehyde and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehyde and ketones using 1, 3 dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, perkin and Knovenagel condensations, condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction, use of acetals as protecting group, oxidation of aldehyde and ketones, Cannizzaro reaction, Bayer Villiger oxidation of ketones, MPV, Clemmensen's reduction, Wolf Kishner reduction, $LiAlH_4$ and $NaBH_4$ reduction, Halogenation of enolizable ketones.

Unit IV : Ethers and epoxides & Organic synthesis via Enolates

Nomenclature of ethers and methods of their formation, physical properties, chemical reactions- cleavage and auto oxidation, Ziesel 's method. Synthesis of epoxides. Acid and base- catalyzed ring opening of epoxides, orientation of epoxide ring opening; reactions of Grignard and organolithium reagents with epoxides.

Acidity of α hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethylacetoacetate; The Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3- dithianes, alkylation and acylation of enamines.

Learning outcomes: After complition the course student would able to:

- Calssify the various organic compounds on the basis of mechanism and structure.
- Apply the knowledge of processing derivatives for synsthesize various products.
- Describe and discuss about technical terminology related to alcohols, ketones & ethers ec.
- Explain different methods of formation according to chemical reactions.

Chemistry-Paper-III : Physical chemistry

Objectives:

- To develop the knowledge about laws of thermodynamics, electrochemistry & equilibrium.
- To aware about the behavior of ideal gases, enthalpy and process of dissociation.
- To describe the relationship pressure and heat, conductivity & electrolytes etc.
- To develop understanding about the thermodynamics process and chemical equilibrium.

Unit I: Thermodynamics-I & First law of thermodynamics

Definition of thermodynamics terms: systems, surroundings etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamics process. Concept of heat and work.

Statement, definition of internal energy and enthalpy. Heat capacity. Heat capacities at constant volume and pressure and their relationship. Joule law-Joule Thomsan co-efficient and inversion temperature. Calculation of w,q,dU &dH for the expansion of ideal gases under isothermal and adiabatic condition for reversible process.

Unit II: Themochemistry

Standard state, standard enthalpy of formation- Hess`s Law of heat summations and its applications, Heat of reaction at constant pressure and constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchhoff `s equation.

Unit III: 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. Ostwald dilution law its uses and limitations.

Debye Huckel– Onsager`s equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method. Application of conductivity measurements; determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt, condutometric titrations.

Unit IV: Chemical equilibrium

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le- Chatelier`s principle. Reaction isotherm and reaction isochore – Clapeyron equation and Clausious- Clapeyron equation, application.

Learning Outcomes: After complition the course student would able to:

- Calculate and measure equivalent conductance, bond energy and thermo chemical data.
- Differentiate among intensive and extensive properties of system according to thermodynamics.
- Plot and interpret graph, equations and interrelationship related to volume, pressure and heat energy.
- Describe various phenomenon of thermodynamics, thermochemistry and electrochemistry.
- Measure thermo chemical data, enthalpy, solubility and equilibrium constant etc

.

Practicals

Inorganic Chemistry

Preparation of standard solutions

Dilution 0.1M to 0.001M solutions

Gravimetric analysis:(Any One)

i) Analysis of Cu as CuSCN ,
ii) Analysis of Ni as Ni (dimethylglyoxime) and
iii) Analysis of Zn as Zn3(PO4)2

Organic Chemistry

Qualitative Analysis : Identification of two organic compound through the functional group analysis, determination of melting point/boiling point and preparation of suitable derivatives of any one.

Suggested Reading:

1. कार्बनिक रसायन, सुरेश आमेटा, एच.के. पाण्डे, एच.एस. शर्मा, हिमांशु पब्लिकेशन्स, उदयपुर
2. अकार्बनिक रसायन, ओझा, भोजक, कोठारी, चतुर्वेदी, रमेश बुक डिपो, जयपुर
3. प्रायोगिक रसायन, भार्गव, लवानिया, ओझा, रमेश बुक डिपो, जयपुर
4. भौतिक रसायन, शर्मा, भार्गव, गुप्ता, रमेश बुक डिपो, जयपुर

5. कार्बनिक रसायन, विजयश्री मनोज छंगाणी, अल्का पब्लिकेशन, अजमेर
6. अकार्बनिक रसायन, विजयश्री कोठारी छंगाणी, अल्का पब्लिकेशन, अजमेर
7. प्रायोगिक रसायन, छंगाणी, विजयश्री, खण्डेलवाल, अल्का पब्लिकेशन, अजमेर
8. अकार्बनिक रसायन, सुरेश आमेटा, उमा शर्मा, पी.के. शर्मा, मुकेश मेहता, हिमांशु पब्लिकेशन्स, उदयपुर
9. अकार्बनिक रसायन, जी.के. रस्तोगी, यशपाल सिंह, कॉलेज बुक हाऊस, जयपुर
10. प्रायोगिक रसायन, वी.के. गोयल, आर.एस. पीतलिया, कॉलेज बुक हाऊस, जयपुर

Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 302	Physics-I	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25** Practical	

Physics-Paper-I: Statistical And Thermodynamical Physics-I

Objectives:

- To aware general thermo-dynamical interaction.
- To develop concept about carnot's engine and Maxwell relation.
- 3 To apply the concepts production of low temperature.
- 4. To apply the concepts of low temperature.

UNIT I General Thermo-dynamical Interaction:

Thermal interaction; Zeroth law of thermodynamics Helmholtz free energy; Adiabatic interaction and enthalpy; General interaction and first law of thermodynamics; Infinitesimal general interation; Gibb's free energy and Phase transitions. Clausius-Clapeyron equation; Vapour pressure curve.

UNIT II Carnot's Engine and Maxwell Relation:

Heat engine and efficiency of engine, Carnot,s Cycle; Thermodynamic scale as an absolute scale; Maxwell relations and their applications.

UNIT III Production of Low Temperature:

Joule Thomson expansion and J.T. coefficients for ideal as well as Vander Waal's gas. Porous plug experiment, Temperature inversions. Regenerative cooling and cooling by adiabatic expansion and demagnetization.

UNIT IV Application of Low Temperature:

Liquid Helium, He I and He II, super fluidity, quest for absolute zero. Nernst heat theorem. Qualitative Discussion of Superconductivity.

Learning Outcomes: After complition the course student would able to:

- Identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, chemical potential, Free energies, partition functions.
- Use the statistical physics methods, such as Boltzmann distribution, Gibbs distribution, Fermi-Dirac and Bose-Einstein distributions to solve problems in some physical systems.

- ❖ Apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.
- ❖ Apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators etc.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, उष्मा गतिकी एवं सांख्यकीय भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics-Paper-II: Optics –I

Objective

- ❖ To give information about geometrical optics.
- ❖ To aware about the lenses and these properties.
- ❖ To develop concept about the interference.
- ❖ To give information about polarization and types of polarization.

UNIT-I Geometrical Optics:

Fermat's principle, Laws of reflection and refraction from Fermat's principle, refraction at a spherical surface. Axial, lateral, angular magnification and their interrelationship; Abbe's Sine condition for spherical surfaces;

UNIT-II Lenses:

Refraction through a thick and thin lenses and its Focal length , Focal length of two thin lenses separated by a distance, Cardinal points of a co-axial lens system, properties of cardinal points; construction of image using cardinal points.

UNIT-III Interference:

Young's double slit experiment, temporal and spatial coherence, coherence length, Division of amplitude, Interference in thin films, colour in thin films. Wedge shaped film, Newton rings and determination of wavelength and refractive index by Newton ring. Michelson Interferometer, Measurement of wavelength and refractive index by Michelson Interferometer.

Unit-IV Polarization:

Polarization states of electromagnetic (EM) waves, reflection and refraction of plane EM wave at plane dielectric surface, boundary conditions, derivation of Fresnel's relations. Huygen's theory, Theory of double refraction using Fresnal's ellipsoidal surface (no mathematical derivation). Production and analysis of plane, circularly and elliptically polarized light, quarter and half wave plates.

Learning Outcomes: After complition the course student would able to:

- ❖ Gain knowledge on various theories of light
- ❖ Acquire skills to identify and apply formulas of optics and wave physics
- ❖ Classify the properties of light like reflection, refraction, interference, diffraction etc
- ❖ Applies the diffraction and polarization.
- ❖ Classify the theory of double refraction.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, प्रकाशिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली**,** 2015–16

Physics-Paper-III: Electronics & Solid State Devices –I

Objectives:

- To give information about circuit analysis.
- To aware about the network theorems.
- To develop concept about the semiconductor.
- To give information about rectifiers and voltage regulation.

UNIT-I Circuit Analysis:

Network-some important definitions, loop and nodal equation based on DC and AC circuits (Kirchhoff's Laws), Four terminal network parameters; Current volt conventions, Open circuit, short circuit and hybrid parameters of any four terminals network. Input, Output and mutual impendence for an active four terminal network.

UNIT – II Network Theorems:

Superposition, Thevenin, Norton, Reciprocity, Compensation and maximum power transfer and miller theorems.

UNIT – III Semiconductors:

Intrinsic and extrinsic semiconductors, charge densities in N and P materials, conduction by drift and diffusion of charge carriers. PN diode equation, capacitance effects. Nature of charge carriers by Hall effect and Hall coefficient. Zener Diode, tunnel diode, photovoltaic effect.

UNIT – IV Rectifiers and Voltage Regulation:

Half-wave, full wave and Bridge rectifiers, Calculation of ripple factor, efficiency and regulation. Filters: shunt inductors, shunt capacitor, L sections and π sections filters. Voltage regulation and voltage stabilization by Zener diode, Voltage multiplier circuits.

Learning Outcomes: After complition the course student would able to:

- Applies the kirchhoff's law (first and second) and circuit analysis.
- Calculate the network theorem (superposition, thevenin, reciprocity, compensation, maximum power transfer and miller theorems).
- Discuss the concept of the semiconductor, type of semiconductor, zener diode and hall effect.
- Identify the concept of rectifiers, voltage regulation, various type of filter.
- Calculation of ripple factor, efficiency and regulation

.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, इलेक्ट्रोनिकी एवं ठोस प्रावस्था युक्तियां, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली**,** 2015–16

Physics Practical: III

1. Study of dependence of velocity of wave propagation on line parameter using torsional wave apparatus.
2. Study of variation of reflection coefficient on nature of termination using torsional wave apparatus.
3. Using Platinum resistance thermometers find the melting point of a given substance.
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 interferometers find out the wavelength of given monochromatic source (Sodium light).
6. To determine dispersive power of prism.
7. To determine wave length by grating.
8. To determine wave length by Biprism.
9. Determine the thermodynamic constant using Clements & Desorme's method.
10. To determine thermal conductivity of a bad conductor by Lee's method.
11. Determination of ballistic constant of a ballistic galvanometer.
12. Study of variation of total thermal radiation with temperature
13. To study the Specific rotation of sugar solution by polarimer.
14. Any experiment according to theory paper.

Suggested Reading :

1. प्रभा दशोरा, द्वितीय वर्ष, प्रायोगिक भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 303	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25** Practical	

Mathematics-Paper-I : Real Analysis

Objectives:

- To aware the Real Numbers as Complete Ordered Field, Closed & opened Sets.
- To gain knowledge about the Cauchy's Sequences, Subsequences.
- To develop knowledge about the Notion of Limit & Continuity for Functions of Two Variables.
- To develop concept about the properties of continuous function on close intervals.

Unit 1: Real numbers as complete ordered field, Limit point, Bolzano-Weierstrass theorem, Closed and Open sets, Union and Intersection of such sets. Concept of compactness. Heine-Borel theorem. Connected sets. Real sequences- Limit and Convergence of a sequence, Monotonic sequences.

Unit 2: Cauchy's sequences, Subsequences, Cauchy's general principle of convergence.

Unit 3 ; Properties of continuous functions on closed intervals. Properties of derivable functions, Darboux's and Rolle's theorem.

Unit 4: Notion of limit and continuity for functions of two variables. Riemann integration — Lower and Upper Riemann integrals, Riemann integrability, Mean value theorem of integral calculus, Fundamental theorem of integral calculus,

Learning Outcomes: After complition the course student would able to:

- ❖ Applies the Real Numbers as Complete Ordered Field, Closed & opened Sets.
- ❖ Calculate the Cauchy's Sequences, Subsequences.
- ❖ Discuss the Properties of Continuous Functions on Closed Intervals.
- ❖ Classify the Notion of Limit & Continuity for Functions of Two Variables.
- ❖ Interprets the fundamental theorem.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, रियल एनालिसिस, आर. बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, रियल एनालिसिस, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics-Paper-II : Differential Equations I

Objectives

- ❖ To give information about Degree & Order of a Differential Equation.
- ❖ To aware Linear Equation & Exact Differential Equation.
- ❖ To develop concept of the 1st Order but Higher Degree Differential Equation Solve for x,y &p.
- ❖ To develop knowledge about the Homogeneous Linear Differential Equations.

Unit 1: Degree and order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations and equations reducible to homogeneous form.

Unit 2; Linear equations and equations reducible to linear form. Exact differential equations and equations which can be made exact.

Unit 3: First order but higher degree differential equations solvable for x,y and p. Clairaut's form and singular Solutions with Extraneous Loci. Linear differential equationS with constant coefficients, Complimentary function and Particular integral.

Unit 4 : Homogeneous linear differential equations, Simultaneous differential equations.

Learning Outcomes: After complition the course student would able to:

- ❖ Calculate Degree & Order of a Differential Equation.
- ❖ Differentiate between Linear Equation & Exact Differential Equation.
- ❖ Calculate the 1st Order but Higher Degree Differential Equation Solve for x,y &p.
- ❖ Discuss on the Homogeneous Linear Differential Equations.
- ❖ Discuss on the linear differential equation constant coefficients.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, अवकलन समीकरण, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, अवकलन समीकरण, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics-Paper-III: Numerical Analysis

Objectives:

- To aware Relation b/w Differences and Derivatives .
- To Understand the Divided Differences by Newton's .
- To give knowledge about the Stirling's and Bessel's Interpolation Formulae.
- To develop concept of Numerical Integration .

Unit 1: Differences. Relation between differences and derivatives. Differences of a polynomial. Newton's formulae for forward and backward interpolation.

Unit 2: Divided differences. Newton's divided difference, Lagrange's interpolation formula.

Unit 3: Central differences.Gauss's, Stirling's and Bessel's interpolation formulae. Numerical Differentiation. Derivatives from interpolation formulae.

Unit 4: Numerical integration, Derivations of general quadrature formulas, Trapazoidal rule. Simpson's one-/ third, Simpson's three-eighth and Gauss's quadrature formulae.

Learning Outcomes: After complition the course student would able to:

- Calculate Relation b/w Differences and Derivatives .
- Discuss on the Divided Differences by Newton's .
- Applies the Stirling's and Bessel's Interpolation Formulae.
- Identify the concept of Numerical Integration.
- Applies the trapezoidal rule.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, संख्यात्मक विश्लेषण, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, संख्यात्मक विश्लेषण, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 304	Botany-I	CE*	4	15	20	100
	Botany-II				20	
	Botany-III				20	
	Botany Practical				25 Practical	

Botany-Paper-I : Molecular Biology

Objectives:

- To know the concept of genetic material
- To understand the structure of DNA with its model
- To get knowledge about the concept, types and process of DNA replication
- To understand the concept of transcription and Translation
- To learn about the regulation of gene expression

UNIT I: Genetic Material

- Biological, Chemical and physical Nature of Heredity material.
- Structure of DNA, WATSON & Crick model of DNA, Nuclcosome model.
- Structure and types of RNAs (mRNA, tRNA adr RNA)

UNIT –II DNA Replication

- Concept, Types and process of DNA Replication.
- Staht experiment of semiconservative replication of DNA
- Okazaki fragments, DNA Polymerases, DNA protein interaction.
- Preliminary account of DNA damage and repair.

UNIT-III Transcription and Translation

- Transcription in Eukaryotes, role of promoters, RNA Polymerases, Pre RNA synthests, pre RNA Processing, copping, splicing and polyadenylation.
- Translation in Eukaryotes, Genetic code (Initiation, Elongation and Termination.)

UNIT-IV Regulation of Gene Expression

- Regulation in Gene expression in prokaryotes and Eukaryotes,
- Negative and Positive control.
- Attenuation and Antitermination.
- Reverse Transcription and its application.

Learning Outcomes: After complition the course student would able to:

- ❖ Explain the concept of genetic material
- ❖ Understand the structure of DNA with its model
- ❖ Describe the concept, types and process of DNA replication
- ❖ Differentiate the transcription and Translation
- ❖ Interpret the regulation of gene expression

Suggested Readings:

1. Becker, W.M., Kleinsmith, L.J., Hardin, J. and Bertoni, G. P. 2009. The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Brown, T. A. 2010. Gene cloning and DNA analysis: An Introduction. Blackwell Publication, USA.
3. Buchanan, B., Gruissem, W. and Jones, R. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists., USA.
4. Chrispeel, M.J. and Sadava, D.E. 1994. Plants, Genes and Agriculture**.** Jones and Barlett Publishers, USA.
5. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press and Sunderland, Washington, D.C. Sinauer Associates, MA.
6. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology 8th edition. Lippincott Williams and Wilkins, Philadelphia.
7. Glick, B.R. and Pasternak, J.J. 2003. Molecular Biotechnology: Principles and Applications of recombinant DNA. ASM Press, Washington.
8. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th edition. John Wiley and Sons. Inc. New jersey, USA.
9. Mascarenhas, A.F. 1988. Hand book of Plant tissue culture. Publication and information. Div., ICAR, New Delhi.

10. Purohit, S.S. and Mathur, S.K. 1996. Biotechnology Fundamental and Application. Agro Botanical Publisher, Bikaner.
11. Razdan, M.K., 1993. An introduction to Plant tissue culture. Publication and Information Div., ICAR, New Delhi.
12. Rana, S.V.S. 2012. Biotechnology theory and practice. (Third Ed.) Rastogi Publication, Meerut.
13. Rastogi, V.B. 2008. Fundamentals of Molecular Biology.Ane Books, Meerut, India.
14. Smith, R. H. 2000. Plant Tissue Culture: Techniques and Experiments. 2nd edition, Academic Press, USA.
15. Upadhyaya, A. and Upadhayaya, K. 2005. Basic Molecular Biology. Himalaya Publishers. New Delhi.

Botany-Paper-II : Biotechnology

Objectives:

- To know the whole concept of Biotechnology
- To distinguish between morphogenesis and micro propagation
- To aware about the mechanism of plant tissue culture.
- To learn about the isolation, culture and somatic cell hybridization
- To acquire knowledge about recombinant DNA technology and PCR technique.
- To understand the introduction, process of transgenic plants.

UNIT I: Biotechnology and Plant tissue culture

Biotechnology: Functional definition. Basic aspects of Plant tissue culture, Basal medium, Media preparation and aseptic culture technique. Concept of cellular totipotency, Differentiation and morphogenesis and Micropropagation.

UNIT II: Protoplast, Anther and Embryo culture

Protoplast isolation, culture and Somatic cell hybridization, Anther culture , Embryo culture and their Applications, Applications of Plant tissue culture,

UNIT III: Recombinant DNA technology

Techniques used in rDNA technology. Restriction enzymes. Vectors for gene transfer. Plasmids and Cosmids. Genomic and c-DNA library, Polymerase Chain Reaction (PCR), Applications of PCR technique, DNA Finger Printing.

UNIT IV: , **Transgenic plants**

Introduction , Process of production of transgenic plants, types of transgenic plants ,
Application of transgenic plants and Biotechnology

Learning Outcomes: After complition the course student would able to:

- Comprehend the concept of Biotechnology
- Distinguish between morphogenesis and micro propagation
- Describe the role of plant tissue culture.
- Explain the isolation, culture and somatic cell hybridization
- Acquire knowledge about recombinant DNA technology and PCR technique.
- Interpret the transgenic plants.

Suggested Readings:

1. Becker, W.M., Kleinsmith, L.J., Hardin, J. and Bertoni, G. P. 2009. The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Brown, T. A. 2010. Gene cloning and DNA analysis: An Introduction. Blackwell Publication, USA.
3. Buchanan, B., Gruissem, W. and Jones, R. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists., USA.
4. Chrispeel, M.J. and Sadava, D.E. 1994. Plants, Genes and Agriculture**.** Jones and Barlett Publishers, USA.
5. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press and Sunderland, Washington, D.C. Sinauer Associates, MA.
6. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology 8th edition. Lippincott Williams and Wilkins, Philadelphia.
7. Glick, B.R. and Pasternak, J.J. 2003. Molecular Biotechnology: Principles and Applications of recombinant DNA. ASM Press, Washington.
8. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th edition. John Wiley and Sons. Inc. New jersey, USA.
9. Mascarenhas, A.F. 1988. Hand book of Plant tissue culture. Publication and information. Div., ICAR, New Delhi.
10. Purohit, S.S. and Mathur, S.K. 1996. Biotechnology Fundamental and Application. Agro Botanical Publisher, Bikaner. Razdan, M.K., 1993. An introduction to Plant tissue culture. Publication and Information Div., ICAR, New Delhi.
11. Rana, S.V.S. 2012. Biotechnology theory and practice. (Third Ed.) Rastogi Publication, Meerut.
12. Rastogi, V.B. 2008. Fundamentals of Molecular Biology.Ane Books, Meerut, India.
13. Smith, R. H. 2000. Plant Tissue Culture: Techniques and Experiments. 2nd edition, Academic Press, USA.
14. Upadhyaya, A. and Upadhayaya, K. 2005. Basic Molecular Biology. Himalaya Publishers. New Delhi.

Botany-Paper-III : Plant Physiology I

.**Objectives:**

- To understand structure, properties, components and phenomenon of water
- To know about different theories related to water absorption.
- To learn about Nitrogen and phosphorous cycle
- To get knowledge about concept and process of photosynthesis and respiration.
- To distinguish Aerobic and anaerobic pathways

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UNIT I: Water

Structure and properties of water, osmosis, water potential and its components, absorption of water, root pressure, pathway of water movement; concepts of symplast and apoplast. Ascent of sap, mechanism of stomatal movements, factor affecting transpiration, it's theories, mechanism and significance, antitranspirants and guttation.

UNIT II: Mineral Nutrition

Transport of ions across cell, mechanism of active and passive transport, translocation of, macro and micro nutrients; role of essential nutrients in plant metabolism and their deficiency symptoms. Outline of Nitrogen and phosphorus cycle. Transamination and deamination.

UNIT III: Photosynthesis

Photosynthesis, discovery and structure of pigments (chlorophyll and accessory pigment) ,light harvesting units, law of limiting factors. Light reaction- photophosphorylation- (cyclic and non cyclic), dark Reaction- Calvin and Benson cycle, Hatch and Slack pathway, Crassulacean acid metabolism and photorespiration.

UNIT IV: Respiration

Respiration: Aerobic and anaerobic, glycolysis, tricarboxylic acid cycle, oxidative phosphorylation, and factors affecting oxidative processes, pentose phosphate pathway, fermentation.

Learning Outcomes: After complition the course student would able to:

- Understand structure, properties, components and phenomenon of water
- C out different theories related to water absorption.
- Explain the Nitrogen and phosphorous cycle
- Get knowledge about concept and process of photosynthesis and respiration
- Distinguish Aerobic and anaerobic pathways

Suggested Readings:

1. Hopkins, W.G. and Huner, P. A. 2008. Introduction to Plant Physiology**.** John Wiley and Sons, USA.
2. Jain, V.K. 2013. Fundamental of Plant Physiology. S. Chand and Company Ltd., New Delhi.
3. Malik, C. P. and Srivastava A.K. 1982. Text book of Plant Physiology. Kalyani publication, New Delhi.
4. Mukherjee S., Ghosh A. K. 2006. Plant Physiology. New Central Book Agency, Calcutta.
5. Parashar, A. N. and Bhatia, K. N. 1985. Plant Physiology. Trueman Book Company, New Delhi.
6. Sinha, R. K. 2007. Modern Plant Physiology. 2nd Edition Tata McGraw, New Delhi.
7. Taiz, L. and Zeiger, E. 2006. Plant Physiology**.** 4th Edition, Sinauer Associates Inc. Publishers, Massachusetts, USA.
8. Verma, S. K. and Verma, M. 2000. A Text book of Plant Physiology, Biochemistry and Biotechnology. S. Chand and co. Ltd., New Delhi.
9. Verma, V. 2007. Text Book of Plant Physiology. ANE Books, India.

BOTANY PRACTICAL III

1. To determine the water potential of given plant material.
2. Demonstration of phenomenon of osmosis using potato osmometer.
3. Demonstration of phenomenon of plasmolysis.
4. To study the permeability of plasma membrane using different concentration of organic solvents.
5. To study the effect of temperature on permeability of plasma membrane.
6. To demonstrate root pressure.
7. Study of effect of temperature on rate of transpiration.
8. Study of transpiration rate in dorsiventral and isobilateral leaves by use of potometer.
9. Study of the mechanism of stomatal opening and closing.
10. Rate of photosynthesis under varying HCO_3 concentration in an aquatic plant using bicarbonate (Wilmott and Bubbler).
11. Demonstration of O_2 evolution during photosynthesis by inverted funnel method.
12. To study that light is necessary for photosynthesis by using ganong screen.
13. To demonstrate of anaerobic and aerobic respiration.
14. To study that $C_{O2,}$ light and chlorophyll is essential for photosynthesis (Moll's half experiment).

15. Study C3 andC4 plant with the kranz anatomy.
16. To study the R.Q. by Ganong's respirometer.

Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 305	Zoology-I	CE*	4	15	**20**	100
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25** Practical	

Zoology-Paper-I : Life and Diversity of animals – Chordata- I

Objectsives:

- To explain what the vertebrates are.
- To understand the general characters of each class of vertebrates.
- To understand the origin and evolutionary relationship in different classes of vertebrates.
- To understand the classification of pisces
- To develop the general characters and classification in Amphibia

Unit I: Protochordates

1.1 **Protochordata**: General characters and classification up to order Type Study:

1.2 ***Herdmania*** : Morphology, digestive system, Nervous System and sense organs, Excretory System, Reproductive system, Ascidian tadpole larva

1.3 ***Amphioxus***: Structure, digestive system, respiratory system, circulatory system, sense Organs, excretory system

Unit – II Agnatha and Pisces

2.1 Agatha: General Features of Agnatha and classification up to classes Type study: General Features of Petromyzon, Ammocete Larva

2.2 Pisces: Classfication of Pisces upto classes; Difference between Chondrichthyes and Osteichthyes Type Study**:** General Morphology and anatomy of Scoliodon

Unit-III Tetrapoda

3.1 Amphibia: Classification and characters with suitable examples, adaptations for amphibious life

3.2 Reptilia: Classification and characters with suitable examples,

3.3 Aves: General classification and characters with important examples;

3.4 Mammalia-I: Classification and characters with suitable examples

Unit – IV Miscellaneous

4.1 Protochordates: General features and phylogeny of Urochordates & cephalochordates; Retrogressive metamorphosis

4.2 Pisces: Fins (structure and origin); Types of scales; Migration; Parental Care

Learning Outcomes: After complition the course student would able to:

- Discuss and study the classification of Protochordata, Ascidia & Amphioxus
- Understand the classification of Agnatha & Gnathostomata, Characters of Petromyzon, Ammocoet larva, .

- ❖ Learn about the classification of Pisces, and basics of pisciculture, Scales, Fins, migration in fishes.
- ❖ Understand the classification of Amphibia, Reptilia, and the General Topics like Adaptive radiation in Amphibian, Neoteny, Parental care in Amphibians,
- ❖ Understand the classification of Aves, Mammals and the General Topics like perching mechanism, flight adaptation, migration and feathers in birds and adaptation, hair and dentition in Mammals

Zoology-Paper-II: Microbiology & Parasitology

Objectsives:

- ❖ To understand the classification Microorganisms.
- ❖ To Understand and study the Bactria.
- ❖ To Understand the Parasite Protozoan's.
- ❖ To Understand the Virus, Hepatitis and HIV.
- ❖ To explain the morphology of bacteria

Unit –I: Microbiology

1.1 The scope of Microbiology: Characterization, Classification and identification of Microorganisms.

1.2 History and landmark events in Microbiology: Working of A.V. Leeuvenhock, Louis Pasteur, Robert Koch, Germ Theory of diseases.

1.3 World of Microbes: General Morphology of Protozoa, fungi – Molds and Yeasts

Unit-II: Bacteria

2.1 The World of Bacteria – Morphology of Bacteria; Difference between Gram-positive and Gram-negative Bacteria

2.2 Basic idea of Culture: Types of culture media, Maintenance of pure cultures

2.3 Growth & Reproduction: Bacterial division, growth curve, generation time, measurement of growth. Asepsis, sterilization with physical and chemical agents; Reproduction- Asexual and sexual

Unit-III: Other Microbes

3.1 Virus: Structure, Classification; Life Cycle- Lytic and Lysogeny; A Bacteriophage

3.2 Hepatitis: Structure and types of causative agent, Precaution, Prevention and Control

3.3 HIV and AIDS: Epidemiology, prevention, control and treatment

Unit-IV: Parasitology

4.1 Parasitic Protozoans: life cycle, pathogenesis and disease caused by Entamoebae; Plasmodium, Trypanosoma, Leishmania

4.2 Epidemiology of infectious diseases with reference of Human:

- Bacterial [Tuberculosis, Leprosy, Meningitis]
- Fungal[any one]diseases

Learning Outcomes: After complition the course student would able to:

- ❖ Applies the classification Microorganisms.
- ❖ Understand and study the Bactria.
- ❖ Explain the Parasite Protozoans.
- ❖ Classify the Virus,Hepatitis and HIV.
- ❖ Interprets the plasmodium, trypanosome, leishmania.

Zoology-Paper-III: Physiology- I

Objectsives:

- To develop the metabolic activities in mammalian body.
- To understand the various Biomolecules in body.
- To understand the structural chemistry of proteins, carbohydrates, fats.
- To understand the functions of Biomolecules in body Secretion.
- To explain the process of digestion.

Unit I Respiration

1.1 Mechanism and regulation of Respiration

1.2 Transport of oxygen and carbon dioxide, Respiratory Pigments

1.3 Respiratory quotient, Respiratory volumes and capacities

1.4 Respiratory Disorders and effect of smoking

Unit II Circulation

2.1 Body Fluid: Composition and functions of blood; Lymph composition & function; Blood Pressure, Regulation of Blood Pressure

2.2 Blood clotting – Intrinsic and extrinsic factors, Blood groups and Rh factor

2.3 Physiology of cardiac muscles, structure & function of heart; Human Cardiac Cycle; Cardiac Rhythm; Origin of Heart Beat; Regulation of Heart Beat

2.4 Elementary idea of Haemostasis, ECG, factors contributing to heart problems; Angioplasty; Angiography

Unit III Nutrition and Digestion

3.1 Balanced diet

3.2 Digestion and absorption of carbohydrates, proteins and fats

3.3 Hormonal regulation of gastrointestinal function

3.4 Vitamins- Fat soluble and water soluble vitamins; Sources, deficiency and diseases

Unit IV Excretion

4.1 Types of Nitrogenous waste products (ammonotelic, uricotelic, ureotelic)

4.2 Structure and function of kidney; Nephron; Renal blood supply

4.3 Mechanism of Urine formation in mammals; Counter Current Principle

4.4 Hormonal control of renal function; Rennin- Angiostensin System, Micturition, Regulation of Body Fluids & Acid Base balance

Learning Outcomes: After complition the course student would able to:

- Understand the Physiology of Digestion & Respiration.
- Discuss the Physiology of Circulation & nerve impulse and Reflex Action.
- Understand the Physiology of Excretion
- Describe in nitrogenous waste products.
- Interprets in hormonal control of renal function

Zoology -----Practical Based on paper I, II and III

Paper-I: Study of Chordates:

A. Study of Specimen.

a) **Protochordata**: Herdmania, Ciona, Salpa, Doliolum, Amphioxus

b) **Lower Chordates**: Petromyzon, Myxine/Bdellostoma, Ammocete larva,

c) **Pisces:** Sphyrna, Trygon (Sting ray), Pristis (Saw Fish), Raja (Skate),Torpedo, Chimaera (Rat Fish), Acipensor, Amia, Lepidosteus, Notopterus, Labeo, Clarius, Anguilla (eel), Exocoetus, Hippocampus, Echenesis Sucker Fish), Protopterus,

d) **Amphibia:** Icthyophis, Cryptobranchus, Ambyostoma (Tiger Salamander), Axolotl Larva, Salamandra, Proteus, Siren, Alytes, Pipa, Hyla, Rhacophorous (Flying Frog)

B. Study of Slides.

a) Tadpole larva of Herdmania, Herdmania Spicules, T.S. of Amphioxus (Through Oral hood, Pharyngeal, Intestinal and Caudal regions)

b) V.S. of Skin of Scoliodon, Amphibia

C. Mounting.

a) Herdmania Spicules, Placiod Scale

D. Dissection: [Through demonstration by chart/ CAL/ Video]

a) **Major:** Afferent branchial vessels; Efferent branchial vessels; Cranial nerves ofScoliodon.

b) **Minor:** Internal Ear; Eye Muscles; Ampulla of Lorrenzini

Paper-II : Microbiology and Parasitology

1. Preparation and use of culture media for microbes
2. Study of microbes in food material (milk, Curd etc.)
3. Staining procedure for parasites
4. Identification of Protozoan parasites from permanent slides.
   - Trypanosoma(epimastigote or trypomastigote form); Leishmania (promastigote and amastigote form); Plasmodium (sporozoites and signet ring); Giardia; Entamoeba (trophozoites);;
5. Identification and characterization of helminth parasites from permanent slides
   - Cercaria of Fasciola; Eggs of Schistosoma; Cyst of Echinococcus granulosus; Microfilarie of Wuchereria

Paper: III Physiology:

1. Demonstration of ptyalin enzyme activity
2. Estimation of haemoglobin content; RBC Counting, WBC Counting; Haematocrit value and ESR of given blood sample
3. Histological Slides of mammalian T.S. of spinal Cord, stomach, duodenum, ileum, liver, lung, kidney

Suggested Readings:

Chordates:

1. Colbert's evolution of the vertebrates; Colbert, E.H; John Wiley & Sons
2. Text book of Chordate Zoology vol. II ; Sandhu, G.S. and Sandhu, G.S; Campus Books.
3. Modern text book of Zoology-Vertebrates; Kotpal, Rastogi Publication.
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16. Bhastiya&Jain,2015, Immunology, microbiology,&Biotechnology, Himalaya Pubishing House pvt. Ltd. Delhi

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Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 301	Understanding a Discipline and Subject	Any one **CE**	**4**	**30**	**70**	**100**
EDU 302	Innovative Methods					

EDU 301 : Understanding a Discipline and Subject

Objectives:

- To make aware the students about the diciplines and its characteristics.
- To give Introduction of Kalidas, Tulsidas and Shakespeare
- To understand the scientific idea of science education.
- To apply the thought of social science language in their day to day life.

Course Contents:

Unit- I Language and Disciplines

a) Meaning of discipline
b) Characteristics of a discipline
c) Inter- disciplinary approach

Unit- II Language and Disciplines

a) History of language development (Hindi, Sanskrit and English)
b) Language technology
c) Language lab
d) Phonetics science
e) Introduction of Kalidas, Tulsidas and Shakespeare

Unit- III Social Science and Discipline

a) History and game cricket
b) History of woman empowerment
c) New trends cultural in society
d) Political socialization
e) Article of democratic problems (Terrorism, corruption &kola-Brokers)

Unit- IV Science and Disciplines

a) Life sketch of scientists (Dalton, Rutherford, Newton, Mendal and Homi Jahangir Bhabha)
b) Science and sound
c) Nutrition and balanced diet
d) Human diseases
e) Electricity and light

Assignment & Practical Work (Any Two)

a) Write Any one term paper.
b) Write a short note on Importance of Language in teacher.

c) Read and review an article.
d) Prepare a report on creative writing.

Learning Outcomes: After completion of this course students would able to:

- ❖ Understand language of various discipline.
- ❖ Develop expression of various language areas.
- ❖ Acquire scientific study of language phonetics.
- ❖ Know the scientific idea of science education.
- ❖ Apply the thought of social science language in their day today life.
- ❖ Develop interdisciplinary approach of language (Hindi/Sanskrit/English).

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4. विज्ञान पाठ्य पुस्तक कक्षा 9 से 12 तक, माध्यमिक शिक्षा बोर्ड राजस्थान, अजमेर (2014)
5. संस्कृत पाठ्य पुस्तक कक्षा 9 से 12 तक, माध्यमिक शिक्षा बोर्ड राजस्थान, अजमेर (2014)
6. सामाजिक अध्ययन पाठ्य पुस्तक कक्षा 9 से 12 तक, माध्यमिक शिक्षा बोर्ड राजस्थान, अजमेर (2014)
7. हिन्दी पाठ्य पुस्तक कक्षा 9 से 12 तक, माध्यमिक शिक्षा बोर्ड राजस्थान, अजमेर (2014)

EDU 302: Innovative Methods

Objectives:

- ❖ To introduce students about the concepts of innovations in teaching.
- ❖ To understand the idea of various subject methods.

Course Contents:

Unit- I Concept of Innovation.

a) Innovation : Meaning, Definition
b) Characteristics of Innovation
c) Methods : concept, Objective
d) Meathods Characteristics and Utility

Unit- II Methods of Social science

a) Time line method
b) Source method
c) Biographical method
d) Socialized Recitation method

Unit- III Methods of Science

a) Demonstration method
b) Experimental/ Laboratoury method
c) Heuristic method
d) Project method

Unit- IV Methods of Language

a) Lecture method

b) Inductive and Deductive
c) Supervised study method
d) Brain Storming

Assignment & Practical Work (Any Two)

- Write any one term paper
- Write a short note on Importance of Language in teacher
- Read and review an article
- Prepare a report on creative writing

Learning Outcomes: After completion of this course students would able to:

- ❖ Develop knowledge of various innovative methods.
- ❖ Understand the idea of methods.

Suggested Readings:

1. सिंह, कर्ण, (2008), शैक्षिक तकनीकी एवं प्रबन्ध, लखीमपुर – खीरी, गोविन्द प्रकाशन
2. शर्मा, संदीप एवं पारीक, अलका (2007), शैक्षिक तकनीकी एवं कक्षा–कक्ष प्रबन्ध, शिक्षा प्रकाशन, जयपुर
3. कुलश्रेष्ठ, एस.पी. (2005), शैक्षिक तकनीकी के मूल आधार, विनोद पुस्तक मंदिर, आगरा
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Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
JVB 301	Critical Understanding of ICT	**FC**	**2**	**15** Practical	**35**	**50**

Objectives:

- ❖ To explain the concept of ICT in education.
- ❖ To develop skills in using MS Office applications for education.
- ❖ To use internet efficiently to access information and communicate with others.
- ❖ To understand the applications of E-learning in education.

Course Contents:

Unit - I MS Office

a) MS- word (Text management)
b) Power Point (Preparation of Slide)
c) Smart Class
d) E - Learning

Unit - II Internet and Multimedia

a) E-mail, Chat
b) Searching, Downloding and Uploding
c) Multimedia and its Education Uses.

d) Mobile Banking

Learning Outcomes: After completion of this course students would able to:

- ❖ Explain the concept of ICT in education.
- ❖ Develop skills in using MS Office applications for education.
- ❖ Use internet efficiently to access information and communicate with others.
- ❖ Understand the applications of E-learning in education.

Assignment & Practical Work (Any Two)

- Prapare one term paper on any topic related to above units.
- Prepare power point presentation on any one topics related to School content/ B.Ed. Syallbus.

Semester-III

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
JVB 302	Yoga and Preksha Meditation	**FC**	**2**	**15** Practical	**35**	**50**

Objectives:

- ❖ जीवन विज्ञान, प्रेक्षाध्यान एवं योग विद्या की जानकारी प्राप्त कर सकेंगे।
- ❖ संतुलित व्यक्तित्व का निर्माण।
- ❖ विद्यालयस्तरीय ध्यान एवं योग के प्रशिक्षक तैयार करना।

विषयवस्तु :

इकाई–1 योग के प्रयोग

(अ) योग : अर्थ, परिभाषा, अष्टांग योग की उपयोगिता
(ब) आसन : सूर्यनमस्कार,(अर्थ, प्रक्रिया एवं लाभ) ताड़ासन, पाद्हस्तासन, गरूड़ासन, जानुशिरासन, वक्रासन, वज्रासन, पद्मासन, उत्तानपादासन, पवनमुक्तासन, भुजगांसन, शलभासन,(स्थिति, विधि, लाभ)
(स) प्राणायाम : सूर्यभेदी, चन्द्रभेदी,व अनुलोम विलोम
(द) मुद्रा : ज्ञान मुद्रा,वीतराग मुद्रा
(य) बन्ध : मूलबन्ध, उड्डियानबन्ध व जालधंर बन्ध

इकाई–2 प्रेक्षाध्यान

(अ) प्रेक्षाध्यान का इतिहास, अर्थ एवं उद्देश्य
(ब) प्रेक्षाध्यान के सहायक अंगो का सक्षिप्त परिचय एवं महत्व
(स) कायोत्सर्ग, अर्न्तयात्रा, श्वास प्रेक्षा एवं ज्योतिकेन्द्र प्रेक्षा (प्रयोग, अभिव्यक्ति एवं प्रस्तुति)
(द) प्रेक्षाध्यान के मुख्य चरणों का संक्षिप्त परिचय

सत्रीय कार्य :(कोई एक)

- विषय से सम्बन्धित कोई एक टर्म पेपर तैयार करना।
- सूर्य नमस्कार की विभिन्न स्थितियों का प्रदर्शन।

Learning Outcomes:

- ❖ जीवन विज्ञान, प्रेक्षाध्यान एवं योग विद्या की जानकारी प्राप्त कर सकेंगे।
- ❖ संतुलित व्यक्तित्व का निर्माण।
- ❖ विद्यालयस्तरीय ध्यान एवं योग के प्रशिक्षक तैयार करना।

संन्दर्भ ग्रन्थ सूची :

1. अमूर्त चिन्तन : आचार्य महाप्रज्ञ
2. जीवन विज्ञान की रूपरेखा, लेखक : मुनि धर्मेश कुमार
3. जीवन विज्ञान शिक्षक निर्देशिका – मुनि किशनलाल
4. जीवन विज्ञान : मूल्यपरक शिक्षा का एवं अभिनव प्रयोग – मुनि धर्मेश
5. जीवन विज्ञान प्रेक्षाध्यान एवं योग : समणी मल्लि प्रज्ञा
6. जीवन विज्ञान : शिक्षा का नया आयाम, लेखक : आचार्य महाप्रज्ञ
7. जीवन विज्ञान : शिक्षक प्रशिक्षक मार्गदर्शिका– मुनि किशनलाल
8. जीवन विज्ञान : स्वस्थ समाज रचना का संकल्प, लेखक : आचार्य महाप्रज्ञ
9. नया मानव : नया विश्व – आचार्य महाप्रज्ञ
10. परिवार के साथ कैसे रहें ? – आचार्य महाप्रज्ञ
11. प्रेक्षाध्यान प्रयोग पद्धति – लेखक : आचार्य महाप्रज्ञ
12. प्रेक्षाध्यान : आसन प्राणायाम, मुनि किशनलाल
13. प्रेक्षाध्यान : सिद्धान्त और प्रयोग, लेखक : आचार्य महाप्रज्ञ, सम्पादक : मुनि किशन लाल, शुभकरण सुराना
14. प्रेक्षाध्यान : यौगिक क्रियाएं, मुनि किशनलाल
15. प्रेक्षाध्यान : शरीर विज्ञान, श्री जेठालाल जवेरी, मुनि महेन्द्र कुमार
16. प्रेक्षाध्यान : स्वास्थ्य विज्ञान (भाग 1,2), श्री जेठालाल जवेरी, मुनि महेन्द्र कुमार 'तुम स्वस्थ रह सकते हो, लेखक – आचार्य महाप्रज्ञ
17. प्रेक्षाध्यान : व्यक्तित्व विकास, लेखक : मुनि धर्मेश कुमार
18. प्रेक्षा संदर्शिका – मुनि धर्मेशकुमार
19. Preksha Meditation : Therapeutic Thinking by Arun Zaveri
20. Science of Living, Ed. Muni Mahendra Kumar

Semester-IV

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 401	Gender , School and Society	**CC**	**4**	**30**	**70**	**100**

Objectives:

- To understand the modern concept of society, organization & gender sensitivity.
- To aware about the dimension of development of school administration.
- To develop basic understanding & familiarity with key concept, society, social problem, social relationship and new trends
- To develop knowledge of the role of different NGO & organizations.

Course Contents:

Unit- I Role of Society & Organization in Gender sensitivity.

a) Gender Equity : Concept, Needs, Problem and solution
b) Nature of Society
c) Women Commission
d) Right to Education

Unit- II Dimensions of Development of School

a) Administration – Structure of Centre and State education.
b) Head-Master – Merits, work, Duties and Leadership.
c) Ideal Teacher – Personality and Qualification
d) Modern school , Library, Laboratory, and Hostel
e) Outline of Co-Curricular Activities in School.

Unit- III Present Education & Society

a) Role of education in different Areas (Family, school, and society).

b) Present Social Problems (unemployment, Students indiscipline, Poverty, Illiteracy, Health & Nutrition)Concept, cause, and Solution

c) Education and Society Relationship

Unit- IV Role of organization in Gender sensitivity, society, and school

a) NGO – (meaning and Role)

b) Role of present Social – worker

c) Govt. Planning

d) Role of Religious Organization

Assignment & Practical Work (Any Two)

- Study of any one significant Problems of a secondary school. Prepare report detail – it's possible Causes and Solutions
- One Term paper solve.
- Critically Evaluate of the different Activities of any one school.
- Case study of any N.G.O working locally.

Learning Outcomes: After completion of this course students would able to:

- ❖ Sensitize students about different social & national level problems at school level.
- ❖ Remedies regarding gender discrimination, government schemes and Right to Education.
- ❖ Implement their knowledge to plan community awareness programmes to sensitize weaker section of society.
- ❖ Understanding relationship between education and society as well as NGO's.

Utilize their administrative skill to manage different administrative activities at school level

Suggested Readings:

1. कुशवाहा, पुष्पलता एवं सक्सैना, कनक, (2006), शैक्षिक प्रबंधन एवं संगठन, आस्था प्रकाशन, जयपुर
2. चौबे, सरयू प्रसाद, (1990), शिक्षा के समाजशास्त्रीय आधार, विनोद पुस्तक मंदिर, आगरा
3. पाण्डेय, रामशक्ल (2008), उभरते हुए भारतीय समाज में शिक्षा, विनोद पुस्तक मंदिर, आगरा
4. बघेला, एच. एस. सिंह, (2007), शैक्षिक प्रबंधन एवं संगठन, राजस्थान प्रकाशन, जयपुर
5. भटनागर, सुरेश (1996), शैक्षिक प्रबंध व शिक्षा की समस्याएं, सूर्या पब्लिकेशन, मेरठ
6. वशिष्ठ, के. के. (1985), विद्यालय संगठन एवं भारतीय समाज की शिक्षा की समस्याएं, लायक बुक डिपो, मेरठ
7. शर्मा, आर. ए. (1995), विद्यालय संगठन एवं शिक्षा प्रशासन, सूर्या पब्लिकेशन, मेरठ
8. शर्मा, ओ. पी., गुप्ता, शोभा (2008), उभरते हुए भारतीय समाज में शिक्षा, विनोद पुस्तक मंदिर, आगरा
9. सुखिया, एस. पी., (2008), विद्यालय प्रशासन एवं संगठन, विनोद पुस्तक मंदिर, आगरा
10. www.gender.com.ac.uk.
11. www.genderstuddies.org.
12. www.genderparddigm.com./publication/html

Semester-IV

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 402	Reading and Reflecting on texts (EPC)	**CC**	**2**	**15**	**35 Practical and Viva-voce**	**50**

Objectives:

- To develop basic Communication Skills.
- To promote Creative Writing among students.
- To acquire the knowledge of art of Speaking.

Course Contents:

Unit- I Reading Comprehension

a) Explain with stage of any self expression of any one guest.
b) Enlist errors in reading among school students.
c) Review of any one books with reading.
d) Write the educational essence of any five stories and morale thought with reading.

Unit- II Writing composition & Action Plan

a) Recite 10 poem / verse/ stanza and write it.
b) Prepare an action plan and organize accordingly.
c) Proof reading.
d) Prepare list of innovative vocabulary for speaking. (50 words).

Learning Outcomes: After completion of this course students would able to:

- Understnd Communication Skills.
- Promote Creative Writing among students
- Explain the art of speaking.

Assignment & Practical Work (Any Two)

- One term paper on any topic related to above units.
- Prepare a plan and organize any two activities related to above units.
- Demonstrate different type of speaking.
- To identify the causes of ineffective speech and remedies for it.

Semester-IV

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 403	Drama and Arts in Education (EPC)	**CC**	**2**	**15**	**35 Practical and Viva-voce**	**50**

Objectives:

- To develop skills of role playing and acting.
- To acquire the knowledge and develop skill of arts, painting and playing musical Instruments.

Course Contents:

Unit- I Write a Drama Script

a) Prepare a Drama for any Social issues (Class VI to XI)
b) Role playing for different scene of Drama
c) To know different types of Drama

Unit- II Fine Arts, materials and its relevancy (Any two works)

a) Mehendi, Drawing
b) Rangoli/Model Preparation
c) Poster Painting

Assignment & Practical Work (Any Two)

- Prepare any one term paper related to above units.
- Plan and organize any two activities related to above units.
- Prepare Arts and crafts with un usual material
- Prepare Fine Arts with paper
- Hand made Architecture
- Soft toys (Teddy bear)
- Dance Art
- Fine Arts/ Painting
- Skill of Playing musical instrument
- Food Shef
- Handicraft

Learning Outcomes: After completion of this course students would able to:

- Develop skills of role playing and acting.
- Acquire the knowledge and develop skill of arts, painting and playing musical Instruments.

Semester-IV

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 401	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25 Practical**	

Chemistry-Paper -I : Inorganic chemistry

Objectives:

- To develop the knowledge about chromatography, oxidation reduction and polymerization.
- To aware about the conceptual knowledge of chromatography, polymer chemistry and bioinorganic chemistry.
- To acquaint about the classification of acids, non aquous solvents and separation methods.
- To give information about solvent systems, diagrams and preparation methods.
- To develop understanding about phosphazenes, trace elements and nitrogen fixation.

Unit I : Chromatography

Types of chromatographic methods and their applications, principle of differencial migration, Adsorption phenomenon, nature of the adsorbent, solvent systems, Rf values.

Unit II : Oxidation and Reduction

Use of redox potential data, analysis of redox cycle, redox stability in water, disproportionation, Frost, the diagrammatic representation of potential data, Latimer and Pourbaix diagrams, principles involved in the extraction of the elements.

Unit III : Polymer chemistry of Silicones & Phosphazenes

Classification, Preparation and Structure of silicons, silicon resin, silicon rubber, silicon fluid, industrial application of silicones.

Preparation, properties, substitution reaction and structure of Phosphazenes

Unit IV : Bioinorganic chemistry

Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with reference to Na+, K+, Ca+2 and Mg+2, nitrogen fixation.

Learning Outcomes: After complition the course student would able to:

- Differentiate between oxidation & reduction and structures of silicons .
- Describe the principles related to differential migration, substitution and biochemistry .
- Apply the methods of chromatography, industrial uses of silicon and biochemistry to solve different issues.
- Interpret the diagrams related to redox reaction, structure and processes of polymerization.

Chemistry-Paper -II : Organic chemistry

Objectives:

- To develop knowledge about classification & nomenclature of carboxylic acid and dicarboxylic acid .
- To aware about the chemical reactions, mechanism and properties of polymers, halonitroarenes and amines.
- To develop concept of various laws related to synthesis and catalyzing process.
- To aquaint the various reactions on the basis of their mechanism.

Unit I : Carboxylic acids & Dicarboxylic acids

Nomennclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength, preparation of carboxylic acids, reactions of carboxylic acids – Hell Volhard Zelinisky reaction, synthesis of acid chlorides, esters and amides, reduction of carboxylic acids, mechanism of decarboxylation. Method of formation and chemical reaction of haloacids, hydroxyl acids, malic tartaric and citric acids. Methods of formation and chemical reactions of α, β- unsaturated monocarboxylic acids. methods of formation and effect of heat and dehydrating agents (succinic, glutaric and adipic acids).

Unit II : Carboxylic acids derivatives & Synthetic polymers

Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides, relative stability of acyl derivatives. Physical properties, inter conversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives, chemical reactions, mechanism of esterification and hydrolysis (acidic and basic).

Addition or chain growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Polyesters, polyamides, phenol-formaldehyde resin, urea-formaldehyde resin, epoxy resins and polyurethanes. Natural and synthetic rubbers.

Unit III : Alkyl nitrates, Nitroarenes & Halonitroarenes

Preparation of nitroalkanes and nitroarenes. chemical reactions of nitro alkanes, mechanism of nucleophilic substitution in nitro arenes and their reduction in acidic, neutral and alkaline medium, picric acid.

Reactivity, structure and nomenclature of amines, physical properties, stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines, structural features effecting basicity of amines.

Unit IV Amines

Amines salts as phase transfer catalyst, preparation of alkyls and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehylic and ketonic compounds. Gabriel- Pthalamide reaction, Hofmann bromamide reaction.

Reaction of amines, electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acids. Diazotization, mechanism, synthetic transformation of aryl diazonium salts, azocoupling.

Learning Outcomes: After complition the course student would able to:

- Calssify the various organic compounds on the basis of mechanism and structure.
- Apply the knowledge of processing derivatives for synsthesize various products.
- Describe and discuss about technical terminology related to acids, alkyl nitrates and amines.
- Discuss about the methods of formation, structural features and mechanism of various compounds.

Chemistry-Paper - III: Physical Chemistry

Objectives:

- To aware about laws of thermodynamics, pH, polarization of molecular structure.
- To develop conceptual knowledge about entrophy, electrolytes dipole moment etc.
- To develop analytical view about evaluation of absolute entrophy, activity coefficient and magnetic propertires of compounds.
- To give information about carnt theorem, mixing of gases, overvoltage and referectivity.

Unit I : Second and Third law of thermodynamics & Concept of entropy

Need for the law, different statements of the law, Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature.

Entropy as a state function, entropy as a function of Volume and temperature, entropy as a function of pressure and temperature, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium, Entropy change in ideal gases and mixing of gases

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, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

Unit II : Electrochemistry II

Types of reversible electrodes, gas metal ion, metal-metal ion, metal insoluble salt-anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign convention, 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, computation of cell EMF, calculation of thermodynamic quantities of cell reactions (ΔG, ΔH and K), polarization, over potential and overvoltage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells, solubility product and activity coefficient, potentiometric titrations.

Unit III : pH & Corrosion

Definition of pH and pKa determination of pH using hydrogen, quinhydrone and glass electrodes, by poteniometric methods. Buffers- mechanism of buffer action. Henderson- Hazel equation. Hydrolysis of salts.

Fundamental of electrolytic corrosion: theories and kinetics, corrosion prevention. Batteries, fuel cells

Unit IV : Physical properties and molecular structure

Optical activity, polarization (Clausius-Mosotti equation) orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment temperature method and refractivity method, dipole moment and structure of molecular magnetic properties- paramagnetism, dimagnetism and ferromagnetics.

Learning Outcomes: After complition the course student would able to:

- Classify the electrodes, cells and properties of organic compounds.

- ❖ Determine and interpret the function of volumes, equations, coefficients related to entrophy, corrosion and molecular structures.
- ❖ Describes various properties of compounds on the basis of energy, potential and dipole moment etc.
- ❖ Measure the entropy change, pH and polarization and magnetic properties of compounds.

Practicals

Organic Chemistry

TLC/ Paper chromatography

(a) Separation of fluorescein and methylene blue

(b) Separation of leaf pigments from spinach leaves

Synthesis of organic compounds (Any Four)

(a) Acetylation of salicylic acid aniline glucose and hydroquinone

(b) Aliphatic electrophilic substitution - Preparation of iodoform from ethanol and acetone

(c) Aromatic electrophilic substitution

- Nitration
- Preparation of m-dinitrobenzene Preparation of p-nitroacetanilide Halogenations
- Preparation of p-bromoacetanilide
- Preparation of 2,4,6-tribromophenol

(d) Diazotization/Coupling

- Preparation of methyl orange and methyl red

(e) Oxidation

- Preparation of benzoic acid from toluene

(f) Reduction

- Preparation of aniline from nitrobenzene
- Preparation of m-nitroaniline from m-dinitrobenzene
- Physical Chemistry

Phase Equilibrium :

1. To study the effect of a solute (e.g. NaCl,succinic acid) on the critical solution temperature of two partially
2. miscible liquids (e.g. Phenol-Water system) and to determine the concentration of that solute in the given phenol-water system.
3. To construct the phase diagram of two component (e.g. diphenylamine-benzophenone) system by cooling curve method.

Transition Temperature:

1. Determination of the transition temperature of the given substance by thermometric/dialometric method (e.g. MnCl2
   4H2O/SrCl2 2H2O).

Thermochemistry :

1. To determine the solubility of benzoic acid at different temperature and to determine H of the dissolution process.
2. To determine the enthalpy of neutralization of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionization of the weak acid /weak base.

3. To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

Viva-Voce and Record

Suggested Reading:

1. कार्बनिक रसायन, सुरेश आमेटा, एच.के. पाण्डे, एच.एस. शर्मा, हिमांशु पब्लिकेशन्स, उदयपुर
2. अकार्बनिक रसायन, ओझा, भोजक, कोठारी, चतुर्वेदी, रमेश बुक डिपो, जयपुर
3. प्रायोगिक रसायन, भार्गव, लवानिया, ओझा, रमेश बुक डिपो, जयपुर
4. भौतिक रसायन, शर्मा, भार्गव, गुप्ता, रमेश बुक डिपो, जयपुर
5. कार्बनिक रसायन, विजयश्री मनोज छंगाणी, अल्का पब्लिकेशन, अजमेर
6. अकार्बनिक रसायन, विजयश्री कोठारी छंगाणी, अल्का पब्लिकेशन, अजमेर
7. प्रायोगिक रसायन, छंगाणी, विजयश्री, खण्डेलवाल, अल्का पब्लिकेशन, अजमेर
8. भौतिक रसायन, वी.के. गोयल, आर.एस. पीतलिया, कॉलेज बुक हाउस, जयपुर

Semester-IV

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 402	Physics-I	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Prcatical				**25 Practical**	

Physics-Paper -I: Statistical And Thermodynamical Physics-II

Objectives:

- To aware kinetic theory of gases.
- To Understand the transport phenomenon of gases.
- To give knowledge about the classical statistics.
- To develop concept of quantum statistics.

UNIT I Kinetic Theory of Gases:

Distribution law of molecular velocities, most probable, average and RMS velocities, Energy distribution function; Experimental verification of the Maxwell velocity distribution the principle of equipartition of energy.

UNIT II Transport Phenomenon of Gases:

Transport Phenomenon: Mean free path, distribution of free paths, coefficients of viscosity, thermal conductivity, diffusion and their interrelation.

UNIT III Classical Statistics:

Validity of classical approximation, Phase space, micro and macro states; Thermodynamical probability, entropy and thermodynamic probability; Monoatomic ideal gas; Barometric equation ; Specific heat capacity of diatomic gas; Heat capacity of solids.

UNIT IV Quantum Statistics:

Black body radiation and failure of classical statistics, Postulates of quantum statistics, indistingushability , wave function and exchange degeneracy, a priori-probability; Bose Einstein statistics and its distribution function ; Plank distribution function and radiation formula ;Fermi Dirac statistics and its distribution function ,contact potential ,thermionic emission ;Specific heat anomaly of metals ;Nuclear spin statistics (para and ortho hydrogen)

Learning Outcomes: After complition the course student would able to:

- Analyze phase equilibrium condition and identify types of phase transitions of physical systems.
- Make connections between applications of general statistical theory in various branches of physics.
- Design, set up, and carry out experiments, analyze data recognising and accounting for errors and compare with theoretical predictions.
- Differentiate between B-E statistics & F-D statistics
- Discuss on the nuclear spin statistics.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना,, उष्मा गतिकी एवं सांख्यकीय भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics-Paper -II: Optics –II

Objectives:

- To aware fraunhofer diffraction.
- To Understand the Fresnel class of diffraction and resolving power.
- To give knowledge about the optical activity and holography.
- To develop concept of lasers.

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UNIT-I Fraunhofer Diffraction:

Fraunhofer diffraction at single slit and a circular aperture, intensity distribution and width of central maxima, and determination of slit size, two slit diffraction and its intensity distribution with missing orders. Diffraction due to N slits with intensity distributions. Plane transmission grating its formation and intensity distribution.

UNIT-II Fresnel class of Diffraction & Resolving Power:

Fresnel class of diffraction, half period zones, zone plate, diffraction due to circular aperture. Diffraction at straight edge, thin and thick wire, rectangular slit. Rayleigh's criterion, resolving power of prism, telescope, microscope and plane transmission grating.

Unit-III Optical Activity and Holography:

Optical activity, Specific rotation, biquartz and half shade polarimeters. Basic concepts of holography, construction of a hologram and reconstruction of the image, important features of hologram and uses of holography.

Unit-IV Lasers:

Difference between ordinary and laser source, stimulated and spontaneous emission, stimulated absorption.

Einstein's A and B coefficients, population inversion, conditions for laser action, meta-stable states, pumping. Types of lasers, construction, working and energy level schemes of He-Ne and Ruby laser. Properties and uses of lasers.

Learning Outcomes: After complition the course student would able to:

- Applies interference in design and working of interferometers.
- Discuss on the resolving power of different optical instruments.
- Identify the working of holography and their applications in various fields.
- Classify the optical fiber and their applications in communication.
- Differentiate between simple light source and laser

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, प्रकाशिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics-Paper -III: Electronics & Solid State Devices –II

Objectives:

- To aware about transistor.
- To Understand the amplifiers with feedback.
- To give knowledge about the amplifiers and oscillators.
- To develop concept of field effect transistor and digital circuits.

UNIT-I Transistor:

Notations and volt -ampere characteristics for bipolar junction transistor, concept of load line and operating point, hybrid parameters. Transistor as Amplifiers: CB, CE, CC configurations, its characteristic curves and their equivalent circuits. Analysis of transistor amplifiers using hybrid parameters and its frequency response. Fixed and emitter biasing, bias stability in transistor circuits.

UNIT-II Amplifiers with Feedback:

Concept of feedback, positive and negative feedback, voltage and current feedback circuits, Advantages of negative feedback- stabilization of gain by negative feedback, Effect of feedback on output and input resistance. Reduction of nonlinear distortion by negative feedback. Effect on gain- frequency response.

UNIT-III Operational Amplifier & Oscillators:

Differential amplifier, DC levels shifter, operational amplifier, input and Output impedances, input offset current. Application: Unity gain buffer, Adder, Subtractor, Integrator and Differentiator. Feedback requirements for oscillations, circuit requirement for oscillation, basic oscillator analysis. Colpitt and Hartley oscillators. R-C oscillators, piezoelectric frequency control.

UNIT-IV Field Effect Transistor and Digital Circuits:

Field Effect Transistor (FET) and its characteristic biasing JFET, ac operation of JFET and MOSFET.

Binary, Hexadecimal and Octal number systems. Binary arithmetic. Logic fundamentals AND, OR, NOT, NOR., NAND, XOR gates, Boolean theorems, transistor as a switch, logic gates: circuit realization of logic functions. Analog to digital and digital to analog analysis. DDL, RTL, TTL circuits.

Learning Outcomes: After complition the course student would able to:

- Identify characteristics of transistor (common base configuration, common emmiter configuration, common collector configuration).

- ❖ Discuss on the amplifiers with feedback.
- ❖ Discuss on the concept of operational amplifier & oscillators.
- ❖ Classify the field effect transistor and digital circuits.
- ❖ Differentiate between TTL and RTL.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, इलेक्ट्रोनिकी एवं ठोस प्रावस्था युक्तियां, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics Practical: IV

1. Plot thermo emf versus temperature graph and find the neutral temperature (Use sand bath)
2. Study of power supply using two diodes/bridge rectifiers with various filter circuits.
3. Study of half wave rectifier using single diode and application of L and π 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 □) 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.
12. Any experiment according to theory paper.

Suggested Reading :

1. प्रभा दशोरा,, द्वितीय वर्ष प्रायोगिक भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Semester-IV

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 403	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25 Practical**	

Mathematics-Paper-I : Real analysis and matric space

Objectives:

- ❖ To give information about the Sequence and Series of Functions.
- ❖ To aware about the Term by Term Differentiation and Integration.
- ❖ To develop knowledge about the Metric Space
- ❖ To develop knowledge about the Subspace.

Unit 1 . Sequence and series of functions —

Pointwise and Uniform convergence, Cauchy's criterion, Weierstrass M-test, Abel's test, Dirichlet's test for uniform convergence of series of functions, Uniform convergence and Continuity of series of functions,

Unit 2; Term by term differentiation and integration. Metric space —
Definition and examples, Open and Closed sets, Interior and Closure of a set, Limit point of a set.

Unit 3:
Subspace of a metric space, Product space, Continuous mappings, Sequence in a metric space, Cauchy sequence. Complete metric space,

Unit 4 : Baire's theorem, Compact sets and Compact spaces, Connected metric spaces.

Learning Outcomes: After complition the course student would able to:
- ❖ Discuss on the Sequence and Series of Functions.
- ❖ Calculate the Term by Term Differentiation and Integration.
- ❖ Classify the Metric Space, Subspace.
- ❖ Applies the Compact Sets and Compact Space.
- ❖ Calculate the connected matric space.

Suggested Reading:

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी रियल एनालिसिस एण्ड मैट्रिक स्पेस, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, रियल एनालिसिस एण्ड मैट्रिक स्पेस, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics-Paper-II : Differential Equations II

Objectives:
- ❖ To give knowledge about the exact linear differential equations of nth order.
- ❖ To aware about the linear differential equations of second order.
- ❖ To know the partial differential equations of first order.
- ❖ To Understand the homogeneous and non-homogenous linear partial differential equation.

Unit 1 ; Exact linear differnitial equations, of nth order. Existence and uniqueness theorem.

Unit 2: Linear differential equations of second order. Linear independence of solutions. Solution by transformation of the equation by changing the dependent variable/the independent variable, Factorization of operators, Method of variation of parameters, Method of undetermined coefficients.

Unit 3: Partial differential equations of the first order. Lagrange's linear equation. Charpit's general method of solution.

Unit 4 ; Homogeneous and non-homogeneous linear partial differential equations with constant coefficients. Equations reducible to equations with constant coefficients.

Learning Outcomes: After complition the course student would able to:
- ❖ Calculate the exact linear differential equations of nth order.
- ❖ Classify the linear differential equations of second order.

- ❖ Discuss the partial differential equations of first order.
- ❖ Identify the homogeneous and non-homogenous linear partial differential equation.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी रियल एनालिसिस एण्ड मैट्रिक स्पेस, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, रियल एनालिसिस एण्ड मैट्रिक स्पेस, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics- Paper-III: Optimization Theory vector calculus

Objectives:

- ❖ To aware about the Linear Programming Problem.
- ❖ To develop knowledge of properties and Elementary Theorems on Duality Only.
- ❖ To understand the Differentiation & Integration of vector Point functions.
- ❖ To conceptualize the Divergence & Curls.

Unit 1: The linear programming problem. Basic solution. Some basic properties and theorems on convex sets.. Fundamental theorem of L.P.P.

Unit 2 ; Theory of simplex method only Duality. Fundamental theorem of duality, properties and elementary theorems on duality only.

Unit 3: Scalar and Vector point functions. Differentiation and integration of vector point functions. Directional derivative. Differential operators.

Unit 4: Gradient, Divergence and Curl. Theorems of Gauss, Green, Stokes (without proof) and problems based on these theorems.

Learning Outcomes: After complition the course student would able to:

- ❖ Applies Linear Programming Problem.
- ❖ Classify the Properties and Elementary Theorems on Duality Only.
- ❖ Discuss on the Differentiation & Integration of vector Point functions.
- ❖ Identify the Divergence & Curls.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी रियल एनालिसिस एण्ड मैट्रिक स्पेस, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, रियल एनालिसिस एण्ड मैट्रिक स्पेस, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 404	Botany-I	CE*	4	15	20	100
	Botany-II				20	
	Botany-III				20	
	Botany Practical				25 Practical	

Botany-Paper-I : Pteridophytes

Objectives:

- To develop knowledge on pteridophytes with its origin and classification
- To know general characteristics of psilophyta.
- To understand the life cycle of class lycophyta and sphenophyta.
- To discuss economic importance of pteridophytes.
- To compare pteridophyte with bryophyte and gymnosperms.

UNIT I:

Pteridophytes**:** General account of Pteridophytes, origin, classification (G.M. Smith), evolution of stele, development of sporangia (eusporangiate and leptosporangiate) and life cycle patterns of homosporus and heterosporus pteridophytes.

UNIT –II:

Heterospory and seed habit, Apospory and Apogamy. General characteristics of Psilotophyta: Morphology, anatomy and reproduction of *Psilotum*

UNIT-III:

General characteristic of Lycophyta and Sphenophyta: Morphology,anatomy and reproduction of *Seleginella* and *Equisetum*

UNIT-IV:

General characteristics of Filicophyta: Morphology, anatomy and reproduction of *Pteridium* and *Marsilea*. Economic importance of Pteridophytes.

Learning Outcomes: After complition the course student would able to:

- Develop knowledge on pteridophytes with its origin and classification
- Explain general characteristics of psilophyta.
- Understand the concept of lycophyta and sphenophyta.
- Discuss concept of filicophyta and their economic importance
- Compare pteridophyte with bryophyte and gymnosperms.

Suggested Readings:

1. Bierhorst, D.W. 1971. Morphology of Vascular Plants. MacMillan Co., N.Y. and Collier-MacMillan Ltd., London.
2. Parihar, N.S. 1996. The Biology and Morphology of Pteridophytes**.** Central Book Depot, Allahabad.

3. Singh, V., Pandey, P. C. and Jain, D. K .2013. A text book of Botany. IV edition, Rastogi publication, Meerut.
4. Sharma, O. P. 1990. Textbook of Pteridophyta, MacMillan India Ltd., Delhi.
5. Vashishta, P.C. 1997. Botany for Degree Students- Pteridophyta. S. Chand and Company, New Delhi.
6. Wilson, N. S. and Rothewall, G. W. 1993. Paleobotany and Evolution of Plants. (2nd Edition), Cambridge University Press, U. K.

Botany- Paper-II : Gymnosperms And Paleobotany

Objectives:

- To know the general characteristics, distribution, classification of gymnosperms
- To learn about the economic importance of gymnosperms
- To understand the morphology anatomy, reproduction of the cycadales .
- To acquire knowledge about Ephedrales and Palaeobotany.
- To discuss the dominant fossils flora of different ages.

UNIT I:

Gymnosperm: General characteristics, distribution, classification (K. R. Sporne, 1965) and economic importance. Brief account of Progymnosperm, affinities of Gymnosperms with Pteridophytes and Angiosperms.

UNIT: II

General characteristics of Cycadales, Coniferales: Morphology, anatomy, reproduction and life cycle with special reference to the genera *Cycas* and *Pinus.*

UNIT: III

General characterstics of Ephedrales: Morphology, anatomy, reproduction and life cycle of *Ephedra.* Palaeobotany: Geological time scale, fossil types and their formation, technique of study of fossils.

UNIT IV:

General account of dominant fossils flora of different ages, palaeobotany in relation to exploration of fossil fuels. Primitive land plant: *Rhynia*, Fossil pteridophytes: reconstructed plant-*Lepidodendron* and *Calamites*, Fossil gymnosperm-*Williamsonia*.

Learning Outcomes: After complition the course student would able to:

- Interpret the general characteristics, distribution, classification of gymnosperms
- Acquaint with the economic importance of gymnosperms
- Discuss the morphology anatomy, reproduction of the cycadales .
- Acquire knowledge about Ephedrales and Palaeobotany.
- Explain the dominant fossils flora of different ages.

Suggested Readings:

1. Bhatnagar, S. P. and Moitra, A. 1997. Gymnosperms. New Age International (P) Ltd., Publisher, New Delhi.
2. Clark, D. L. 1976. Fossils, Palaeobotany and Evolution. W.M.C. Brown Company, New York.
3. Meyen, S. V. 1978. Fundamentals of Palaeobotany. Chapman and Hall, London.
4. Sharma, O. P. 1997. Gymnosperms. Pragati Prakashan, Meerut, India.

5. Sporne, K. R. 2002. The Morphology of Gymnosperms. B. I. Pub. Pvt. Ltd. Mumbai, Kolkata, Delhi.
6. Thomas, B. A. and Spice, R. A. 1986. The Evolution and Palaeobotnay of land Plants. Publ. Crom. Helm London and Sydney.
7. Vasishta P.C. 1980. Gymnosperms. S. Chand and Co. Ltd., New Delhi.

Botany- Paper-III: Plant Physiology Ii And Biochemistry

Objectives:

- To know structure, biosynthesis and physiological role of plant hormones
- To understand structure, physiological role with distinguishable factors of hormones
- To provide knowledge of vernalization and photoperiodism.
- To comprehend the introduction, importance, nomenclature and classification of carbohydrates lipids, proteins.
- To acquire knowledge about enzymes.

UNIT I:

Seed dormancy and germination, phases of growth and development; plant movement and biological clock and their regulatory factor. Growth hormones: Structure, biosynthesis, and physiological role of auxins, gibberllins.

UNIT II:

Structure, biosynthesis and physiological role of Cytokinine and Ethylene. Growth inhibitors: ABSEisic acid. Physiology of Flowering: Photoperiodism, flowering stimulus, florigen concept, vernalization. Discovery, chemical nature and role of phytochrome in photomorphogenesis and senescence.

UNIT III:

Carbohydrates: Introduction, Importance, Nomenclature and Classification of Carbohydrates , Molicular Structure and Function of monosaccharides, oligosaccharides and polysaccharides. Glycisidic linkage and Glycoprotein.

Lipids–Structure and classification of lipids, fatty acids- saturated and unsaturated, Alpha Oxidation, Bita oxidation and Glyoxalate Cycle, oxidation of fatty acids.

UNIT IV:

Proteins- Amino acids as basic units, structure and classification of proteins (primary, secondary, tertiary and quaternary), Physical and Chemical Properties.

Enzymes :Structure, Nomenclature and classification of enzymes, Characteristics of Enzymes, mechanism of action, Multi Enzyme System, Regulation of Enzyme Activity.

Learning Outcomes: After complition the course student would able to:

- Get knowledge about structure, biosynthesis and physiological role of plant hormones
- Understand structure, physiological role with distinguishable factors of hormones
- Discuss the concept of vernalization and photoperiodism.
- Describe the importance, nomenclature and classification of carbohydrates lipids, proteins.
- Acquire knowledge about enzymes

Suggested Readings:

1. Berg, J.M., Tymoczko, J.L., Stryer, L. 2006. Biochemistry. 6th Edition, W.H. Freeman and Company, New York.
2. Buchanan, B., Gruissem, W. and Jones, R. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists, USA.
3. Conn, E.E., Stumpf, P.K. and Bruening, G. 2006. Outlines of Biochemistry. 4th Edition**,** John Wiley and Sons Inc. New Jersey, USA.
4. Elliot, W.H. and Elliot, D.C. 2009. Biochemistry and Molecular Biology. Oxford Publishers, India.
5. Hopkins, W.G. and Huner, P.A. 2008. Introduction to Plant Physiology**.** John Wiley and Sons, USA.
6. Mukherjee, S., Ghosh, A.K. 2006. Plant Physiology. New Central Book Agency, Calcutta.
7. Nelson, D.L. and Cox, M.M. 2004. Lehninger Principles of Biochemistry, 4th edition, W.H. Freeman and Company, New York, USA.
8. Ranjit, K. 2008. Research methodology: A step by step guide for beginners. Pearson, India.
9. Sinha R. K., 2007. Modern Plant Physiology. 2nd Edition Tata McGraw, New Delhi.
10. Taiz, L. and Zeiger, E. 2006. Plant Physiology**.** 4th Edition Sinauer Associates Inc. Publishers, Massachusetts, USA.
11. Voet, D. and Voet, J.G. 2000. Biochemistry, John Wiley, New York.
12. Wilson, K. and Walker, J. 2008. Principles and techniques of Biochemistry and Molecular Biology**,** Cambridge University Press.

BOTANY PRACTICAL IV

1. Double staining technique and technique for preparation of permanent slides.
2. Study of following with the temporary slide preparation and specimens:
   Pteridophytes: *Psilotum, Selaginella, Equisetum, Pteridium* and *Marselia* (Vegetative and reproductive).
3. **Gymnosperm:** *Cycas* (coralloid root, T.S. of coralloid root, T.S. of leaflet, petiole, male cone and L.S. of male cone, microsporophyll, megasporophyll, T.S. of microsporophyll, ovule, L.S. of ovule and seed).
4. *Pinus* (T.S. of stem and needle, male cone and female cone, L.S. of male cone and female cone, seed).
5. *Ephedra* (Stem T.S., leaf T.S., male and female cones, L.S. of ovule, seed).
6. Study of fossil specimens.
7. Principle, working and use of colorimeter and spectrophotometer.
8. Principle, types and application of centrifuges.
9. Principle and types of Chromatography.
10. Separation of amino acids by paper chromatography and thin layer chromatography.
11. Microchemical tests for carbohydrates (Fehling's test, Benedicts test) and proteins (Ninhydrin test, Xanthoproteic test).
12. Separation of chlorophyll and carotenoid pigments by solvent method
13. Separation of chlorophyll and carotenoid pigments by paper chromatography .
14. Estimate chlorophyll and carotenoid content in C3 andC4 plant.
15. To test the presence of ascorbic acid in different plant juices.
16. Bioassay of plant growth hormone(auxin,gibberellins and cytokinin).
17. Measurement of growth using auxanometer.

Semester-IV

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 405	Zoology-I	CE*	4	15	20	100
	Zoology-II				20	
	Zoology-III				20	
	Zoology Practical				25 Practical	

Zoology-Paper-I : Life and Diversity of animals – Chordata II

Objectives:

- To learn about the comparative study scoliodon and Rana of Integumentary system i.e. Structure of skin.
- To Understand and study the comparative study scoliodon and Rana of Heart and brain.
- To Understand and study the comparative study scoliodon and Rana of Bones.
- To Understand and study the Poisonous and nonpoisonous snakes.
- To explain the flight adaption

UNIT-I: Comparative Anatomy of Vertebrates-I

Comparative anatomy of the following organ systems of Scoliodon, Rana,

1.1 Integument and its derivatives.

1.2 Alimentary canal and accessory digestive glands.

1.3 Respiratory organs.

UNIT-II Comparative Anatomy of Vertebrates-II

Comparative anatomy of the organ systems of Scoliodon, Rana,

2.1 Heart, aortic arches and their evolution.

2.2 Brain and cranial nerves,

2.3 Comparative structure and evolution of urinogenital system (pro, meso and metanephric kidney and genital ducts in males and females).

Unit III: Comparative Anatomy of Vertebrates-III

Comparative anatomy of the organ systems of Scoliodon, Rana,

3.1 Osteology**:** Girdles, limb bones, Vertebrae, ribs and sternum; jaw suspension, Structure and types of vertebrae

3.2 Sense Organ**:** Comparative anatomy of eye

3.3 Sense Organ**:** Membranous labyrinth; sound production

Unit IV: Miscellaneous

4.1 Reptila**:** Poisonous and Non Poisonous Snakes of India.

4.2 Aves: Flight Adaptation; Flight Muscles; Perching Mechanism

4.3 Mammals-I**:** Dentition; Adaptive radiation

Learning Outcomes: After complition the course student would able to:

- Understand and study the comparative study scoliodon and Rana of Integumentary system i.e. Structure of skin.
- Study the comparative study scoliodon and Rana of Heart and brain.
- Comparative study scoliodon and Rana of Bones.
- Interprete Poisonous and nonpoisonous snakes.
- Discuss the flight adaption

Zoology-Paper-II: Biochemistry and Endocrinology

Objectives

- To explain the function of Carbohydrates and other metabolism.
- To aware the function of Lipids and metabolism
- To understand the importance of Bio molecules
- To learn about the function of Proteins and metabolism
- To aware the Types of Endocrine glands

Unit I: Carbohydrates and their metabolism

1.1 Biomolecule: Structure, types, function and properties of Carbohydrate

1.2 Metabolism: Glycolysis; fermentation; citric acid cycle; gluconeogenesis;

1.3 Glycogen metabolism (glycogenesis and glycogenolysis).

Unit II: Lipids and their metabolism

2.1 Biomolecule: Structure, types, function and properties of Lipid

2.2 Fatty acid; Triglycerides and Steroids

2.3 Metabolism: Biosynthesis and β-oxidation of saturated fatty acids, ketogenesis

2.4 LipidDisorders: Ketosis, Lipidosis

Unit III: Proteins and their metabolism

3.1 Biomolecule: Amino acids; essential and non-essential amino acids

3.2 Biomolecule: Structure, types, function and general properties of Proteins; four levels of structures in proteins

3.3 Enzymes: Major classes, Basic mechanism of action, kinetics and factors affecting enzyme activities

Unit IV: Endocrine Glands and Disorders

Structure, biological actions and regulation of following endocrine glands:

4.1 Pituitary

4.2 Thyroid; Thymus

4.3 Adrenal; Pineal; Pancreas

4.4 Testes and Ovary

Learning Outcomes: After complition the course student would able to:

- Interprets the function of Carbohydrates and other metabolism.
- Explain the function of Lipids and metabolism
- Interprete the importance of Bio molecules
- Understand the function of Proteins and metabolism
- Explain the Types of Endocrine glands

Zoology-Paper-III: Physiology- II

Objectsives:

- To Understand the Nerve and Muscles.
- To explain the Sensory Physiology.
- To Understand the Reproduction.
- To understand the hormones action.

- ❖ To learn about the human ear mechanism of hearing

Unit –I: Nerve and Muscle Physiology

1.1 Nerves: Types of neurons, E.M. structure of neuron; Myelinated and non-myelinated nerve fibres

1.2 Muscles: Ultra structure of striated muscle, Physiology of Muscle Contraction; sliding filament theory of muscle contraction; Neuromuscular Junction

Unit II: [Sensory Physiology]

2.1 Structure of human eye; image formation and colour vision

2.2 Structure of human ear, mechanism of hearing

2.3 Elementary idea of EEG, MRI, CT-scan, mental health (epilepsy, neurosis, psychosis)

Unit III [Reproduction]

3.1 Oestrous and menstrual cycle

3.2 Male and female sex hormones

3.3 Causes of infertility in male and female

Unit IV [Hormones]

4.1. General mechanism of hormone action: Peptide hormone; Steroid hormone

4.2 Neurohypophysial hormones – Oxytocin and Vasopressin

4.3 Hormones of the Adenohypophysis; Hypothalamic control of Adenohypophysis; Dwarfism; Acromegali

Learning Outcomes: After complition the course student would able to:

- ❖ Interprets the Nerve and Muscles.
- ❖ Understand the Sensory Physiology.
- ❖ Understand the Reproduction.
- ❖ Classify the hormones action.
- ❖ Describe the human ear mechanism of hearing

Zoology Practical- IV

Paper-I: Study of Chordates:

A. Study of Specimen.

a) **Reptilia:** Chelone, Trionyx, Testudo, Sphenodon, Hemidactylus, Draco,Phrynosoma, Chamaeleon, Typhlops, Python, Eryx (Sand Boa), Bungarus, Naja, Vipera, Hydrophis, Crocodylus, Alligator, Gavials

b) **Aves:** Archeopteryx, Pavo cristatus, Psittacula (parrot), Great Indian Bustard,Saras crane

c) **Mammals:** Echidna (Tachyglossus/ Spiny Anteater), Ornithorhyncus (Duck-billed Platypus), Macropus (Kangaroo), Bat, Loris, Manis, Herpestes (Mongoose)

B. Study of Permanent Slides.

a. V.S. of Skin of Reptiles, Aves and Mammals.

C. Osteology (Comparative study of amphibia to mammals articulated and disarticulated)

a) Vertebrae.
b) Limb bones.
c) Girdles.
d) Ribs.

D. Dissection:

a) A Rat: External Feature, General anatomy, General Viscera [through chart/ video/ CAL]

Paper-II: Biochemistry

1. Biochemical detection of carbohydrates, proteins and lipids in a given sample
2. Calorimetric estimation of glucose / Protein in a given solution

Paper-III: Physiology II

I. Study of Permanent Slides

a. Histological Slides: Bone, Cartilage, Striated Muscle Fibre
b. Endocrine Glands: Pituitary, Thyroid, Parathyroid, Thymus, Adrenal cortex, Adrenal Medula, ovary, testis
c. To study the knee jerk reflex in man

Suggested Readings:

Biochemistry:

1. Stryer, I. (1988). Biochemistry II. Freeman and Co.
2. Plummer, L. (1989). Practical biochemistry. Tata McGraw.
3. Murray, R. K. et al (1995). Harper's biochemistry, 24th ed. Prentice Hall.
4. Lewin, B. (2000). Gene. John Wiley & sons.
5. Strikburger, M. W. (1994). Genetics. Macmillan Publ. Co.
6. Russel, P. J. (1998). Genetics. The Benjamin Cummins Publishing Co.
7. Lehninger (2004). Principles of biochemistry 4th ed.
8. Gilbert, F. (2000). Basic concepts in biochemistry: A student's survival guide.2nd ed. McGrawHill
9. Price, N. E. & Stevens, L. (1982). Fundamentals of enzymology. OUP
10. K.V. Shastri, 2015, Animal Physilogy and Biochemistry, Rastogi Publication, Meerut, Delhi

Physiology:

1. Ganong: Review of Medical Physiology (22nd ed. 2005, Lange Medical)
2. Guyton and Hall: A text book of Medical Physiology (11th ed. 2006, Saunders).
3. Keele & Neil: Samson Wright's Applied Physiology (13th ed. 1989, Oxford)
4. K.V. Shastri : Physiology
5. William S. Hoar, 1976. General and Comparative Physiology, Prentice
6. K.V. Shastri, 2015, Animal Physilogy and Biochemistry, Rastogi Publication, Meerut, Delhi

Endocrinology

1. Hadley: Endocrinology (5th ed. 2000, Prentice Hall)
2. Turner and Bagnara: General Endocrinology (6th ed. 1984, Saunders)
3. Norris: Vertebrate Endocrinology, Fourth Edition, 2007, Academic Press

Semester-V

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 501	General English	**CC**	**4**	**30**	**70**	**100**

Objectives:

- Students will be able to recognize and understand the meaning of targeted grammatical structures in written and spoken form.
- Students will practice the grammar skills involved in writing sentences and short paragraphs.

Unite -I Grammar and Usage:

1. Parts of Speech
2. Basic Sentence Patterns

3. Sentences beginning with 'It' and 'There'
4. Tenses
5. Phrasal Verbs
6. Articles and other Determiners
7. Direct & Indirect Speech
8. Active and Passive Voice
9. Modal Auxiliaries
10. Simple, Complex and Compound sentences.

Unite -II Book : A Cavalcade of Modern English Prose Essays :

(1) Essentials of Education (2) Testament

Unite -III Writing Skills

(1)Paragraph Writing (2) Letter & Application Writing

Unite -IV Vocabulary

(1)Word often confused (2) Antonyms and Synonyms

Learning Outcome: After complition the course student would able to:

- ❖ Begin to self-edit their oral and written production.
- ❖ Make less grammatical errors.
- ❖ Clear of grammatical terms.
- ❖ Get exposure of writing letters, application and paragraph.

Suggested Reading :

1. R. Quirk et al (ed.) A Grammar of Contemporary English. Longman, London, 1972.
2. A Textbook of General English for Undergraduate students by R.P. Bhatnagar, Rajul Bhargava, Jain Prakashan Mandir, 1024, Shinghiji ki Gali, Chaura Rasta, Jaipur-302 002.
3. English Grammar, Composition and Reference skills by R.P. Bhatnagar & Rajul Bhargava, Board of Secondary Education, Ajmer.
2. Text Book: A Cavalcade of Modern English Prose, R.P. Bhatnagar, Jain Pustak Mandir, Chaura Rasta, Jaipur.
3. English for Indian Learners by R.P. Bhatnagar, University book house, (P), Jaipur.

Semester-V

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 502	Contemporary India and Education	**CC**	**4**	**30**	**70**	**100**

Objectives:

- ❖ To know the concept and nature of Educaiton.
- ❖ To know the social mobility and social skill.
- ❖ To understand the various committee and commission.
- ❖ To educate about the recent policies of Education.

Course Contents:

Unit-I Concept and Nature of Education

a) Education : Concept, Nature, Objectives and Functions
b) Role and problems of education in nation building
c) Current educational provisions of education in India (One year)
d) Educational thoughts of Indians thinkers (Vivekanand and Mahatma Gandhi)

Unit-II Social Aspects of Education

a) Sociology in education : Concept, Functions and Contribution
b) Social change : Meaning, Definition, Factors and Effects of Education
c) Social mobility
d) Education and culture
e) Role of education in development of social skills.

Unit-III Progressive Development of Education in Terms of Commissions and Committees

a) Characteristics of ancient, medieval and british period of education.
b) Radhakrishna Commission of Education (1948)
c) Mudaliyer Commission of Education (1952)
d) Kothari Commission of Education(1964)
e) National education policy (1968 and 1986)
f) Revised national education policy (1992)

Unit : IV Programmes for Education

a) Issues and problems in prevailing education system at National and State level
b) Right to Education Act 2009
c) Sarva Shiksha Abhiyan and Mid day Meal Programme
d) Rashtriya Madhyamik Shiksha Abhiyan
e) Education as related to social equity and equality of educational opportunities

Assignment & Practical Work (Any Two)

- Write the educational contribution of any one Indian Thinker.
- Prepare a term paper on how we can inculcate values in the present system of education.
- Prepare a structure of education since ancient period to present time.

Practical Works : (Any one)

- Concept of education in Emerging Indian Society as relevant to school children's
- Development of moral attitude through self management.

Learning Outcomes: After completion of this course students would able to:

- Know social aspects of education and develop educational perspective.
- Solve prevailing problems of education in India.
- Understand the purpose, function and Role of education in nation building.
- Understand knowledge of the Indian education system as it has evolved from the past, as it is today.

- ❖ Understand the concept, principle of sustainable development and core concept of educational thinkers.
- ❖ Know social equity and equality of educational opportunities.

Suggested Readings:

1. Crown, R.G. (1965),A Society of Education, Engineering patterns of class, status and power in the public school, New York : Appleton-century crofts.
2. Durkhem, S. (1956), Education and Sociology of Education, New York : The Free Press of Glenoce.
3. Gore, M.S., et. al. (1967), Papers in the sociology of Education in India, New Delhi, NCERT.
4. Hanseu, D.A. et. al (1965), On Education : Sociological Perspective. New York :John Wiley and Sons.
5. चौबे, सरयूप्रसाद, (2005), शिक्षा के समाजशास्त्रीय आधार, विनोद पुस्तक मंदिर, आगरा
6. त्रिपाठी, शालिग्राम, (2008), शिक्षा सिद्धान्त, कनिष्क पब्लिशर्स डिस्ट्रीब्यूटर्स, अंसारी रोड़, नई दिल्ली
7. पाण्डेय, रामशक्ल, (2008), उभरते हुए भारतीय समाज में शिक्षा, विनोद पुस्तक मंदिर, आगरा
8. पाठक, पी. डी., (2008), भारतीय शिक्षा और उसकी समस्याएँ, विनोद पुस्तक मंदिर, आगरा
9. पाठक एवं त्यागी, (2008), शिक्षा के सिद्धान्त, विनोद पुस्तक मंदिर, आगरा
10. पाण्डेय, रामशक्ल, (2007), शिक्षा के मूल सिद्धान्त, विनोद पुस्तक मंदिर, आगरा
11. शर्मा, ओ. पी., गुप्ता शोभा, (2008), उभरते हुए भारतीय समाज में शिक्षा, विनोद पुस्तक मंदिर, आगरा
12. सिन्हा, मंजरी, सिन्धु, आई. एस., (2007), विकासोन्मुख भारतीय समाज में शिक्षा तथा शिक्षक की भूमिका, विनोद पुस्तक मंदिर, आगरा

Semester-V

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 501	Chemistry-I	Any Three CC	4	15	**20**	100
	Chemistry-II				**20**	
	Chemistry-III				**20**	
	Chemistry Practical				**25** Practical	

Chemistry-Paper-I : Inorganic Chemistry

Objectives:

- ❖ To develop the knowledge about coordination compound, lanthanides and actinides.
- ❖ To aware about the conceptual knowledge of valance bond theory, nomenclature, spectral properties of elements of transition series.
- ❖ To give information about coordination theory, magnetic moments, spectral properties and electronic configuration of various elements of transition series.
- ❖ To develop understanding about correlation between periodicity and general features of various elements .

Unit I: Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, Valence bond

theory of transition metal complexes with reference to tetrahedral, octahedral and cubic complexes, back bonding, Limitations of valence bond theory.

Unit II: Chemistry of elements of first transition series

Characteristic properties of d block elements, properties of the elements of the first transition series, complexes illustrating relative stability of their oxidation states, coordination number and geometry, Types of magnetic behaviour, magnetic and molar susceptibility, determination of magnetic susceptibility, orbital contribution of magnetic moments , spin-only formula, correlation of μ_S and μ_{eff} values, applications of magnetic moment.

Unit III: Chemistry of lanthanide elements

Position in periodic table, occurrence and isolation, Electronic structure, oxidation states and ionic radii, lanthanide contraction and its consequences, complex formation, spectral properties, magnetic properties, Separation of lanthanides Application of lanthanides.

Unit IV: Chemistry of actinides

Occurrence, electronic configuration, General features and chemistry of actinides, oxidation states and stereochemistry, spectral properties, magnetic properties , chemistry of separation of Np, Pu and Am from U, comparison of lanthanide and actinide.

Learning Outcomes: After complition the course student would able to:

- Differentiate between lanthanides and actinides on the basis of their properties.
- Measure the correlation of various values, complex formation and spectral properties of elements of transistion series.
- Classify the coordination compounds, magnetic behavior and stereochemistry of lanthanides and actinides.
- Define the separation process, structural properties and electronic configuration of compounds

Chemistry- Paper-II : Organic Chemistry

Objectives:

- To develop conceptual knowledge about infrared absorption spectroscopy,nomenclature of organometallic compounds.
- To aquaint about various laws of spectroscopy and methods of synthesis related to organmetallic and heterocyclic compounds.
- To aware about laws related to IR spectrum, types of tranisitions and preparation of heterocyclic compounds.
- To develop understanding about effects of solvents, structural features and basicity of pyridine, piperidine and pyrrole.

Unit I Electromagnetic spectrum: Absorption spectra (UV) & Infrared IR absorption spectroscopy

Ultraviolet absorption spectroscopy- absorption laws (Beer- Lambert Law) molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of solvents on transitions, effect of conjugation, concept of chromophore and auxochrome. Bathochromic, hypsochromic and hyperchromic and hypochromic shifts, UV spectra of conjugated enes and enones.

Molecular vibrations, Hookes law, selection rules, intensity and position of IR bands, measurement of IR spectrum, finger print region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds

Unit II : Organometallic compounds

The Grignard reagent- formation, structure and chemical reaction, organozinc compound: formation and chemical reactions. Organolithium compounds- Formation and chemical reactions.

Nomenclature, structural features, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamide and sulpha guanidine.

Unit III : Heterocyclic compounds- I

Introduction, molecular orbital picture and aromatic characteristic of pyrrole, furane, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reaction in pyridine derivatives. Comparision of basicity of pyridine, piperidine and pyrrole

Unit IV : Heterocyclic compounds- II:

Introduction to condensed five and six membered hetrocycles. Preparation and reaction of indole, quinoline and isoquinoline with special reference to fischer indole synthesis, skraup synthesis and Bischler-Napieralski synthesis, mechanism of electrophilic substitution reaction of indole, quinoline and iso quinoline.

Learning Outcomes: After complition the course student would able to:

- Calssify the various organic compounds on the basis of UV spectra and transition.
- Describe and discuss about formation, structure and chemical reactions of heterocyclic compounds.
- Draw and interpret the molecular orbit picture and aromatic characteristics of organometallic and heterocyclic compounds.
- Define various devivatives and reaction mechanism of synthesis and substitution related to heterocyclic compounds.

Chemistry- Paper-III : Physical Chemistry

Objectives:

- To aware about degree of freedom, phase equilibria and quantum mechanism.
- To develop conceptual knowledge about entrophy, electrolytes dipole moment etc.
- To develop analytical view about evaluation of absolute entrophy, activity coefficient and magnetic propertires of compounds.
- To give information about carnt theorem, mixing of gases, overvoltage and referectivity.

Unit I: Phase Equilibrium I

Statement and meaning of the terms-phase, component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems.

Phase equilibria of two component system: Solid-liquid equilibria, simple eutectic Bi-Cd, Pb-Ag systems, desilverisation of lead.

Solid solutions**:** Compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H_2O), ($FeCl_3$-H_2O) and $CuSO_4$-H_2O) system. Freezing mixtures, acetone-dry ice.

Unit II : Phase Equilibrium II

Liquid –Liquid mixtures- Ideal liquid mixtures. Raoult`s and Henry`s law. Non ideal system-azeotropes-HCl –H_2O and ethanol-water systems.

Partially miscible liquids- Phenol-water, trimethylamine-water, nicotine-water systems. Lower and upper consulate temperature. Effect of impurity on consulat temperature.

Immiscible liquids, steam distillation. Nernst distribution law- Thermodynamic derivation, applications.

Unit III : Quantum Mechanics I

Black-body radiation, Planck`s radiation law, photoelectric effect, heat capacity of solids, Behr,s model of hydrogen atom(no derivation) and its defects. Compton Effect. De Broglie hypothesis, Heisenberg,s uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.

Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

Unit IV : Adsorption

Difference between adsorption, absorption and sorption, Chemisorption, adsorbent and adsorbate, reversible and irreversible adsorption, Characteristics of adsorption ,adsorption of gases by solids, factors affecting adsorption, types of adsorption, types of adsorption isotherms, Freundlich and Langmuir adsorption isotherms.

Learning Outcomes: After complition the course student would able to:

- Classify the electrodes, cells and properties of organic compounds.
- Determine and interpret the function of volumes, equations, coefficients related to entrophy, corrosion and molecular structures.
- Describes various properties of compounds on the basis of energy, potential and dipole moment etc.
- Measure the entropy change, pH and polarization and magnetic properties of compounds.

Term paper/ practicals

Inorganic chemistry:

Preparation:

1. Preparation of sodium trioxalato ferrate (III), Na_3 [$Fe(C_2O_4)_3$] (b) preparation of Ni-DMG complex [$Ni(DMG)_2$]
2. Preparation of copper tetraammine complex [$Cu(NH_3)$]SO_4
3. Preparation of cis- and trans- bisoxalato diaqua chromates (III) ion
4. Preparation of sodium tetrathionate

Organic Chemistry

Qualitative analysis: Analysis of an organic mixture containing two solid components using water, $NaHCO_3$, and NaOH for separation and preparation of suitable derivatives.

Suggested Reading:

1. A New Concise Inorganic Chemistry; Fifth Edition; J.D. Lee; Blackwell Science, London, 1989.
2. Inorganic Chemistry; Third Edition; D.F. Shriver and P.W. Atkins; Oxford University Press, New York, 1999.
3. Inorganic Chemistry; Third Edition; Gary L. Miessler and Donald A. Tarr; Pearson Education Inc. Singapore, 2005.
4. Organic Chemistry; Seventh Edition; T.W. Graham Solomons & Craig B. Fryhle; John Wiley and Sons, 1998.
5. Organic Chemistry; Sixth Edition; Robert Thornton Morrison & Robert Neilson Boyd; PHI Pvt. Ltd, 2004.
6. Organic Chemistry Vol. I ; Fifth Edition; I.L. Finar; Longman Scientific and Technical, Singapore, 1975.
7. Organic Chemistry: Vol 1, Mukerjee and Singh
8. Organic Chemistry: Vol 2, Mukerjee and Singh
9. Organic Chemistry: Vol 3, Mukerjee and Singh
10. A Text Book of Physical Chemistry; A.S. Negi, S.C. Anand; New Age International (P) Limited, New Delhi, 2002.
11. The Elements of Physical Chemistry; P.W. Atkins; Oxford University Press, 1996.
12. University General Chemistry; C.N.R. Rao; Macmillan India Ltd., New Delhi, 1998.
13. Physical Chemistry: Puri Sharma and Pathania
14. Physical Chemistry: J. Moore
15. कार्बनिक रसायन, सुरेश आमेटा, एच.के. पाण्डे, एच.एस. शर्मा, हिमांशु पब्लिकेशन्स, उदयपुर
16. अकार्बनिक रसायन, ओझा, भोजक, कोठारी, चतुर्वेदी, रमेश बुक डिपो, जयपुर
17. प्रायोगिक रसायन, भार्गव, लवानिया, ओझा, रमेश बुक डिपो, जयपुर
18. भौतिक रसायन, शर्मा, भार्गव, गुप्ता, रमेश बुक डिपो, जयपुर
19. कार्बनिक रसायन, विजयश्री मनोज छंगाणी, अल्का पब्लिकेशन, अजमेर
20. अकार्बनिक रसायन, विजयश्री कोठारी छंगाणी, अल्का पब्लिकेशन, अजमेर
21. प्रायोगिक रसायन, छंगाणी, विजयश्री, खण्डेलवाल, अल्का पब्लिकेशन, अजमेर
22. प्रायोगिक रसायन, वी.के. गोयल, आर.एस. पीतलिया, कॉलेज बुक हाऊस, जयपुर
23. कार्बनिक रसायन, वी.के. रस्तोगी, यसपाल सिंह, कॉलेज बुक हाउस, जयपुर

Semester-V

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 502	**Physics-I**	CE*	4	15	**20**	100
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25** Practical	

Physics-Paper-I : Mathematical Physics and Special Theory of Relativity – I

Objectives:

- To understand the concept of co-ordinate transformation.
- To know the concept of tensor analysis and dirac delta function.
- 3.To understand the Special functions (Legendre, Bessel, hermite and laguerre) .
- To aware the techniques of variables and its application to boundary value problems

UNIT I Coordinate Transformation:
Orthogonal curvilinear coordinate system, scale factors, expression for gradient, divergence, curl and their application to Cartesian, circular cylindrical and spherical polar coordinate. Coordinate transformation and Jacobian.

UNIT II Tensor analysis & Dirac Delta function:
Transformation of covariant, contravariant and mixed tensor; Addition, multiplication and contraction of tensors; Metric tensor and its use in transformation of tensors. Dirac delta function and its properties.

UNIT III Special functions:
The second order linear differential equation with variable coefficient and singular points, series solution method and its application to the Hermite, Lagendre and Laguerre differential equations: basic properties like orthogonality, recurrence relation, graphical representation and generating function of Hermite, Lagendre , Leguerre functions (simple applications)

UNIT IV Boundary Value Problems:
Techniques of separation of variables and its application to following boundary value problems
(i) Laplance equation in three dimensional Cartesian coordinate system- line charge beween two earthed parallel plates (ii) Helmholtz equation in circular cylindrical coordinates – cylindrical resonant cavity, (iii) Wave equation in spherical polar coordinates – the vibrations of a circular membrane, (iv) Diffusion equation in two dimensional Cartesian coordinate system – leat conduction in a thin rectangular plate, (v) Laplace equation in spherical coordinate system – electric potential around a spherical surface.

Learning Outcomes: After complition the course student would able to:
- Discuss the concept of co-ordinate transformation.
- Classify the concept of tensor analysis and dirac delta function.
- 3.Differentiate the Special functions (Legendre, Bessel, hermite and laguerre) .
- Applies the techniques of variables and its application to boundary value problems.
- 5 Identify the laplace equation in spherical co ordinate system.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, गणितीय भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics- Paper-II : Quantum Mechanics – I

Objectives:
- To Understand the Origin and Experimental Evidence of Quantum theory.
- To aware the Uncertainty Principles and Schrodinger's Wave Mechanics.
- To develop concept the Postulates and Operators of Quantum Mechanics.
- To understand the Simple Solutions of Schrodinger Equation.

UNIT I Origin and Experimental Evidence of Quantum Theory:

Development of quantum theory –Historical development and experimental evidence for quantum theory Electromagnetic Radiation: Black Body Radiation, qualitative discussion of spectral distribution of energy, limitation of classical theory, Planck's radiation law, photoelectric effect, Compton effect, Matter Waves: De Broglie hypothesis, Davison Germer experiment.

UNIT–II Uncertainty Principles and Schrodinger's Wave Mechanics :

Uncertainty principle and its consequences gamma ray microscope, diffraction at a single slit, its application such as (i) Non existence of electron in nucleus, (ii) Ground state energy of H–atom, (iii) Ground state energy of harmonic oscillator (iv) Natural width of spectral lines. Schrodinger's equation : Its need and justification, time dependent and time independent forms, physical significance of the wave function and its interpretation, probability current density.

UNIT–III Postulate's and Operators of Quantum Mechanics :

Operators in quantum mechanics, definition of an linear operator. Linear and Hermition operator, state function. Expectation value of dynamical variable-position, momentum and energy, Fundamental postulates of quantum mechanics, Eigen function and eigen values, Degeneracy. Orthogonality of eigen function, Commutation relations, Ehrenfest's theorem and complementarily wave packet, group and phase velocities, Principle of superposition, Gaussian wave packet.

UNIT IV Simple Solutions of Schrodinger equation :

Time independent Schrodinger equation and stationary state solution, Boundary and continuity conditions on the wave function, particle in one dimensional box, eigen function and eigen values , discrete energy levels, extension of results for three dimensional case and degeneracy of levels.

Learning Outcomes: After complition the course student would able to:*:*

- Discuss the Origin and Experimental Evidence of Quantum theory.
- Apply the Uncertainty Principles and Schrodinger's Wave Mechanics.
- Identify the Postulates and Operators of Quantum Mechanics.
- Calculate the Simple Solutions of Schrodinger Equation
- Discuss on the descrete energy level.

Suggested Reading:

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, क्वांटम यांत्रिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics- Paper-III: Solid State Physics

Objectives:

- To know the concept of Crystal Binding and crystal Structure.
- To understand the Thermal and Electrical Properties of the Solids.
- To aware the concept of Band Theory of Solids.
- To develop concept the Magnetic Property of materials.

UNIT-I Crystal Binding and Crystal Structure:

Various types of Bindings: Cohesive energy and compressibility of ionic crystals , Space Lattice and Crystal Structure, Bravis Lattice, Miller Indices and Crystal Structure, Spacing of Planes in Crystal Lattice,

Determination of different crystal properties for SC, FCC, BCC,HCP and perovaskite structure, X-ray Diffraction and Bragg's Law, Laue equation of X-ray diffraction, Debye Scherer and Laue Camera.

UNIT-II Thermal and Electrical Properties of the Solids:

Concepts of Thermal Energy and Phonons, Internal Energy and Specific Heat, the Various Theories of Lattice Specific Heat of Solids: The Einstein Model, Debye Model, Electronic Contribution of the internal Energy hence to the Specific Heat of Metals, Thermal Conductivity of the lattice. Electrical Conductivity: Drude-Lorentz Theory of Electrical Conductivity, Boltzmann Transport Equation, Sommerfield Theory of Electrical Conductivity, Mathiessen's Rule, Thermal Conductivity and Wildemann-Franz's Law, The Hall Effect.

UNIT-III Band Theory of Solids:

Formation of Bands, Periodic Potential of a Solid, Wave Function in a Periodic Lattice and Bloch Theorem, Density of states , Kronig Penny Model, Velocity of the Bloch electrons and Dynamical Effective Mass, Momentum, Crystal Momentum and Physical Origin of the Effective Mass, Negative Effective Mass and concept of Holes, The distinction between metals, insulators, and semiconductors.

UNIT-IV Magnetic Properties:

Classification of Magnetic Materials, Origin of Atomic Magnetism, Dynamics of Classical Dipole In Magnetic Field, Magnetic Susceptibility, phenomenon of Diamagnetic, Para magnetic susceptibility of Ionic Crystal, Ferromagnetism, Temperature Dependence of Saturation of Spontaneous Magnetization, The Paramagnetic Region, the Nature of Ferromagnetism, Nature and Origin of Weiss Molecular Field, Heisenberg's Exchange Interaction, (Quantum Theory of Ferromagnetism), Relation between Exchange Integral and Weiss Constant, Ferromagnetism Domains, Magnetostriction

Learning Outcomes: After complition the course student would able to:

- ❖ Identify the concept of Crystal Binding and crystal Structure.
- ❖ Study the Thermal and Electrical Properties of the Solids.
- ❖ Classify the concept of Band Theory of Solids.
- ❖ Discuss the Magnetic Property of materials.
- ❖ Identify relation between exchange integral and Weiss constant.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, ठोस अवस्था भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics Practical: V

1. 1.Study of a RC transmission line at 50 Hz
2. Study of a RC transmission line
   - at fixed frequency
   - at variable frequency
3. Study of resonance in a LCR circuit 9 (Using air core inductance and damping by metal plate)
   - At fixed frequency by varying C, and
   - by varying frequency
4. Study of charecteristics of junction diode and zener diode
5. Study of
   - Recovery time of junction diode and point contact diode

- Recovery time as function of frequency of operation and switching current

6. To design zener regulated power supply and study the regulation with various loads.
7. To study the characteristics of a field effect transistor (FET) and design/study amplifier of finite gain
8. To study the frequency response of a transistor amplifier and obtain the input and output impendence of the amplifier.
9. To Design and study of an R-C phase shift oscillator and measure output impendence (frequency response with change of component of R and C).
10. To study a voltage multiplier circuit to generate high voltage D.C. from A.C.
11. Using discrete components, study OR, AND, NOT logic gates, compare with TTL integrated circuits (I.C.'s).
12. Application of operational amplifier (OP-AMP) as : Minimum two of the following exercises- (a) Buffer (for accurate voltage measurement) (b) Inverting amplifier (c) Non inverting amplifier (d) Summing amplifier.

Suggested Reading :

1. प्रो. प्रभा दशोरा, तृतीय वर्ष प्रायोगिकी भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, नई दिल्ली, 2015

Semester-V

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 503	Mathematics-I	CE*	4	15	**20**	100
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25** Practical	

Mathematics-Paper-I: Algebra - I

Objectives:

- To Understand the definition and Simple Properties of Group & Subgroup.
- To aware the Cayley's Theorem and Fundamental Theorem of Isomorphism.
- To know the Definition of Ring and Subrings.
- 4 To gain knowledge of morphism of ring.

Unit 1: Definition and simple properties of Groups and Subgroups. Permutation group, Cyclic group. Cosets,

Unit 2 ; Lagrange's theorem on the order of subgroups of a finite order group.

Unit 3: Morphism of groups, Cayley's theorem. Normal, subgroups and Quotient groups. Fundamental theorems of Isomorphism.

Unit 4: Definition and simple properties of Rings and Subrings. Morphism of rings. Embedding of a ring

Learning Outcomes: After complition the course student would able to:

- Discuss on definition and Simple Properties of Group & Subgroup.
- Apply the Lagrange's Theorem on the Order of Subgroups.
- Calculate the Cayley's Theorem and Fundamental Theorem of Isomorphism.
- Discuss the definition of Ring and Subrings.
- Differentiate group, subgroup and quotient group.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, बीजगणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, बीजगणित, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics- Paper-II: Complex Analysis -I

Objectives:

- To Understand the Complex Plane, Connected & Compact Set.
- To Aware the Complex Valued function.
- To know the Complex Integral.
- To study taylor's theorem and laurent's theorem .

Unit 1: Complex plane. Connected and Compact sets. Curves and Regions in complex plane. Jordan curve Theorem (statement only). Extended complex plane. Stereographic projection.

Unit 2 ; Complex valued function — Limits, Continuity and Differentiability. Analytic functions, Cauchy-Riemann equations (Cartesian and polar form). Harmonic functions, construction of an analytic function.

Unit 3 : Complex integration, Complex line integrals, Cauchy integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions. Cauchy integral formula, Analyticity of the derivative of an analytic function, Morera's theorem, Poisson integral formula, Liouville' theorem.

Unit 4 : Taylor's theorem. Laurent's theorem. Maximum modulus theorem

Learning Outcomes After complition the course student would able to:

- Discuss the Complex Plane, Connected & Compact Set.
- Identify the Complex Valued function.
- Classify the Complex Integral.
- Solve the Taylor's Theorem and Maximum Modulus Theorem.
- Discuss on the fundamental theorem of integral calculus for complex functions.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, बीजगणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, बीजगणित, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics- Paper-III: Dynamics

Objectives:

- To Understand the Velocity and Acceleration.
- To Study the Motion along Horizontal & Vertical Elastic String.
- To aware the Motion in Resisting medium.
- To know about simple harmonic motion and Hooke's Law.

Unit 1: Velocity and acceleration — along radial and transverse directions, along tangential and normal directions.

Unit 2 : S.H.M., Hooke's law, motion along horizontal and vertical elastic strings.

Unit 3: Motion in resisting medium - Resistance varies as velocity and square of velocity.

Unit 4: Work and Energy. Motion on a smooth curve in a vertical plane. Motion on the inside and outside of a smooth vertical circle.

Learning Outcomes: After complition the course student would able to:

- Discuss the Velocity and Acceleration.
- Classify the Motion along Horizontal & Vertical Elastic String.
- Identify the Motion in Resisting medium.
- Calculate Work and Energy.
- Calculate the motion on the inside and outside of a smooth vertical circle.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, बीजगणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, बीजगणित, जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Semester-V

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 504	Botany-I	CE*	4	15	**20**	100
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25** Practical	

Botany-Paper-I: Morphology Of Angiosperms

Objectives:

- To understand the basic plan of flouring plants.
- To get knowledge about the morphology of root system and shoot system.
- To learn the origin, development and types of leaves
- To study the detailed structure of flower.
- To aware students with the concept and significance of seed.

UNIT 1: Plant habit

The basic plan of flowering plants, modular types of growth, diversity of plant form in annuals, biennials and perennials, evolution of tree habit in gymnosperm, monocotyledons and dicotyledons, trees largest and longest lived plants.

UNIT II Morphology of Root System

Root: Structure of root, types and structural modification for storage, physiological and mechanical, interaction of root with other microorganisms.

Stem: Structure, types and modification (storage and mechanical), branching pattern, monopodial and sympodial growth, canopy architecture.

UNIT III: II Morphology of Leaves

Leaves: Origin, development, types, phyllotaxy, venation, lamina parts, shapes, size and modifications, leaf surface features and appendages, leaf surface area, stomata and trichome structure.

UNIT IV: II Morphology of Flower and Seed

Flower: Flower as a modified shoot, detailed structure of flower, types of inflorescence and specialized inflorescence, **fruit** Structure, types and classification,

Seed: detail structure of seed and seed coat (monocot and dicot), significance of seed, suspended animation, dispersal strategies.

Learning Outcomes: After complition the course student would able to:

- Understand the basic plan of flouring plants.
- Carry out the comparative morphology of root system and shoot system.
- Discuss the origin, development, types of leaves
- Get knowledge about the detailed structure of flower
- Interpret the concept of seed with its significance.

Suggested Readings:

1. Eames, A. J. 1981. Morphology of Angiosperms .McGraw Hill, New York.
2. Gifford, E.M. and Foster, A.S. 1989. Morphology and Evolution of Vascular Plants. W.H. Freeman, New York.
3. Sporne, K.R. 1974. Morphology of Angiosperms. Hutchinson University Press, London.
4. Singh, V.P., Pandey, P.C. and Jain, D.K**.** 2011. A Text book of Botany- Angiosperms. Rastogi Publication, Merrut.
5. Trivedi, P.C., Sharma, N. and Dhankad, R. S. 2009. Plant Morphology and Anatomy. Ramesh Book Depot. Jaipur.

Botany- Paper-II : Anatomy Of Flowering Plants

Objectives:

- To understand the structure and classification of tissues
- To distinguish simple and complex tissues.
- To know about the definition, classification, types and function of meristem.
- To study the anatomy of stem, root and leaf.
- To analyze different types of wood with secondary growth

UNIT I: Classification and structure of tissues

Simple tissue: Structure occurrence and function (parenchyma, collenchyma, sclerenchyma), Complex tissues: Structure, origin and function (xylem and phloem), tissue systems, Secretary tissues: Glands, glandular hairs, nectaries, hydathodes, schizogenous and lysigenous ducts, resin ducts, mucilage ducts and laticifers. Vascular bundle: Types (conjoint, collateral, bi-collateral, open closed, radial, concentric: amphicribal and amphivasal).

UNIT II: Meristem

Meristem definition, classification, types and function, Shoot apical meristem theories: Apical cell theory, histogen theory, tunica-corpus theory, continuing meristematic residue, cytohistological zonation. Root apical meristem theories: Apical cell theories, histogen theory, korper-kappe theory, quiescent cell theory,

UNIT III: Analogy of Stem, Root and Leaf

Stem: Primary structure in dicotyledonous and monocotyledonous, primary anomalous structures. Root: Primary structure in dicotyledonous and monocotyledonous, development of lateral roots and adventitious root. Leaf- Internal structure of dorsiventral,isobilateral and centric leaves.

UNIT IV: Secondary growth

Secondary growth in dicot and monocot stem. Secondary structures: Wood structure, types and formation of wood, annual rings, tyloses, dendrochronolgy,periderm,bark and lenticels. Anomalous secondary growth in dicot stem, in monocot stem in dicot roots.

Learning Outcomes: After complition the course student would able to:

- Understand the structure and classification of tissues
- Distinguish simple and complex tissues.
- Explain the definition, classification, types and function of meristem.
- Discuss the anatomy of stem, root and leaf.

- ❖ Analyze different types of woods with secondary growth.

Suggested Readings:

1. Cuttler, E.G. 1971. Plant Anatomy. Part III Organs, Edward Arnold Ltd., London.
2. Cuttler, E.G. 1969. Plant Anatomy. Part I Cells and Tissue. Edward Arnold Ltd., London.
3. Eames, A.J. and MacDaniels, L.H. 1987. An Introduction to Plant Anatom***y***. Tata MacGraw-Hill Publishing Company Ltd., New Delhi.
4. Esau, k. 1985. Plant Anatomy. 2nd Edition Wiley Eastern, New Delhi.
5. Fahn, A. 1997. Plant Anatomy. Aditya Books (P) Ltd., New Delhi.
6. Fahn, A. 2000. Plant Anatomy. Permagon Press.
7. Gifford, E.M. And Foster, A.S. 1989. Morphology and Evolution of Vascular Plants. W.H. Freeman, New York.
8. Pandey, S.N. and Chadha, A. 2014. A text book of Botany- Plant anatomy and Economic Botany. Vikas publishing house Pvt. Ltd, New Delhi.
9. Vashishta, P.C. 1974. Plant Anatomy. Pradeep Publication, Jalandhar.
10. Singh, V.P., Pandey, P.C. and Jain, D.K**.** 2011. A Text book of Botany- plant Morphology and anatomy. Rastogi Publication, Merrut.
11. Trivedi, P.C., Sharma, N. and Dhankad, R. S. 2009. Plant Morphology and Anatomy. Ramesh Book Depot. Jaipur.

Botany- Paper-III : Anatomy Of Flowering Plants Plant Systematics

Objectives:

- ❖ To understand the scope and importance of plant systematics .
- ❖ To study the different taxonomical tools.
- ❖ To get knowledge about the principle and rules of botanical nomenclature.
- ❖ To aware students with different families with Bentham and hooker classification.
- ❖ To learn about the botanical gardens and herbariums.

UNIT I:

Scope and importance of taxonomy, history and classification of angiosperm (Linneaus, Bentham and Hooker and Engler and Prantl), concept of species, genus and family. Taxonomic tools: Herbarium, E-Flora, botanical garden, monograph, library index, journals, key and icons.

UNIT II:

Principle and rules of botanical nomenclature: Ranks, names, type method, principle of priority and its limitations, Rules of Validity, Rules of Effectivity, Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, paraphyly and polyphyly

UNIT III:

Taxonomic studies of the following families (Bentham and Hooker), Dicots: Ranunculaceae, Brassicaceae, Malvaceae, Rubiaceae, Fabaceae, Apiaceae, Asteraceae, Apocynaceae and Asclepidaceae.

UNIT IV:

Taxonomic studies of the following families (Bentham and Hooker): Solanaceae, Convolvulaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Liliaceae, Orchidaceae and Poaceae.

Learning Outcomes: After complition the course student would able to:

- ❖ Understand the scope and importance of angiosperms.
- ❖ Enhance knowledge about the taxonomical tools.
- ❖ Discuss the principle and rules of botanical nomenclature.
- ❖ Compare different families with Bentham and hooker classification
- ❖ Learn about the botanical gardens and herbariums.

Suggested Readings:

1. Naik, V.N.2011. Taxonomy of Angiosperms. TATA McGraw Hill, New Delhi.
2. Pandey, S.N. and Misra, S.P. 2008. Taxonomy of Angiosperms. Ane Books India, New Delhi.
3. Saxena, N.B. and Saxena, S. 2011. Plant Taxonomy. Pragati Prakashan, New Delhi.
4. Sharma, B.D. 1984. Flora of India vol. I. Botanical Survey of India, Calcutta.
5. Sharma, O.P. 1996. Plant Taxonomy. TATA McGraw Hill, New Delhi
6. Simpson, M.C. 2006. Plant Systematics. Elsevier, Amsterdam.
7. Singh, G. 2001. Plant systematics. Oxford and IBH, New Delhi.
8. Sivarajan, V.V. 1991. Introduction to Principles of Plant Taxonomy**.** Oxford and IBH, New Delhi.

BOTANY PRACTICAL V

1. Study of different modifications of root, stem, leaf by using specimens.
2. Study of different epidermal appendages (trichome etc.) by making slides.
3. Study of floral apex.
4. Survey and study of dispersal mechanism of seeds.
5. Microscopic studies on types and anatomy of stomata (monocotyledons and dicotyledons).
6. Study of apical and lateral meristem using plant material and slides
7. Anatomical study of root, stem and leaf (dicotyledons and monocotyledons) by making double stained temporary and permanent slides.
8. Anatomical studies of anomalous secondary structure in stem by making temporary and permanent slides.
9. Anatomical study of dicot and monocot seed (Cicer, Maize and cotton)
10. Study of vegetative and floral characters of species of the families studied in theory.
11. Identification of selected taxa up to genus using taxonomic keys.
12. Herbarium technique.
13. Familiarity with local flora and preparation of herbarium sheet.

Semester-V

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 505	Zoology-I	**CE***	**4**	**15**	**20**	**100**
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25** Practical	

Zoology-Paper-I : Ethology

Objectives:

- ❖ To understand Concepts of Ethology- Motivation, Fixed Action Patterns (FAP), Sign Stimulus; Innate Releasing Mechanism (IRM); Action Specific Energy (ASE); Learning; Imprinting.

- ❖ To understand Methods of Studying Behaviour: Studies in Laboratory- Neurotransmitter, physiological and Neurochemical techniques. Brief account on Pheromones,
- ❖ To explain the Social organization.
- ❖ To learn about the Biological Rhythms
- ❖ To explain the control of behavior neural control hormonal control

Unit I: Concept of Ethology

1.1 Introduction and history of Ethology

1.2 Concepts and patterns of behaviour: FAP, Sign Stimulus, Innate Releasing Mechanism, Action Specific Energy, Concept of motivation

1.3 Learned behaviour and types of learning

Unit II: Study of Behaviour

2.1. Methods of studying Brain Behaviour: Neurotransmitter, Physiological and Neurochemical Technique

2.2 Genetic basis of behaviour

2.3 Control of behaviour: Neural control, Hormonal control

2.4 Elementary idea of role of Pheromones

Unit III: Social Organisation

3.1 Elements of Social Behabiour

3.2 Living in groups: Characteristics and advantages with respect to Honey bee, Deer, monkey

3.3 Migration in Birds; Causes of migration and Navigation

Unit IV Biological Rhythms

4.1 Faunal diversity in India and World; Endangered Mammals and Birds of India

4.2 Wild life Conservation with reference to India & Rajasthan

4.3 National Parks, Sanctuaries and Biosphere Reserves of India

Learning Outcomes: After complition the course student would able to:

- ❖ Concepts of Ethology- Motivation, Fixed Action Patterns (FAP), Sign Stimulus; Innate Releasing Mechanism (IRM); Action Specific Energy (ASE); Learning; Imprinting.
- ❖ Methods of Studying Behaviour : Studies in Laboratory- Neurotransmitter, physiological and Neurochemical techniques. Brief account on Pheromones,
- ❖ Understand the Social organization.
- ❖ Interprets the Biological Rhythms
- ❖ Discuss the control of behavior neural control hormonal control

Zoology-Paper-II : Biotechniques, Instrumentation and Bioinformatics

Objectives:

- ❖ To learn about the term Electrophoresis, Radioactivity.
- ❖ To understand the working principle of Centrifuge, Incubator, pH meter.
- ❖ To understand the cell culture techniques and separation techniques in biology.
- ❖ To Understand the Principle, parts, and its application of Microscopic techniques. Understand the working principle of UV-Vis principle, Colorimeter.
- ❖ To aware the recognize the importance of various databases

Unit –I: Biotechniques

1.1 Concepts of sterilization: Filtration, autoclaving, dry heat sterilization, wet sterilization and radiation
1.2 Separation of biomolecules: Centrifugation (Sedimentation, density gradient); Chromatography (Elementary idea of Paper – ascending and Circular, thin layer, gel filtration and ion exchange-Principles and applications)
1.3 Electrophoresis: Agarose Gel Electrophoresis, SDS-PAGE

Unit-II: Micro Technique

2.1 Fixation, dehydration, clearing, embedding & section cutting
2.2 Difficulties encountered during section cutting (causes and remedies)
2.3 Double staining with Haematoxylin and Eosin
2.4 Histochemical staining techniques for carbohydrates (Periodic acid schiff), proteins (Mercury-bromophenol blue) and lipids (Sudan black-B)

Unit-III: Instrumentation

3.1 Microscope: Principle of Microscopy and types
3.2 Principles of colorimeter
3.3 Principles of spectrophotometers

Unit-IV: Bioinformatics

4.1 Bioinformatics: Definition, Scope, Basic concepts in bioinformatics, importance and role of bioinformatics in life sciences
4.2 Bioinformatics databases- introduction, types of databases
4.3 Nucleotide sequence databases, Elementary idea of protein databases
4.4 BLASTA, FASTA, PHYLOGENY TREE Analysis

Learning Outcomes: After complition the course student would able to:

- Discuss the term Electrophoresis, Radioactivity.
- Understand the working principle of Centrifuge, Incubator, pH meter.
- Understand the cell culture techniques and separation techniques in biology.
- Understand the Principle, parts, and its application of Microscopic techniques. Understand the working principle of UV-Vis principle, Colorimeter.
- Recognize the importance of various databases

Zoology-Paper-III: Immunology & Biotechnology

Objectives:

- To understand Distinguish Innate immunity and Acquired Immunity
- To understand the importance of Immune system
- To understand Study and understand the DNA Recombinant technology
- To Understand the Scope and Significance of Biotechnology
- To learn about mechanism of Antigen & Antibody reaction

Unit –I: (Basics of Immunology)

1.1 Characteristics of Immune System; Types of immunity: Active, passive, innate and acquired immunity
1.2 Types of antibodies and their structure and function.

1.3 Mechanism of Antigen Antibody reactions: Precipitation, agglutination, Neutralisation, Opsonization, Complement

Unit –II: (Cells and Organs in Immunity)

2.1 Immune Cells & Organs: B and T Lymphocytes, Plasma Cell, Null Cell, Primary and Secondary Lymphoid Organs; tonsils, adenoids, thymus, bone marrow, bursa fabricus, macrophages

2.2 Mechanism: Humoral and Cell- Mediated Immunity.

2.3 Complement System, Interferons, Vaccines

Unit –III: (Biotechnology)

3.1 History, Scope and application of recombinant DNA technology; Genetic Engineering

3.2 Basic concepts in recombinant DNA technology, cDNA Library; DNA manipulation enzymes (Nucleases, Ligases, Polymerases)

3.3 Vectors for Gene Transfer (Plasmids and Phages)

Unit –IV: (Applications of Biotechnology)

4.1 Monoclonal antibodies and their production and applications

4.2 Protoplast Fusion and their Application

4.3 Environmental Biotechnology: Metal recovery; Petroleum recovery; Pest Control; Waste Water Treatment

Learning Outcomes: After complition the course student would able to:

- ❖ Distinguish innate immunity and Acquired Immunity.
- ❖ Understand the importance of Immune system.
- ❖ Study and understand the DNA Recombinant technology.
- ❖ Understand the Scope and Significance of Biotechnology.
- ❖ Discuss the mechanism of Antigen & Antibody reaction

Zoology Practical

Paper-I: Ethology

1. Locomotory behaviour of (Tribolium):
    - Effects of light intensity and light quality on the rate of locomotion
2. Study of individual and social behavioural patterns of a troop of monkey through visual aids
3. Antenal Grooming in Cockroach

Paper-II: Biotechniques, Instrumentation & Bioinformatics

1. Separation of amino acids by paper chromatography and TLC
2. Separation of proteins by electrophoresis technique
3. Double staining method
4. Demonstration of carbohydrates, proteins and lipids by histochemical methods
5. Introduction to basic laboratory instruments and equipments- Autoclave, Centrifuge, pH meter, Micropipettes, Digital balance, Homogenizer, Electrophoresis apparatus; Molar and normal solutions calculations
6. Use of internet for survey of literature using protein and nucleotide databases(NCBI)

7. Use of softwares like Microsoft offices, BLASTA, FASTA

Paper-III: Immunology & Biotechnology

1. Antigen – Antibody interaction by double diffusion method (Ouchterlony)
2. Study of histological slides of organs of immune system – Thymus, Lymph nodes and Spleen
3. Isolation of DNA/ Plasmid (Genomic DNA from any available source) by phenol extraction method.

Suggested Reading:

Biotechnology

1. Elements of Biotechnology – Gupta
2. T. B. of Biotechnology – Dubey
3. Modern Concept of Biotechnology – Kumar H. D
4. Advances in Biotechnology – Jogdand
5. T. B. of Biotechnology – Chatwal
6. Bhatiya and Jain, 2015, Immunology, Microbiology and Biotechnology, Himalaya Publishing House Pvt. Ltd. Delhi

Biotechnique and Microtechnique

1. Animal Tissue Technique – Humason
2. Histological Technique – Devaenport
3. Microtechnique – Jiwaji&Patki
4. Microtechnique – Wankhede
5. Biophysical Chemistry – Upadhyay, Upadhyay and Nath
6. Techniques in Life Sciences – D. B. Tembhare

Bioinformatics

1. Mount W. 2004. Bioinformatics and Sequence Genome Analysis 2nd Editon CBS Pub. New Delhi.
2. Bergman, N. H. Comparative Genomics. Humana Press Inc. Part of Springer Science+BusinessMedia, 2007.
3. Baxevanis, A. D. Ouellate, B. F. F. 2009. Bioinformatics: A Practical Guide to the
4. Analysis of Genes and Proteins.John-Wiley and Sons Publications, New York.
5. Campbell A. M. and Heyer, L. J. 2007. Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition. Benjamin Cummings.
6. Des Higgins and Willie Taylor 2000. Bioinformatics: Sequence, Structure and Databanks.Oxford University Press.
7. Rashidi H. H. and Buehler 2002. Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London.
8. Gibas Cynthia and Jambeck P. 2001. Developing Bioinformatics Computer Skills:
9. ShroffPublishersand Distributors Pvt. Ltd. (O'Reilly), Mumbai.
10. Bhatiya and Jain, 2015, Immunology, Microbiology and Biotechnology, Himalaya Publishing House Pvt. Ltd. Delhi

Semester-VI

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 601	General Hindi	**CC**	**4**	**30**	**70**	**100**

उद्देश्य–

- ❖ हिन्दी व्याकरण– संज्ञा, सर्वनाम, कारक, पर्यायवाची, विलोमशब्द, समुच्चारित भिन्नार्थक शब्द, मुहावरें, लोकोक्तियाँ आदि का सामान्य ज्ञान करवाना।
- ❖ देवनागरी लिपि का परिचय देना।

❖ व्यावहारिक पत्रों की जानकारी देना।

इकाई–I

1. वर्ण–विचार, स्वर एवं व्यजंन–प्रयत्न और उच्चारण स्थान की दृष्टि से
2. हिन्दी का शब्द भण्डार –तत्सम, तद्भव, देशज और विदेशी शब्द
3. विकारी शब्द–संज्ञा, सर्वनाम, विशेषण, क्रिया (अकर्मक,सकर्मक) परिभाषा, भेद एवं उदाहरण
4. वर्तनी एवं वाक्य शुद्धि

इकाई–II

1. अविकारी शब्द– क्रिया विशेषण, समुच्चयबोधक, सम्बन्ध बोधक, विस्मयादि बोधक, निपात
2. संधि, समास, उपसर्ग, प्रत्यय
3. देवनागरी लिपि गुण एवं दोष
4. पत्राचार–सरकारी एवं अर्द्ध सरकारी

इकाई–III

1. अनेकार्थी शब्द, युग्म शब्द, वाक्यांश के लिए एक शब्द, पर्यायवाची शब्द, विलोम शब्द, लोकोक्ति एवं मुहावरे
2. पारिभाषिक शब्दावली (कार्यालयी)
3. निबन्ध लेखन

इकाई–IV

पाठ्यपुस्तक गद्य प्रवाह/गद्य संग्रह/काव्य संचय में से निम्न लिखित लेखकों की चयनित रचनायें–

1.	जयशंकर प्रसाद	भारत महिमा, प्रयाण गीत
2.	महादेवी वर्मा	बहिन सुभद्रा (रेखाचित्र)
3.	जैनेन्द्र कुमार	साधना के कवि (संस्मरण)
4.	हरिशंकर परसाई	मूल्यों का उलटफेर (व्यंग्य)

उपलब्धियाँ–

❖ विद्यार्थियों के व्याकरण ज्ञान में वृद्धि होगी।
❖ विद्यार्थी कार्यालय पत्र लिखने में समर्थ हो सकेंगे।
❖ विद्यार्थी देवनागरी लिपि के महत्त्व, उसकी विशेषता आदि से अपने ज्ञान में वृद्धि करेंगे।

पाठ्यपुस्तक/संदर्भ ग्रंथ–

1. काव्य संचय, संपादक– डॉ शम्भुनाथ पाण्डेय, अनुराग प्रकाशन, अजमेर
2. गद्य संग्रह, संपादक– डॉ विजय कुलश्रेष्ठ, अल्का पब्लिकेशन, अजमेर
3. हिन्दी व्याकरण एवं रचना, डॉ राधव प्रकाश, पिंकसिंटी पब्लिकेशन, जयपुर
4. हिन्दी व्याकरण तथा रचना, डॉ भोलानाथ तिवाडी, नेशनल पब्लिशिंग हाउस, नई दिल्ली
5. सुबोध हिन्दी व्याकरण एवं रचना, डॉ नरेन्द्र भानावत, डॉ भंवरलाल जोशी, अलका पब्लिकेशन, अजमेर

Semester-VI

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 602	Pre. Internship	**CC**	**4**	**100** Pre. Internship		**100**

Pre-iternship distribution (4 Weeks)

Objectives:

❖ To acquire the knowledge of internship.
❖ To understand skill focused teaching.
❖ To develop ability of comprehensive school teaching.

- To understand and organize various school activities.

Sr. No. **Contents**

1. **Skills Fouced Teaching**
   - Introduction
   - Questioning
   - Black Board
   - Reinforecement
   - Stumulus Variation
   - Communication
   - Personality Development etc.

2. **Comprehensive School Teaching**
   - Demsstration Lesson Plan
   - Lesson based on Various Approaches Method, such as --
     - Co-operative Learning
     - Activities Based Apprach
     - Team Teaching
     - Project Method
     - Brain Storming
     - Task Based
     - Programme Instruction etc.

3. Unit Plan, Blue Print, Achivement Test and Use of Teaching Aids

4. School Activities
   - Physical
   - Cultural
   - Leteraty
   - Yoga Exceress

Learning Outcomes: After completion of this course students would able to:

- Acquire the knowledge of internship.
- Understand skill focused teaching.
- Develop ability of comprehensive school teaching.
- Understand and organize various school activities

Semester-VI

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 601	Chemistry-I	**Any Three CC**	**4**	**15**	**20**	**100**
	Chemistry-II				**20**	

	Chemistry-III				**20**	
	Chemistry Practical				**25** Practical	

Chemistry-Paper-I : Inorganic chemistry

Objectives:

- To develop understanding about metl ligand bonding, metal complexes and organometallic.
- To aware about the conceptual knowledge of spectral properties and kinetic aspects of metal complexes.
- To develop conceptual knowledge about slection rules, trans effect and substitution reactions .
- To give information about spectrochemical series, kinetic stability and bonding application of alkyls and aryls .

Unit I : Metal – ligand bonding in transition metal complexes

An elementary idea of crystal-field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal – field parameters, colour of transition metal ions, limitations of crystal field theory.

Unit II : Spectral properties of transition metal complexes

Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states and Spectoscopic terms (L-S Coupling) , spectrochemical series, orgel- energy level diagram for d^1 and d^9 states, the electronic spectrum of $[Ti(H_2O)_6]^{+3}$ complex ion.

Unit III : Thermodynamic and kinetic aspects of metal complexes

Thermodynamic and kinetic stability, thermodynamic stability and factors affecting the stability, substitution reactions of square planar complexes, types of substitution reactions and trans effect.

Unit IV : Organometallic chemistry

Definition, nomenclature and classification of organometallic compounds, preparation, properties, bonding nad applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, a brief account of metal – ethylenic complexes and homogenous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

Learning Outcomes: After complition the course student would able to:

- Classify the organometallic compounds and metal complexes on the basis of transition, stability and bonding structures.
- Measure the correlation among structural & kinetic properties of metal complexes.
- Apply the knowledge of bonding, spectral properties and structures to define basic properties of compounds.
- Draw and interpret the energy level diagram and spectroscopic series for various states

Chemistry-Paper-II : Organic Chemistry

Objectives:

- To develop conceptual knowledge about nuclear magnetic resonance, industrial uses and structures of compounds .
- To aware about classification, nomenclature and properties of carbohydrates, amino acids,fats and detergents.
- To develop understanding about synthesis, group analysis and insdustrial uses of fat, oil and detergents.

Unit I : Nuclear magnetic resonance(NMR) spectroscopy

Proton magnetic resonance ^{1}H-NMR spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin spin splitting and coupling constant, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2 tri bromo ethane, ethyl acetate, toluene and acetophenone.Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.

Unit II : Carbohydrates :

Classification and nomenclature, monosaccharides, mechanism of osazone formation, inter conversion of glucose and fructose, chain lengthing and chain shortening of aldose. Configuration of monosaccharide. erythro and threo diastereomers. Conversion of glucose into mannose. Formation of glucosides, ethers and esters. Determination of ring size of monosaccharides. Cyclic structure of D (+)-glucose. Mechanism of mutarotation. Structure of ribose and deoxy ribose. An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

Unit III : Amino acids, peptides, proteins and nucleic acid

Classification, structure and stereochemistry of amino acids. Acid base behaviour of isoelectric point and electrophoresis. Preparation and reaction of α amino acid. Structure and nomenclature of peptides and proteins. Classification of proteins, peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptides synthesis, solid phase peptide synthesis. Structre of peptides and proteins, levels of protein structure. Protein denaturation / renaturation.

introduction. Constituents of nucleic acid ribo and ribonucieosides , nucleotides. The double helical structure of DNA/RNA

Unit IV : Fats, oils and detergents

Natural fats edible and industrial oils of vegetable resin common fatty acids, glycerides, hydrogenation of unsaturated oils. saponification value, iodine value, acid value, soaps, synthetic detergents, alkyl and aryl sulphonates.

Learning Outcomes: After complition the course student would able to:

- Calssify the various compounds on the basis of structure, stereochemistry and formation process.
- Describe and discuss about formation, structure and chemical reactions of carbohydrates, peptides and nucleic acids.
- Apply the knowledge of industrial uses of fats, oils and detergents to produce some useful products.

Chemistry-Paper-III: Physical chemistry

Objectives:

- To aware about conceptual knowledge of photochemistry,spectroscopy and mechanics.
- To develop understanding about qualitative and quantitative description of fluorescence,selection rules and isotopes.
- To develop analytical view about laws of photochemistry, degree of freedom and energy levels.

- To give information about transfer process, Raman spectrum and atomic orbitals.

Unit I: Photochemistry:

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Drapper law, Stark-Einstien law, Jablonski diagram depicting various processes occurring in the excited state., qualitative description of fluorescence, phosphorescence, non radiative process (internal conversion, inter system crossing) quantum yield, photosensitized reaction-energy transfer process (simple examples)

Unit II: Spectroscopy I

Introduction: Electromagnetic radiation of the spectrum, basic features of different spectrometers, statement of the Born Oppenheimer approximation, degree of freedom.

Rotational spectrum: Diatomic molecules, Energy levels of rigid rotator, (semiclassical principles) selection rules, spectral intensity, distribution using population distribution (Maxwell Boltzmann distribution), determination of bond length, qualitative description of non rigid rotator, isotope effect.

Electronic spectrum: Concept of potential energy curves for bonding and anti bonding molecular orbital's, qualitative description of selection rules and Frank –Condon principle.

Unit III: Spectroscopy II

Vibrational spectrum: Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity., determination of force constant, qualitative relations of force constants and bond energy, effect of anharmonic motion and isotopes on the spectrum, idea of vibrational frequencies of different functional groups.

Raman spectrum**:** Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Unit IV: Quantum Mechanics II:

Molecular orbital theory: Basic ideas criteria for forming M.O. from A.O. construction of M.O.`s by LCAO-H_2^+ ion, calculation of energy levels from wave functions, physical picture of bonding and antibonding wave functions, concept of σ, σ^* and π, π^* orbitals and their characteristics. Hybrid orbitals sp, sp^2, sp^3, calculation of coefficients of atomic orbitals used in these hybrid orbitals.

Learning Outcomes: After complition the course student would able to:

- To measure the calculation of energy levels, coefficients and spectral intensity of compounds.
- To plot and interpret the bond energy, force constant, potential energy curves of compounds.
- To describes various properties of compounds on the basis of energy, potential and dipole moment etc.
- To analyze the various structures of compounds on the basis of quantum mechanics.

Term paper / Practicals

Inorganic chemistry

Calorimetry

a) Jobs
b) Mole ratio method

Adulteration –food stuffs

Effluent analysis water analysis.

Physical Chemistry

Electrochemistry

(a) To determine the strength of the given acid conductometrically using standard alkali solution
(b) To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically
(c) To study the saponification of ethyl acetate acetate conductometrically
(d) To determine the ionization constant of a weak acid conductrometrically
(e) To titrate potentiometrically the given ferrous ammonium sulphate solution using $KMnO_4$/ $K_2Cr_2O_7$ as titrant and calculate the redox potential of Fe^{++}/Fe^{+++} system on the hydrogen scale.

Molecular weight determination :

1. Determination of molecular weight of a non volatile solute by Rast method/Beckmann freezing point method.
2. Determination of the apparent degree of dissociation of an electrolyte (e.g. NaCl) in aqueous solution at different concentrations by ebullioscopy.

Colorimetry:

To verify Beer- Lambert law $KMnO_4/K_2Cr_2O_7$ and determine the concentration of the given solution of the substance.

Viva-Voce & **Record**

Suggested Reading:

1. A New Concise Inorganic Chemistry; Fifth Edition; J.D. Lee; Blackwell Science, London, 1989.
2. Inorganic Chemistry; Third Edition; D.F. Shriver and P.W. Atkins; Oxford University Press, New York, 1999.
3. Inorganic Chemistry; Third Edition; Gary L. Miessler and Donald A. Tarr; Pearson Education Inc. Singapore, 2005.
4. Organic Chemistry; Seventh Edition; T.W. Graham Solomons & Craig B. Fryhle; John Wiley and Sons, 1998.
5. Organic Chemistry; Sixth Edition; Robert Thornton Morrison & Robert Neilson Boyd; PHI Pvt. Ltd, 2004.
6. Organic Chemistry Vol. I ; Fifth Edition; I.L. Finar; Longman Scientific and Technical, Singapore, 1975.
7. Organic Chemistry: Vol 1, Mukerjee and Singh
8. Organic Chemistry: Vol 2, Mukerjee and Singh
9. Organic Chemistry: Vol 3, Mukerjee and Singh
10. A Text Book of Physical Chemistry; A.S. Negi, S.C. Anand; New Age International (P) Limited, New Delhi, 2002.
11. The Elements of Physical Chemistry; P.W. Atkins; Oxford University Press, 1996.
12. University General Chemistry; C.N.R. Rao; Macmillan India Ltd., New Delhi, 1998.
13. Physical Chemistry: Puri Sharma and Pathania
14. Physical Chemistry: J. Moore
15. कार्बनिक रसायन, सुरेश आमेटा, एच.के. पाण्डे, एच.एस. शर्मा, हिमांशु पब्लिकेशन्स, उदयपुर
16. अकार्बनिक रसायन, ओझा, भोजक, कोठारी, चतुर्वेदी, रमेश बुक डिपो, जयपुर
17. प्रायोगिक रसायन, भार्गव, लवानिया, ओझा, रमेश बुक डिपो, जयपुर
18. भौतिक रसायन, शर्मा, भार्गव, गुप्ता, रमेश बुक डिपो, जयपुर
19. कार्बनिक रसायन, विजयश्री मनोज छंगाणी, अल्का पब्लिकेशन, अजमेर
20. अकार्बनिक रसायन, विजयश्री कोठारी छंगाणी, अल्का पब्लिकेशन, अजमेर
21. प्रायोगिक रसायन, छंगाणी, विजयश्री, खण्डेलवाल, अल्का पब्लिकेशन, अजमेर

Semester-VI

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total

BSE 602	Physics-I	**CE***	**4**	**15**	**20**	**100**
	Physics-II				**20**	
	Physics-III				**20**	
	Physics Practical				**25** Practical	

Physics- Paper-I: Mathematical Physics and Special Theory of Relativity – II

Objectives:

- To Understand the Lorentz Transformation.
- To know the concepts of Four Vector Formulation, ongitudinal and Transverse Doppler's Effect.
- To aware the Transformation between Laboratory and Centre of mass.
- To develop concept about the Transformation Electric and Magnetic Field.

UNIT – I Lorentz Transformation:

Lorentz transformation and rotation in space-time, time like and space like vector, world line, macro-causality.

UNIT – II Four vector Formulation:

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, transformation of four frequency vector, longitudinal and transverse Doppler's effect.

UNIT – III Transformation between Lab and CM:

Transformation between laboratory and center of mass system. Four momentum conservation, kinemations of decay products of unstable particles and reaction thresholds: Pair production, inelastic collision of two particles, Compton effect.

UNIT – IV Transformation electric and Magnetic field:

Transformation electric and Magnetic fields between two inertial frames.

Learning Outcomes: After complition the course student would able to:

- Discuss the Lorentz Transformation.
- Classify the concepts of Four Vector Formulation, Longitudinal and Transverse Doppler's Effect.
- Identify the Transformation between Laboratory and Centre of mass.
- Calculate the Transformation Electric and Magnetic Field.
- Differentiate longitudinal and transverse Doppler 's effect.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, गणितीय भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics- Paper-II: Quantum Mechanics – II

Objectives:

- To Know the Bound State Problem-I
- To Understand the Bound State Problem-II
- To aware Application of Quantum Theory.
- o gain knowledge about molecular spectroscopy.

UNIT I Bound State Problems - I:

Potential step and rectangular potential barrier, calculation of reflection and transmission coefficient, Qualitative discussion of the application to alpha decay (tunnel effect), square well potential problem, calculation of transmission coefficient.

UNIT II Bound State Problems- II:

Particle in one dimensional infinite potential well and finite depth potential well, energy value and eigen functions. Simple harmonic oscillator (one dimensional) eigen function, energy eigen values, zero point energy.

UNIT – III Applications of Quantum Theory to Atomic Spectroscopy:

Quantum features of spectra of one electron atoms. Frank–Hertz experiment and discrete energy states. Schrodinger equation for a spherically symmetric potential, Schrodinger equation for a one electron atom in spherically coordinates, separation of variables, Orbital angular momentum and quantization spherical harmonics, energy levels of H–atom, Shapes of n = 1 and n = 2 wave functions, Average value of radius of H–atom, Comparison with Bohr Model and Bohr Correspondence Principle. Stern and Gerlach experiment, spin and magnetic moment. Spin orbit coupling and qualitative explanation of fine structure. Atoms in magnetic field Zeeman spliting.

UNIT – IV Molecular Spectroscopy:

Qualitative features of molecular spectra: Rigid rotator discussion of energy, eigen values and eigen function, rotational energy levels of diatomic molecules, Rotational spectra, vibrational energy levels of diatomic molecules, vibrational spectra, vibrational rotational spectra.

Learning Outcomes: After complition the course student would able to:

- Discuss on the Bound State Problem-I (Potential Step, Potential Barrier, Square Well Potential) and Tunnel Effect.
- Classify the Bound State Problem-II(One Dimensional Potential Box, Eigen Value, Eigen Function).
- Applies Quantum Theory to Atomic Spectroscopy.
- Identify the Concept of Molecular Spectroscopy.
- Differentiate vibrational spectra and rotational spectra

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना,, क्वांटम यांत्रिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics- Paper-III: Nuclear Physics

Objectives:

- To Understand the Concept of Nuclear Properties like Quadrupole Moment, Nuclear Spin, Nuclear Energy, Mass spectroscopy and Theory of Nuclear Forces.
- To know the Concept of Nuclear Fission.
- To Aware the Concept of Elementary Particles.
- To develop knowledge about the Concept of Detector and Accelerator.

UNIT-I Nuclear Properties:

Rutherford's theory of a particle scattering, Properties of Nuclei: Quadrupole Moment and Nuclear Ellipticity, Quadrupole Moment and Nuclear spin, Parity and Orbital angular momentum, Parity and its conservation, Nuclear Mass and Mass Spectroscopy, Nuclear Energy, Discovery of neutron and proton-neutron hypothesis, Neutron to proton Ration (n/z), The nuclear potential, Nuclear mass, Mass Defect and Binding energy, Theory of Nuclear forces.

UNIT-II Nuclear Fission:

The Discovery of Nuclear Fission, The Energy Release in Fission, The Fission products mass distribution of fission products, Charge distribution of fission products, ionic charge of fission products, Fission cross Section and threshold, Neutron emission in fission, The prompt neutron and delayed neutrons, Mechanism for the emission of delayed neutrons. Energy of fission Neutrons, Theory of nuclear fission and Liquid Drop Model, Barrier Penetration-Theory of Spontaneous fission, Nuclear Energy Sources, Nuclear Fission as a source of Energy, The Nuclear Chain Reaction, condition of controlled chain Reaction, Nuclear Reactors.

UNIT-III Elementary particles:

Classification of Elementary Particles, Fundamental Interactions, Unified approach (Basic ideas), The conservation Laws, Quarks (Basic ideas), Charmed and color Quarks. Nuclear Fusion: The sources of stellar Energy.

UNIT-IV Detector and Accelerators:

Particle and Radiation Detectors: Ionization Chamber, Region of Multiplicative Operation, Proportional Counter, Geiger-Muller Counter, Cloud Chamber, BF3 and Scintillation detector. Ion sources, Cock-Craft-Walten High Voltage Generators, Van De-Graff Generators, Drift Tube Linear Accelerators, Wave Guide Accelerator, Magnetic Focussing In cyclotron, Synchrocyclotron, Betatron, The Electromagnetic Induction Accelerator, Electron Synchrotron, Proton Synchrotron.

Learning Outcomes: After complition the course student would able to:

- Discuss the Concept of Nuclear Properties like Quadrupole Moment, Nuclear Spin, Nuclear Energy, Mass spectroscopy and Theory of Nuclear Forces.
- Classify the Concept of Nuclear Fission.
- Identify the Concept of Elementary Particles.
- Applies the Concept of Detector and Accelerator.
- Differentiate drift tube linear accelerator and wave guide accelerator.

Suggested Reading :

1. प्रभा दशोरा, नीलम गुप्ता, उषा परनामी, मीनल बाफना, नाभिकीय भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015–16

Physics Practical: VI

1. Determination of Planck's constant by photo cell (retarding potential method using optical filters, preferably five wave length)
2. Determination of Planck's constant using solar cell.
3. Determination of Stefan's constant (Black body method)
4. Study of the temperature dependence of resistance of a semiconductor (four probe method).
5. Study of lodine spectrum with the help of grating and spectrometer and ordinary bulb light.
6. Study of characteristics of a GM counter and verification of inverse square law for the same strength of a radioactive source.
7. Study of β-absorption in Al foil using GM counter.
8. To find the magnetic susceptibility of a paramagnetic solution using Qninck's method. Also find the ionic molecular susceptibility of the ion and magnetic moment of the ion in and magnetic moment of the ion in terms of both magnetons.
9. Determination of coefficient of rigidity as a function of tem perature using torsional oscillator (resonance method).
10. Study of polarization by reflection from a glass plate with the help of Nichol's prism and photo cell and verification of Brewster law and law of Malus.
11. e/m measurement of magnetic field using ballistic galvanometers and search coil study of variation of magnetic field of an electromagnet with current.
12. Measurement of electric change by Millikan's oil drop method.

Suggested Reading :

1. प्रो. प्रभा दशोरा, तृतीय वर्ष प्रायोगिकी भौतिकी, आर.बी.डी. पब्लिशिंग हाउस, जयपुर, नई दिल्ली, 2015

Semester-VI

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 603	Mathematics-I	**CE***	**4**	**15**	**20**	**100**
	Mathematics-II				**20**	
	Mathematics-III				**20**	
	Mathematics Practical				**25** Practical	

Mathematics- Paper-I : Algebra - II

O**bjectives:**

- To aware the Integral domain and Field.
- To Understand the Ideals and Quotient Ring.
- To develop knowledge the Linear Dependence and Linear Independence of Vectors.
- To know sum of subspaces.

Unit 1 ; Integral domain and field. Characteristics of a Ring and Field.

Unit 2 : Ideals and Quotient Ring. Maximal ideal and Prime ideal. Principal Ideal domain. Field of quotients of an integral domain. Prime fields. Definition, Examples and Simple properties of Vector spaces and Subspaces.

Unit 3 : Linear combination, Linear dependence and Linear independence of vectors. Basis and Dimension.

Unit 4 ; Generation of subspaces. Sum of subspaces. Direct sum and Complement of subspaces. Quotient space and its dimension.

Learning Outcomes: After complition the course student would able to:

- Discuss about integral domain and Field.
- Identify the Ideals and Quotient Ring.
- Classify the Linear Dependence and Linear Independence of Vectors.
- Applies the Sum of Subspace.
- Discuss about quotient space

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, बीजगणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, बीजगणित जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics- Paper-II : Complex Analysis -II

Objectives:

- To understand the Power Series.
- To develop knowledge about the Branch Point.
- To develop concept about the Conformal Mapping.
- To give information about cauchy's residue theorem.

Unit 1 ; Power series — Absolute convergence, Able' s theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.

Unit 2: Singularities of an analytic function, Branch point, Meromorphic and Entire functions, Rouche's theorem, Casorati - Weierstrass theorem.

Unit 3; Residue at a singularity, Cauchy's residue theorem. Argument principle. Rouche's eorem. Fundamental theorem of Algebra.

Unit 4: Conformal mapping. Bilinear transformation and its properties. Elementary mappings: w (z) $=\frac{1}{2}$ $\left(z+\frac{1}{z}\right)$, z2 ,ez,sinz, cosz, and logz.

Evaluation of a real definite integral by contour integration. Analytic continuation. Power series method of analytic continuation.

Learning Outcomes: After complition the course student would able to:

- Discuss on the Power Series.
- Identify the Branch Point.

- ❖ Applies Fundamental Theorem of Algebra.
- ❖ Analyze the Conformal Mapping.
- ❖ Discuss on the circle and radius of convergence

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, बीजगणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, बीजगणित जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Mathematics- Paper-III: Statics

Objectives:

- ❖ To understand the Resultant and Equilibrium Coplanar Force Acting on a Rigid Body.
- ❖ To know the Friction.
- ❖ To aware the Virtual Work.
- ❖ To develop knowledge about the Common Catenary Force in the 3-D.

Unit 1 Resultant and equilibrium coplanar force acting on a rigid body.

Unit 2 Friction

Unit 3 Virtual work,

Unit 4 commom catenary force in the three dimensions.

Learning Outcomes: After complition the course student would able to:

- ❖ Discuss on the Resultant and Equilibrium Coplanar Force Acting on a Rigid Body.
- ❖ Classify about the Friction.
- ❖ Calculate the Virtual Work.
- ❖ Identify the Common Catenary Force in the 3-D.
- ❖ Differentiate friction and virtual work.

Suggested Reading :

1. बी.एल. चौरसिया, संजीव त्यागी अनिल शर्मा, बी. एल. जांगीड. जांगीड़, जितेन्द्र सैनी, बीजगणित, आर.बी.डी. पब्लिशिंग हाउस, जयपुर–दिल्ली, 2015–16
2. जी.सी. गौखरू सैनी, बीजगणित जयपुर पब्लिशिंग हाउस, जयपुर, 2015

Semester-VI

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 604	Botany-I	**CE***	**4**	**15**	**20**	**100**
	Botany-II				**20**	
	Botany-III				**20**	
	Botany Practical				**25** Practical	

Botany- Paper-I : Reproductive Biology Of Angiosperms

Objectives:

- To know the detailed structure of flower and male gametophyte.
- To understand the mechanism of distribution of pollen grains.
- To learn about the structure of pistil and female gametophyte.
- To get knowledge about the process of pollination and fertilization
- To study the development of embryo and endosperm

UNIT I: Structure of Flower and Male Gametophyte

Ontogeny of Flower parts- development and variations, structure of anther, microsporogensis, microgametogenesis, Teptum Types and Functions, Development of Male Gametophyte, Structure of Pollen Grains.

UNIT II: Structure of Pistil and Female Gametophyte

Structure and types of ovule, special structures- aril, oburator etc., megasporogenesis, megagametogensis (monosporic, bisporic and tetrasporic types), structure of typical embryo sac, (Polygonum, Allium and Adoxa type).

UNIT III: Pollination and Fertilization

Pollination types, significance adaptations; compatibility and incompatibility; basic concepts. Pollen tube entry, syngamy and triple fusion, double fertilization, development, type and function of endosperm.

UNIT IV: Development Of Embryo and Endosperm

Six types of Embryogeny; General pattern of development of dicot and monocot embryo suspensor structure and function, embryo-endosperm relationship; nutrition of embryo, apomixis, polyembryony, fruit-development and maturation.

Learning Outcomes: After complition the course student would able to:

- Explain the detailed structure of flower and male gametophyte.
- Discuss the mechanism of distribution of pollen grains.
- Interpret the structure of pistil and female gametophyte.
- Describe the process of pollination and fertilization
- Understand the development of embryo and endosperm

Suggested Readings:

1. Bhojwani, S.S. and Bhatnagar, S.P. 2004. The Embryology of Angiosperms**.** Vikas Publishing House, New Delhi.
2. Davis, C.L. 1965. Systematic Embryology of Angiosperms. John Wiley, New York.
3. Johri, B. D. 1984. Embryology of Angiosperms. Springer Verlag, Berlin.
4. Johri, B. M. 1984 .Embryology of Angiosperms. Springer-Verlag, Netherlands.
5. Maheswari, P. 1985. Introduction to Embryology of Angiosperms**.** Mac Graw Hill House (P) Ltd., New York.
6. Raghavan, V. 2000. Developmental Biology of Flowering plants**.** Springer, Netherlands.
7. Trivedi, P.C. Sharma, N. and Sharma, J. L. 2003. Structure, Development and reproduction in Flowering Plants. Ramesh Book Depot., Jaipur.

Botany- Paper-II : Economic Botany And Ethnobotany

Objectives:

- To know the origin of cultivated plants
- To acquire knowledge of food plants, vegetables and fruits.
- To analyze the spices, oil yielding plants and Beverages.
- To understand medicinal plants, fibers and woods.
- To get aware about ethical aspects of Ethnobotany

UNIT I: Food Plants, Vegetables and Fruits

Centre of origin of cultivated plants , **Food plants** : rice, wheate , maize, potato, **Vegetables** : General account with a note on radish, garlic, cabbage, spinach, cauliflower, cucumber and pea. **Fruits** : General account with a note on apple, banana, mango, watermelon and orange.

UNIT II: Spices ,Oil yeilding Plants, and Beverages

Spices : General account with an emphasis on those cultivated in Rajasthan(Cumin,Capsicum, Coriender). **Beverages :** Characteristics and uses Beverages(Tea and Coffee) , Oil yielding plants (*Brassica* and *Cocus*).

UNIT III: Medional Plants, Fibers and Woods

Medional Plants : General account with an emphasis on those cultivated in Rajasthan(Senna, Isabgol, SAfed musli)

Fibers : General account with a note on Cotten and Jute. **Woods** : General account of sources of fire wood : timbers and bamboos.

UNIT IV: Ethnobotany

Ethnobotany and its concepts and relevance. Ethanobotanical areas of Rajasthan, ethnic groups in India and ethanobotanical study of any tribal area of Rajasthan. Ethical aspect of ethnobotany.

Learning Outcomes: After complition the course student would able to:

- Get knowledge about the cultivated plants
- Interpret different food plants, vegetables and fruits.
- Eenhance knowledge about spices, oil yielding plants and Beverages.
- Comprehend about medicinal plants, fibers and woods.
- Acquire knowledge about ethical aspects of Ethnobotany

Suggested Readings:

1. Gupta, S.K. and Kaushik, M.P. 1973. An Introduction to Economic Botany. K. Nath and Co., Meerut.
2. Hill, A.W. 1952. Economic Botany. McGraw Hill Book Co., New York.
3. Jain, S.K. 1981. Glimpses of Indian Ethnobotany. Oxford and IBH, New Delhi.
4. Jain, S.K .1987. A Manual on Ethnobotany**.** Scientific Publisher, Jodhpur.
5. Prakash, G., Sharma, S. K. 1975. Introductory Economic Botany. Jai Prakash Nath and Cosec, Meerut.
6. Sambamurthy, A.V.V.S. and Subrahmanyan, N.S. 1989. A Text Book of Economic Botany. Wiley Eastern Ltd., New Delhi.
7. Sen, S. 1992. Economic botany. New Central Book Agency, Calcutta.

8. Singh, V., Pandey, P.C. and Jain, D.K. 1998-99. Economic Botany. Rastogi Publications, Meerut.
9. Verma, V. 1974. A Text Book of Economic Botany. Emkay Publications, New Delhi.

Botany- Paper-III : ECOLOGY

Objectives:

- To acquire knowledge of community, ecosystem and phytogeography
- To know about structure, components, food chains, hub, energy flows.
- To understand about vegetation and environmental pollution
- To get aware about environmental management
- To learn about different protocols.

UNIT I: Ecological factors and Population ecology

Environment and plant: Ecological factors; Atmosphere (four distinct zone), light (photosynthetically active radiation, zonation in water bodies, photoperiodism, heliophytes and sciophytes), temperature (Raunkier's classification of plant: megatherm, mesotherm, microtherm, heikistotherm, thermoperiodicity and vernalisation), soil (development, soil profile, properties). Ecological adaptations of hydrophytes, xerophytes, epiphytes and halophytes. Population ecology: growth curve, ecotypes, ecads. Population interaction among organisms (neutralism, amensalism, alleliopathy), competition, predation, parasitism and mutulism.

UNIT II: Community, Ecosystem and phytogeography

Community characteristics, frequency, density, cover, life forms, biological spectrum, ecological succession. Ecosystem: Structure, components, food chain, food web, energy flow, trophic levels and ecological pyramids, primary and secondary productivity, biogeochemical cycle of carbon and phosphorus.

UNIT III: vegetation and Environmental pollution

Biogeographic regions of India, vegetation types of India; forest grassland with special reference to Rajasthan. Environmental pollution- air, water and soil, WWF, chipko movement, green house effect, ozone depletion loss of biodiversity and extinction of species, red data book.

UNIT IV: Environmental management

Concept and principles of environmental management, principle of optimized use and sustainable development, threats to sustainable development, National Environmental Policy, management of forest and degraded lands, concepts and principles of environmental management, efforts to control these effects (Vienna Convention, Montreal Protocol, Earth summit, Kyoto Protocol, World Summit on sustainable development, 2002 Carbon trade); IPCC.

Learning Outcomes: After complition the course student would able to:

- Acquire complete knowledge of community, ecosystem and phytogeography
- Explain the structure, components, food chains and energy flows.
- Understand about vegetation and environmental pollution
- Interpret about environmental management
- Discuss and different protocols.

Suggested Readings:

1. Banerjee, P.K. 2006. Introduction to Biostatistics. S. Chand and Co., New Delhi.

2. Koromondy, E.J.1996. Concepts of Ecology. 4th Edition Prentice-Hall of India Pvt. Ltd., New Delhi.
3. Misra, K.C. 1988. Manuals of Plant Ecology. (3rd Edition) Oxford and IBH Publishing Co., New Delhi.
4. Odum, E.P. 1983. Basic Ecology. 5th Edition Thomson Business International Waldis Pvt. Ltd., Baricahd.
5. Odum, E.P. 2008. Ecology. Oxford and IBH Publisher.
6. Sharma, P.D. 2010. Ecology and Environment, (8th Edition) Rastogi Publications, Meerut.
7. Singh, J.S., Singh, S.P. and Gupta, S. 2006. Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi.

BOTANY PRACTICAL VI

1. Study different types of placentation, ovules and special structures of ovule through permanent slides, specimens or photographs.
2. Study of female gametophyte through permanent slides/ photographs: types and ultra structure of mature embryo sac.
3. Study of pollen grains: fresh and acetolyzed showing ornamentation and aperture, pseudomonads, pollinia (slides/photographs/ fresh materials).
4. Study of the different stages of anther development.
5. Study of pollen morphology of available plants.
6. Study of monocotyledons and dicotyledons embryo of angiosperms through slides/photographs..
7. Submission of economically important plants and plant products (cereals, pulses, spices, fibers, condiments, fat and oils, tea, coffee, wood, dyes, tobacco).
8. Study following specimens with special reference to :
   - Botany of the economically important part.
   - Processing if any involved.
   - Specimens of cereals, pulses, fibres, spices, beverage (tea, coffee), sugar, oil yielding plants and medicinal plants (mentioned in theory).
9. Microchemical test for starch, sugar, oils, proteins, fat, carbohydrate, lignin using wheat, maize, soyabean. Chana, sweet potato, clove, ground nut, mustard and match sticks.
10. Study of starch grains in potato .
11. Field trip to economically important place.
12. Collection, description and submission of at least 5 plants of ethnobotanical importance.
13. Study of adaptive anatomical and morphological features of Hydrophytes, Epiphytes and Xerophytes using plant material.
14. To study different statistical methods: mean, median and mode, standard error, standard deviation.
15. Regression analysis and application of statistical tests in environmental problems.
16. Determine the dissolved oxygen content in polluted and unpolluted water samples.
17. Field trip to a National Park/Biosphere reserve/Wild life Sanctuary (Student should submit a detailed project report based on the field trip. Evaluation of the project will be based on the detailed report and presentation).
18. Project work on a particular ecosystem/Polluted Site/ Level of Pollution in the City or Town/Land use site.

Semester-VI

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 605	Zoology-I	CE*	4	15	**20**	100
	Zoology-II				**20**	
	Zoology-III				**20**	
	Zoology Practical				**25** Practical	

Zoology-Paper-I: Evolution and Biostatistics

Objectives:

- To understand the process of evolution.
- To discuss concept the Lamarkism, Neo-Lamarkism and Darwinism.
- To classify and draws the Geological time scale.
- To understand aware the students for Palaentology Fossils and its significance
- To describe the Biostatistics and Biostatistical Tools.

Unit –I: Evolution

1.1 Basics and origin of life: Definition, pre-darwinian theories of evolution; Oparin-Haldaneconcept of origin of life; Miller- Urey experiment

1.2 Micro-evolution: Lamarckism; Darwinism; Neo-Darwinism

1.3 Evidences of evolution: Various evidences favouring evolution: Homology, analogy, vestigial organs; palaentological, embryological, biogeographical and biochemical evidences

UNIT II: Evolution II

2.1 Macro-evolution: Geological time scale,

2.2 Genetic basis of evolution: Hardy-Weinberg law, genetic drift, , Sewall -Wright effect;

2.3 Variation, Adaptations and Isolation, Mimicry

2.4 Formation of fossils and Important

UNIT III: Biostatistics Concept

3.1 Biostatistics: Definition and Scope

3.2 Census and sampling methods

3.3 Collection and Tabular Presentation of Data: Tabulation of data; Frequency

3.4 Distribution Table; Continuous and Discontinuous Series

3.5 Graphical Presentation of Data: Bar, Histogram, Line graph, Polygon, Pie Diagrams Ogives

UNIT IV: Biostatistical Tools

4.1 Measures of Central tendency: mean, median mode

4.2 Measures of Dispersion, Mean deviation & Standard deviation, and Standard error.

4.3 Probability

Learning Outcomes: After complition the course student would able to:

- Understand the process of evolution.
- Understand the Lamarkism, Darwinism and Neo-Darwinism.
- Interprete Geological time scale.
- Explain Palaentology Fossils and its significance
- Discuss the Biostatistics and Biostatistical Tools

Zoology-Paper-II : Economic Zoology

Objectives:

- To Understand the Various concepts in Sericulture, Lac culture and Apiculture.
- To interprets the various concepts in Chemical Control.
- To Understand aware the students and provides the economical importance of Vermiculture
- To Understand the Various concepts in Vector borne diseases, Animal husbandry.
- To classify the economics of aquaculture.

Unit I: Economic Entomology- Insects of economic importance

1.1 Sericulture: Types of Silkworm. Life cycle and rearing of Bombyx mori,Production of silk , chemical Composition of Silk,

1.2 Apiculture –Habits and Habitat, species of Hony Bees, Types of cates, method of Bee-keeping Honey Bee Product.

1.3 Lac culture – Lac insect, Laccifer lacca - Life cycle, Cultivation of Lac , Lac products and Economic Importance

Unit-II: Economic Entomology

2.1 Chemical control of Insecticides: Pyrethroids, Carbomate and HCN (mode of action, merits and demerits)

2.2 Biological control of Pests: Biological agents (predators and parasites; merits and demerits)

2.3 Animal pest: Life cycle, damage and control of

I. House fly – Musca nebulo

II. Stable fly – Stomoxys calcitrans

Unit III: Economics of aquaculture

3.1 Pisciculture – Steps of Fish culture, Fish Product,

3.2 Prawn culture -Culture techniques of fresh water Prawn,

3.3 Pearl culture: Habit, Habitat, General characters, mentle & Shell,Formation&culture.

Unit IV: Economic importance of other animals

4.1 Vector borne diseases. A brief account of insect vectors affecting the health of man and domestic animals

4.2 Animalhusbandry: Introduction to common dairy animals; Techniques of dairy management

4.3 Vermiculture: Vermitechnology, Bio-Fertilizers

Learning Outcomes: After complition the course student would able to:

- Discuss the various concepts in Sericulture, Lac culture and and Apiculture.
- Understand the various concepts in Chemical Control.
- Provide the economical importance of Apiculture
- Understand the various concepts in Vector borne diseases, and Animal husbandry
- Explain the Economical of aquaculture

Zoology-Paper-III: Ecology and Environmental Biology

Objectives:

- To differentiate current environmental issues based on Atmosphere.
- To understand Gain critical understanding on human influence on environment.
- To understand Positive attitude towards Biodiversity conservation.
- To describe the various concepts in Pollution.
- To know the sources, affect and control measures of water and noise pollution.

Unit I: Atmosphere

1.1 Atmosphere: Major zones and its importance, Composition of air
1.2 Hydrosphere: Global distribution of water, Physico-chemical characteristics of water
1.3 Lithosphere: Soil Layer; formation of soil
1.4 Light: As Abiotic factor; Physico- chemical characteristics of Light; Photoperiodism

Unit II: Ecosystem

2.1 Ecosystem: Definition, Structure and functions; Types of Ecosystem; Food chain, Food web and ecological pyramids
2.2 Ecosystem: Biogeochemical Cycle (O_2, CO_2, N, P, S); Energy flow in an ecosystem,
2.3 Population Introduction: Population characteristics, Population growth patterns: (exponential/ Malthusian and sigmoid growth patterns)
2.4 Community Characteristics, Structure and method (Quadrt method Transeet method, plotless method:

Unit III: Biodiversity & Conservation

3.1 Various Aspects of Biodversity, Degree of Deversity,
3.2 Ex situ and In situ Conservation; Alpha, Beta and Gama Diversity, Causes of reduction of Biodiversity
3.3 Conservation measures of Animals.

Unit IV: Pollution

4.1 Sources, effect and control measures of air pollution, Acid rain, green house effect, Ozone depletion and global warming
4.2 Sources, effect and control measures of water pollution
4.3 Sources effect and control measures of noise pollution

Learning Outcomes: After complition the course student would able to:

- Describe the current environmental issues based on ecological principles.
- Gain critical understanding on human influence on environment.
- Aware about the positive attitude towards Biodiversity conservation.
- Understand the various concepts in Pollution.
- Explain the sources, affect and control measures of water and noise pollution.

Semester VI
Zoology Practical

Paper-I: Evolution and Biostatistics

1. Construction of frequency table, histograms, Polygons, Pie Charts
2. Exercise on Mean, Mode, Median, Std. Deviation, Std. error, Probability

Paper-II: Economic Zoology

1. Study of the following prepared slides/specimens: Honey Bee, Silk Worm, Termite, Earthworm types (any two) -(Drawida modesta, Pheretima posthuma ; Fish parasites, Larvivorous fishes (Guppy, Gambusia)

2. Economic importance of commonly occurring insect pests and preparation of life cycle of these pests.
3. Study of Beneficial insects and their life stages.

Paper-III: Ecology & Environmental Biology

1. Determination of population density in a terrestrial community or hypothetical community by quadrate method.
2. Study of life table and fecundity table, plotting of the three types of survivorship curves from the hypothetical data.
3. Estimation of pH, chlorides and water vapour quantity in soil
4. Estimation of Dissolved oxygen, Salinity, pH, free CO_2 in water samples
5. Plankton study in Fresh water
6. Study of natural ecosystem and field report; Visit to a National park and Sanctuary (candidates are required to submit the report of the visit)

Suggested readings:

Evolution

1. Gupta, P.K., A Text Book of Cytology, Genetics and Evolution, Rastogi Publication, Meerut
2. Ridley, M. (2004) Evolution. III Editio. Blackwell Publishing
3. Stricberger, M.W. Evolution. Jones& Bartlett, USA 1996
4. Hall and Hallgrimsson: Strickberger's Evolution (2008, Jones and Bartlett)
5. Moody: Introduction to Evolution (1978, Kalyani).
6. Rastogi: Organic Evolution (2007, Kedarnath & Ramnath
7. Kohli, Ranga, Lori, Bhatia, Animal Diversity and Evolution, RBD Publishing House, Jaipur.

Statistics:

1. Probability and Statistics for Engineers and Scientists by Walpole, Myers, Myers and Ye, 7th Edition, Pearson Education.
2. Mathematical Statistics by Freund, Prentice Hall, India
3. Introduction to Statistical Quality Control by Montgomerry, John Wiley and Sons.
4. Principles of Biostatistics by M. Pagano and K. Gauvrean: Thompson learning (2nd edition)
5. Biostatistics: A Foundation for Analysis in the Health Sciences by W. W. Daniel: John Wiley and Sons Inc (7th edition); Indian Reprint 2006.
6. Biostatistics by Satguru Prasad: Emkay Publication
7. G.S. Shukhla, Upadhyay, Reena Mathur, S.G. Prasad, 2011, Economic Animal Science, Biostatics and Animal Behaviour, Rastogi Publication, Meerut, Delhi

Economic Zoology:

1. Shukla and Upadhyaya : Economic Zoology (Rastogi Publishers, 1999-2000)
2. Shrivastava: Test book of Applied Entomology, Vol. I &II (Kalyani Publishers, 1991)
3. Mani: Insects, NBT, India, 2006.
4. Jabde: Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture, Agricultural Pests and their Control, 2005 Publisher Vedams eBooks (P) Ltd. New Delhi
5. G.S. Shukhla, Upadhyay, 2015, Economic Animal Science, Rastogi Publication, Meerut, Delhi

Ecology & Environmental Biology

1. Odum, E. P. (1996). Ecology: A bridge between science and society. *Sinauer AssociatesInc*.
2. Chapman, J. L. And Reiss, M. J. (1992). Ecology, principles and applications. *CambridgeUniversity Press*.

3. Verma, P. S. & Agarwal, V. K. (1983). Environmental biology (principles of ecology). *S.Chand & Co*.
4. Singh, J. H. e*t al* (2006). Ecology, environment and resource conservation. *Anamaya Publ.N. Delhi*
5. Kendeigh, S. C. Animal ecology. *Prentice Hall*
6. Kormondy, E. T. Concept of ecology. *Prentice Hal*
7. *Dhirendra, Devershi, Ecology and Environmental Biology, College Book House. Pvt. Ltd., Jaipur*

Semester VII

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 701	Creating and Inclusive Education	**CC**	**4**	**30**	**70**	**100**

Objectives:

- To develop the understanding of the concept and philosophy of inclusive education in the context of education for all.
- To identify and address diverse needs of all learners
- To familarize with the trends and issues in inclusive education
- To develop an attitude to foster inclusive education
- To develop and understanding of the role of facilitators in inclusive education
- To prepare teachers for inclusive schools

Course Contents:

Unit- I Introduction to Inclusive Education

a) Meaning, Objective , Need and Types of Inclusive Education
b) Principles of Inclusive Education
c) Soluation and challenge of Inclusive Education
d) ICT Material of Inclusive Education

Unit- II Legislation, Emerging Issues and Role of Agencies in Inclusive Education

a) Legislation for inclusive education- National policy of disabilities 2006
b) Sarva Shiksha Abhiyan (2002)
c) NGO
d) RTE-2009

Unit- III Exceptional Child and Special Educational

a) Exteptional Child : Meaning and Types
b) Mentally Retared Child
c) Physically Handicapped Child
d) Hearing Impaired Child
e) Visually Handicapped Child
f) Emotionally Disturb Child

Unit- IV Special Educational Need (SEN) of learners in Inclusive School

a) Speech Defective Childern
b) Language Handicapped Child
c) Learning Disadvantage Child
d) Parents of Exceptional Childern
e) Guidance of Exceptional Childern
f) Special School (Building Co-curricular Activities)

Assignment & Practical Work (Any Two)

- One term paper
- Write a One Article of Disabilities Child
- Case study of disabilities child
- Write a report of evaluation process in inclusive school

Learning Outcomes: After completion of this course students would able to:

- Understand of the concept and philosophy of inclusive education in the context of education for all.
- Identify and address diverse needs of all learners
- Describe the trends and issues in inclusive education
- Apply the attitude to foster inclusive education
- Develop and understanding of the role of facilitators in inclusive education
- Prepare teachers for inclusive schools

Suggested Readings:

1. Ahuja.A, Jangira, N.K. (2002) : "Effective Teacher Training, Co-operative Learnin Based pproach", National Publishing House, 23 Daryaganj, New delhi-02
2. Sharma, P.L. (1990), Teacher Handbook on IED, Helping Children with Special Needs NCERT, Publication Delhi
3. UNESCO (1989), UN Convention on the Right of the Child, UNESCO
4. UNESCO (2006), UN Convention on the Right of Persons with Disabilities.
5. UNESCO (2009), Policy Guideline on Inclusion in Education UNESCO
6. कुशवाहा, पुष्पलता, एवं सक्सैना, कनक (2006)., शैक्षिक प्रबन्धन एवं विद्यालय संगठन, आस्था प्रकाशन, जयपुर
7. परवीन, आबिदा (2013), शिक्षण एवं अधिगम के मनो–सामाजिक आधार, आस्था प्रकाशन, जयपुर
8. बघेला, एच.एस. (2007), शैक्षिक प्रबन्धन एवं विद्यालय संगठन, राजस्थान प्रकाशन, जयपुर
9. बिन्दु आभारानी, सक्सैना, स्वाति (2008), विशिष्ट बालक, अग्रवाल पब्लिकेशन्स, आगरा
10. योगेन्द्रजीत, भाई (2008), शिक्षा में नवाचार और नवीन प्रवृत्तियाँ, विनोद पुस्तक मंदिर, आगरा
11. सुखिया, एस.पी. (2008), विद्यालय प्रशासन एवं संगठन, विनोद पुस्तक मंदिर, आगरा
12. हन्फी, ऐम.ए. एवं हन्फी एस.ए. (2009), अधिगमकर्ता का विकास एवं शिक्षण अधिगम प्रक्रिया, विनोद पुस्तक मंदिर, आगरा, जयपुर

Semester VII

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU 702	Language Across the Curriculum	**CC**	**4**	**30**	**70**	**100**

Objectives:

- To understand the various mode of language like reading, wirting, speaking and listining.
- To develop the skill of oral and written language.
- To acquainte with the idea of composition and art of writing i.e. letter, paragraph, application etc.
- To develop the Vocabulary Building and Language Problems & its Remedies
- To develop the vocabulary and language proficiency and related remedies.

Course Contents:

Unit -I Language acquisition and development

a) Language : Concept, Meaning and Nature
b) Language usages : Written, Oral, Role Playing with Communication
c) 3 Language Policy : First (Mother tongue)
: Second (Foreign language)
: Third (Religious or classical language)
d) Language development : From childhood to Adult stages.

Unit -II Language Skills

a) Reading : Silent reading vs Rapid reading, News Paper, Journal, Books
b) Narrative Text vs. Expository text
c) LSRW (Listening, Speaking, Reading, Writing)
d) Note making and creative writing (Essay, Application, Letter, Paragraph)

Unit -III Language & Classroom Interaction

a) Expression : Public Speech, Lecture, Debating
b) Multilingualism in classroom
c) Summarizing and Reflection
d) Errors and Correction of Language in class

Unit-IV Vocabulary Building and Language Problems & its Remedies

a) New Structure and building of vocabulary
b) Learning new vocabulary and Diagnostic Language Errors
c) Language Phonemes & Identification of Sound Errors
d) Remedial Programme for Language Development

Assignment & Practical Work (Any Two)

- Write any one term paper
- Identify speech defect in classroom teaching
- Prepare a Report on Creative Writing
- Prepare a C.D. on communication (30 minutes)

Learning Outcomes: After completion of this course students would able to:

- Understand the nature and use of language.
- Develop the idea of Multilingualism in class room teaching.
- Create the sense of language and its flavor.
- Inculcate language skills among trainees.
- Evaluate skills creative writing and expression.

- ❖ Acquire the idea of composition and art of writing i.e. letter, Paragraph, application etc.
- ❖ Develop ornamental use of vocabulary in different curriculum.

Suggested Readings:

1. Baruah, T.C. (1985), The English Teacher's Hndbook, New Delhi, Sterling Publication Pvt. Ltd.
2. Lado, Robert (1971), Language Teaching, New Delhi, Tata Mc. Graw Hill Pub. Co. Ltd.
3. Richards, J.C. and Rodgers, T.S. (2000), Approaches and Methods in Language Teaching, Cambridge, CUP.

Semester VII

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 701	Chemistry	Pedagogy of a School Subject **Any two**	**4**	**30**	**70**	**100**
BSE 702	Physics					
BSE 703	Mathematics					
BSE 704	General Science	**CE**				
BSE 705	Biology	**CE**	**4**	**30**	**70**	**100**

BSE 701 : Chemistry

Objectives:

- ❖ To develop a broad understanding of the principles and procedures used in moden science specially in chemistry.
- ❖ To develop essential skill for practicising modern science education.
- ❖ To understand aims and objectives of chemistry.
- ❖ To gain ability for critically evaluate the existing syllabus of science.
- ❖ To prepare achievement test and diagnostic test.
- ❖ To enable him to organize co-curricular activities related to science.
- ❖ To appreciate the contribution of world scientist in connection with historical development of chemistry.

Course Contents:

UNIT-I Nature and Scope

a) Nature of Science and Chemistry, Importance of Chemistry in Daily Life, Correlation of Chemistry with Other Subjects
b) Values of Teaching Chemistry
c) Scientific Attitude, Scientific Literacy
d) Eminent World Scientist in the Area of Chemistry Like Dalton, Einstein, Neil Borh, Rutherford, Marry Quarry.
e) Globalisation and Chemistry

UNIT-II Curriculum planning and activities

a) Place of Chemistry in School Curriculum, Principles of Developing Chemistry Curriculum
b) Modern Trends in Chemistry Curriculum, Reading Material - Text Book, Journal, Handbook, Science Library

c) Critical Appraisal of Syllabus of Science with Reference to Chemistry Prescribed by State Board of Secondary Education

UNIT-III Methods and approaches of teaching

a) Lecture cum Demonstration Method (Inductive and deductive method), Project Method, Scientific Method, Heuristic Method
b) Panel Discussion. Seminars and Workshop Laboratory Method.
c) Teaching aid-Bulletin Board, Flannel Board, Filmstrips, Transparency, OHP, Direct Projector LCD Panel, Non-formal Approaches- field trips
d) Laboratory- Lay out Plans, Equipments, Furniture, Maintenance of Records, Repair, Care and Improvisation of Apparatus, Safetymeasures in Laboratory

UNIT-IV

a) Planning for Teaching and Role of Teachers. Annual Plan, Content analysis, Pedogogical Analysis
b) Inquiry Model of Teaching Lesson Plan and Level Plan Piagian and Brunerian Approach- Behaviourist Contribution
c) Evaluation - Criteria of good Evaluation Concept of Evaluation, Types of Test Items : Objective, Short Answer, Essay Type, their Merits and Demerits, Blue Print for a Unit Test
d) Achievement and Diagnostic Test

Term Paper : (Any one)

- Make a list of practicals related to secondary science curriculum
- Essay related to any topic of the paper
- Make a list of local resources useful in teaching chemistry to the students of vv Secondary class
- Make a visit any senior secondary science laboratory of a school and prepare a report.
- Make a presentation based on any above topic.

Learning Outcomes: After completion of this course students would able to:

- ❖ Understanding Importance of Chemistry and correlate it with other subjects
- ❖ Acquient with the Modern Trends in Chemistry.
- ❖ Gain ability for critically evaluate the existing syllabus of science.
- ❖ Prepare achievement test and diagnostic test.
- ❖ Oorganize co-curricular activities related to science.

Suggested Reading:

1. Dass- R.C. (1985), Science Teaching in Schools, Sterling Publications Pvt.Limited, New Delhi.
2. Gupta Nirmal (1967), Method of Teaching Science, Rastogi and Company Meerut.
3. Joshi S. R. (2005), Teaching of Science, APH Publishing Corporation, New Delhi.
4. Mittal A. (2004), Teaching of Chemistry, APH Publishing Corporation, New Delhi.
5. Nayak A. K. (2004), Teaching of Physics, APH Publishing Corporation, New Delhi.
6. NCERT: General Science, Handbook of activities Class-VI-VIII
7. Sood, J. K. (1989), New direction in Science teaching, Kohli Publication, Chandigarh.
8. Yadav M. S.,(2000), Modern methods of teaching science, Anmol Publications Pvt. Ltd. New Delhi.
9. अग्रवाल वी. पी., सिडाना के., पारीक के, (2007), विज्ञान शिक्षण, शिक्षा के प्रकाशन, जयपुर

10. कुलश्रेष्ठ पी. के. (2006), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
11. नेगी जे. एस., नेगी आर, (2000), रसायन विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
12. रावत डी. एस. (2009), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
13. शर्मा एस. आर. (2008), विज्ञान शिक्षण, अर्जुन पब्लिशिंग हाउस, नई दिल्ली
14. सूद जे. के. (2007), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
15. श्रीमाली एन. के., भूषण ए., रिहानी आई, (2007), विज्ञान शिक्षण, राजस्थान ग्रन्थ अकादमी, जयपुर

BSE 702 : Physics

Objectives:

- To appreciate the contribution of eminent physicist in connection with the development of the subject.
- To familiar with the aims and objective of the subject in relation to the present need of the society and educational policies of India.
- To plan curriculum at the secondary level and analyze the syllabus of the subject in relation to its applicability to practical situation.
- To develop scientific attitude and provide training in scientific method to their student.
- To write objectives in behavioural term content analysis and content mapping .
- To develop yearly plan, unit plan and lesson plan.
- To plan, equip and organize physics practical in the laboratory.
- To use various methods with appropriateness of content, level and classroom situation.
- To prepare test paper for theory and practical work.

Course Contents:

Unit- I Nature Scope & Curriculum

a) Nature of science and physics, major milestones in the development of physics
b) Aims, objectives and values of teaching physics at secondary and senior secondary level
c) Concept of curriculum place of physics in secondary/sr. secondary level curriculum, selection and organization of content and experience
d) Correlation of physics with other school subjects and its role in daily life
e) Critical appraisal of the prescribed syllabus of physics (at senior secondary, secondary level of Rajasthan and CBSE board)

Unit- II Planning for Instruction and Role of Teachers

a) Writing of objectives in behavioural terms, content analysis.
b) Developing yearly, unit and daily lesson plan.
c) Teachers role in training students in scientific method and in development of scientific attitude.
d) Qualities, responsibilities and professional growth of physics teacher.
e) Creativity among students.

Unit- III Methods and Approaches of Teaching Physics

a) Demonstration method, heuristic method, inductive-deductive method.
b) Laboratory method, Project method, problem solving method, assignment method.

c) Multi sensory aids in teaching of physics like chart, model modern electronic resources like; LCD projector, OHP and ICT
d) Co-curricular activities like science club, science fairs and field trip.
e) Role of state and national level institutes and laboratories(DST, ISRO, solar observatories etc.) in promoting science education.

Unit- IV Evaluation

a) Types of test items.
b) Construction of various test items.
c) Preparation of blue print and achievement test.
d) Diagnosis and remedial teaching in physics, enrichment material.
e) Evaluation and practical work in physics.

Assignment & Practical Work (Any Two)

- Planning of an out of class activity to use local environment to teach physics.
- Life sketch of any two modern physicists.
- Essay related to a topic prescribed in the paper .
- Case study of any one senior secondary lab of physics.
- Conducting and reporting three experiments useful at secondary level.
- Description of design of any improvised apparatus.

Learning Outcomes: After completion of this course students would able to:

- Appreciate the contribution of eminent physicist in connection with the development of the subject.
- Understand with the aims and objective of the subject in relation to the present need of the society and educational policies of India.
- Plan curriculum at the secondary level and analyze the syllabus of the subject in relation to its applicability to practical situation.
- Develop scientific attitude and provide training in scientific method to their student.
- Write objectives in behavioural term content analysis and content mapping .
- Develop yearly plan, unit plan and lesson plan.
- Plan, equip and organize physics practical in the laboratory.
- Use various methods with appropriateness of content, level and classroom situation.
- Prepare test paper for theory and practical work

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Suggested Reading:

1. Joshi S. R. (2005) Teaching of Science, APH Publishing Corporation, New Delhi.
2. Maitre, K. (1991), Teaching of Physics, Discovery Publishing House, New Delhi.
3. Nayak A. K. (2004), Teaching of Physics, APH Publishing Corporation, New Delhi.
4. Sharma, R;C. (1971), Teaching of Science Dhanpat Rai and Sons, Delhi.
5. Sood, J. K. (1989), New direction in Science teaching, Kohli Publication, Chandigarh.
6. Vaidya, N. (1970), The impact of science Teaching, Oxford & IBH Publishing Company, New Dehli.
7. Yadav M. S., Modern methods of teaching science, Anmol Publications Pvt. Ltd. New Delhi.
8. अग्रवाल वी. पी., सिडाना के., पारीक के, (2007), विज्ञान शिक्षण, शिक्षा के प्रकाशन, जयपुर

9. कुलश्रेष्ठ पी. के. (2006), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
10. त्यागी एस.के. (2000), भौतिक विज्ञान शिक्षण साहित्य प्रकाशन, आगरा
11. नेगी जे. एस., (2007), भौतिकी शिक्षण, विनोद पुस्तक मंदिर, आगरा
12. रावत डी. एस. (2009), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
13. शर्मा एस. आर. (2008), विज्ञान शिक्षण, अर्जुन पब्लिशिंग हाउस, नई दिल्ली
14. सूद जे. के. (2007), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
15. श्रीमाली एन. के., भूषण ए., रिहानी आई, (2007), विज्ञान शिक्षण, राजस्थान ग्रन्थ अकादमी, जयपुर

BSE 703 : Mathematics

Objectives:

- To understand and appreciate the uses and significance of Mathematics in daily life
- To learn various approaches of teaching mathamethics and use them judiciously.
- To know the methods of planning instruction for the classroom.
- To prepare curricular activities and organize the mathematics Laboratory.
- To appreciate and organize activities to develop aesthetics of mathematics.
- To give competence in teaching different mathematics topic effectively

Course Contents:

Unit- I Concept meaning and objectives of mathematics.

a) Concept, meaning and nature of mathematics
b) History of mathematics
c) Contribution of Indians and western mathematics.
d) Aims and objectives of teaching mathematics
e) Blooms taxonomy relating to the teaching objectives in mathematics (cognitive , Affective, psychomotor domain)

Unit- II Methods and approaches of teaching mathematics.

a) Inductive vs. Deductive
b) Analytical vs. synthesis
c) Heuristic, Project, drill, assignment and supervised study, Laboratory method.
d) Lesson planning, Unit plan and Yearly plan for mathematics teaching.
e) Audio visual teaching aids in mathematics (Chart, Model, OHP, LCD, ICT), Improvising Low cost teaching aids in mathematics.

Unit- III Planning for instruction and curriculum.

a) Curriculum development principle for the secondary and senior secondary level.
b) Teaching of Arithmetic, algebra and Geometry
c) Text book in mathematics, Quality of good book in mathematics.
d) Critically evaluation of existing mathematics syllabus prescribed by Rajasthan Board of Secondary Education and C.B.S.E. at different levels.
e) Using mathematics as a game for recreation, organizing Quiz programmes, magic square, answering puzzle and reasoning.

Unit- IV Evaluation in teaching mathematics:

a) Academic testing – objective vs. subjective type test.

b) Diagnostic evaluation in mathematics.
c) Preparation of blue print and achievement test.
d) Preparations of standardized vs. teacher made test in mathematics.
e) Process of obtaining feedback and evaluation in mathematics in term of teaching objectives.

Assignment & Practical Work (Any Two)

- Preparation of detailed plan about development of mathematics laboratory or mathematics club.
- Life sketch of any two Mathematicians.
- Essay related to a topic prescribed in above paper.
- Prepare a case study of slow learner in mathematics or gifted child in mathematics.
- Observation of mathematics classroom teaching in any secondary school and then prepare a diagnostic and remedial teaching plan.

Learning Outcomes: After completion of this course students would able to:

- ❖ Understand and appreciate the uses and Significance of Mathematics in daily life
- ❖ Use various approaches of teaching mathamethics and use them judiciously.
- ❖ Understand the methods of planning instruction for the classroom.
- ❖ Prepare curricular activities and organize the mathematics Laboratory.
- ❖ Appreciate and organize activities to develop aesthetics of mathematics.
- ❖ Give competence in teaching different mathematics topic effectively

Suggested Reading:

1. Kumar S., Ratnalikar D. N. (2003), Teaching of mathematics, Anmol Publications Pvt. Ltd. New Delhi.
2. Mustafa M. (2004), Teaching of mathematics, New trends and innovations, Deep and Deep Publications Pvt. Ltd., New Delhi.
3. Wadhwa S., (2000), Modern methods of teaching mathematics, Sarup and sons, New Delhi.
4. Yadav S. (2007), Teaching of mathematics, Vinod Pustak Mandir, Agra.
5. जैन, एस. एल. (2007), गणित शिक्षण, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
6. नेगी जे. एस. (2006), गणित शिक्षण, विनोद पुस्तक मंदिर, आगरा
7. रावत एम. एस. (1960), अग्रवाल एम. बी. एल., गणित शिक्षण, विनोद पुस्तक मंदिर, आगरा
8. सिंह एस. (2005), गणित शिक्षण, विनोद पुस्तक मंदिर, आगरा

BSE 704 : General Science

Objectives:

- To develop the knowledge about science and its nature.
- To acquire the knowledge about contribution of eminent Indian scientists.
- To aware about the aims, objectives and construction of curriculum.
- To develop understanding aout co-curricular activities, methods of teaching and preparation of test paper.

Course Contents:

UNIT- I Concept and Nature of General Science

a) Science : concept, nature and scope
b) Correlation of science with other subjects
c) General Science and its importance in school curriculum.
d) Inquring influence of science on man and environment.
e) Scientist and their professional achivement.

UNIT- II Aims Objectives and Curriculum

a) Writing aims and objectives in behavioural term.
b) Developing yearly, unit and daily lesson plan.
c) Principle of curriculum construction in General Science.
d) Teachers role in training students in scientific method and scientific attitude.
e) Professional growth of General Science teacher.

UNIT-III Methods of Teaching General Science

a) Lecture method, Demonstration method
b) Inductive-deductive method
c) Project method, problem solving method
d) Laboratory method, Assignment method
e) Heuristic method

UNIT- IV Activities and Evaluation

a) Science laboratory
b) Teaching aids in General science- OHP, LCD Projector , Television.
c) Co curricular activities, Science club, Science fair
d) Evaluation : concept and importance
e) Preparation of blue print and test paper construction.

Assignment & Practical Work (Any Two)

- Make a list of practicals related to secondary science curriculum.
- Essay related to one topic prescribe in the paper.
- Preparation of a comprehensive field trip to plan for a group of twenty students.
- Make a list of local resources useful in teaching general science to the students.
- Make a visit at any senior secondary science laboratory of a school and prepare a report.
- Conducting and reporting three experiments useful at secondary level.
- Make a presentation based on any above topic.

Learning Outcomes: After completion of this course students would able to:

- ❖ Contribution of eminent Indian scientists in connection with the development of the subject.
- ❖ Familiar with the aims and objectives of the subject in relation to present needs of the society and education policies in India.
- ❖ Plan curriculum at secondary and senior secondary level and analyze the syllabus of the subject in relation to its applicability to practical situations.
- ❖ Identify proper methodology to deal with the content which is to be handled by him as teacher in secondary and higher level.
- ❖ Develop a broad understanding of the principles and procedures used in modern science education.
- ❖ Prepare test paper for evaluation.

Suggested Reading:

1. Dass- R.C. (1985), Science Teaching in Schools, Sterling Publications Pvt. Limited, New Delhi.
2. Dass- R.C. (1986), Teaching Science in India, Sterling Publications Pvt. Limited, New Delhi.
3. Gupta Nirmal (1967), Method of Teaching Science, Rastogi and Company Meerut.
4. Joshi S. R. (2005), Teaching of Science, APH Publishing Corporation, New Delhi.
5. Mittal A. (2004), Teaching of Chemistry, APH Publishing Corporation, New Delhi.
6. Nayak A. K. (2004), Teaching of Physics, APH Publishing Corporation, New Delhi.
7. NCERT: General Science, Handbook of activities Class-VI-VIII
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9. Yadav M. S.,(2000), Modern methods of teaching science, Anmol Publications Pvt. Ltd. New Delhi.
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14. भूषण शैलेन्द्र (1977), जीव विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
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18. श्रीमाली एन. के., भूषण ए., रिहानी आई, (2007), विज्ञान शिक्षण, राजस्थान ग्रन्थ अकादमी, जयपुर

BSE 705 : Biology

Objectives:

- To acquire the knowledge of nature and scopes of Biology.
- To develop understanding the principles of curriculum, planning and E-resources in Biology.
- To develop awareness about various approches and innovative methods of Biological science for effective teaching learning process.
- To develop knowledge of multisensory teaching aids to enhance students engagement and activity based learning.
- To aware about construction of blue print, dignostic test and remedial self learning material and conduct CCE procedure.

Course Contents:

Unit- I Theoritacl Perspective of Biology

a) Meaning , Nature and Scope of Biological science and its branches
b) Historical Dvelopment of Biological science
c) Development of values through Biology teaching
d) Science as a domain of enquiry, dynamic body of knowledge and as a process of constructing knowledge
e) Developing and significance of Scientific Temper through activities
f) Aims and Objectives of Biological teaching
g) Writing Objectives in Behavioral terms and Content analysis

Unit- II Curriculum and Planning

a) Concept and principles of curriculum
b) Models and approaches related to curriculum organization
c) Recent curriculum innovations in context of National Curriculum Framework (NCF)
d) Planning : Concept, Types and Importance
e) Co- Curricular activities- Excursion, Science fair, Science club
f) E-resources in Biology : Biology blog, E-learning, Useful links and websites etc.

Unit- III Methods and Approaches

a) Herbertian & Constructivist approach (Five 'E' model)
b) Co- operative learning approach
c) Inquiry training model & its application
d) Problem solving approach
e) Inductive and Deductive methods
f) Multisensory Teaching aids- Low cost models, L.C.D. Projector, Poster making, Concept map etc.

Unit- IV Measurement and Evaluation

a) Concept of Measurement and Evaluation
b) Criteria of good Evaluation
c) Preparation of Blue Print
d) Dignostic test and Remedial lerning material
e) Continuous and Comprehensive Evaluation in biology

Assignment & Practical Work (Any Two)

- Construct, administer and interpret an achievement/diagnostic test and resolving related problems through remedial measure too
- Prepare the Concept map related to school level teaching and demonstrate them to learndifferent contents in classroom
- Prepare the report on environmental problems in local area and resolving issues through scientific project.
- Poster Presentation/ Drama on various issues related to community awareness about biodiversity/ environmental problems/ waste management.
- Organization of exploratory activities to develop scientific attitude and temper

Learning Outcomes: After completion of this course students would able to:

- ❖ Acquire the knowledge of nature and scopes of Biology.
- ❖ Understand the principles of curriculum, planning and E-resources in Biology.
- ❖ Know and apply the various approches and innovative methods of Biological science for effective teaching learning process.
- ❖ Apply knowledge of multisensory teaching aids to enhance students engagement and activity based learning.
- ❖ Construct blue print, dignostic test and remedial self learning material and conduct CCE procedure.

Suggested Reading:

1 Choudhary, S. (2010), Teaching of Biology, APH Publishing Corporation, New Delhi.
2 Grear, T. L., The Teaching of Biology in Secondary Schools.
3 Joshi, S. R. (2005), Teaching of Science, A.P.H. Publishing Corporation, New Delhi.
4 Lakshmi, Gade Bhuvneswara, Rao Digumarti Bhaskara, (2004) , Method of Teaching Life Science, Discovery Publishing House, New Delhi.
5 Mohan, Radha (2007), Innovative Science Teaching, Prentice Hall of India, (p) Ltd., New Delhi.
6 Singh, Yogesh Kumar & Nath, Ruchika (2005), Teaching of General Science, A.P.H. Publishing Publishing Corporation, New Delhi.
7 Sood, J. K. (1987), Teaching of Life Science, Kohali Publishers, Chandigarh.
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15 सूद, जे. के. (2007), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
16 श्रीमाली, नंदकिशोर (2007), विज्ञान शिक्षण, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर

Semester VII

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
BSE 706	Optional Course Environmental Education	**Any one CE**	**4**	**30**	**70**	**100**
BSE 707	Health and Physical					
BSE 708	Guidance and Counseling					
BSE 709	Distance Education					
BSE 710	Additional Course (Any one) 5.1 Chemistry					
	5.2 Physics					
	5.3 Mathematics					
	5.4 General Science					
	5.5 Biology					

BSE 706 : Environmental Education

Objectives:

- To understand the problems of concerning environment through multi disciplinary approach.
- To develop the skill of planning and organizing ecological activities in the schools.
- To create consciousness about environment among the adult learners.
- To give information on different techniques and materials for the affective dissemination of environmental information.

Course Contents:

UNIT- I Concept Of Environment

a) Meaning , Scope, Importance
b) Eco-System – Charecteristic Qualities
c) Inter- Dependence In Environment
d) Natural Resources
e) Bio-Diversity – Scope & Threats, Preservation

UNIT- II Environmental Education

a) Meaning, Importance and Objective
b) Scope of Environmental Education
c) Need for Public Awareness as a subject
d) Muti-disciplenary Nature of Environmental Studies Curriculum Development

UNIT- III Environmental Hazards and Pollution

a) Air Pollution
b) Water Pollution
c) Soil Pollution
d) Noise Pollution

UNIT- IV Global Issues and Environmental Conservation

a) Global Issuse (Global Warming, Climate Change, Deplition of Ozone Leyer and Energy Crisis)
b) Different Aspects Related To Environmental Conservation.
c) Environmental Preservation &Improvement (At National & International Level)
d) National Environment Policy

Assignment & Practical Work (Any Two)

- Study on Any one environmental problems. The report on the study must include efforts of the pupil / teacher in developing awareness among people about the environmental problems.
- Prepare a plan to teach environment at education to the adults.
- One term paper solve.
- Prepare a scrap book of an environmental articles and news.
- Conduct environmental competition for local school student.

Learning Outcomes: After completion of this course students would able to:

- ❖ Students are able to understand the problems concerning environment through multi disciplinary approach.
- ❖ Students are able to develop the skill of planning and organizing Ecological activities in the schools so the children can equipped to play their part in protection and enrichment of environment.
- ❖ Students are able to create Environment Consciousness among the adult learners.
- ❖ Students are able to use different Techniques and materials for the affective Dissemination of Environmental information.
- ❖ Students are able to conduct local surveys, arrange field trips Environmental games and hobbies.

संदर्भ ग्रन्थ सूची :

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2. गुप्ता, चाँदमल, शर्मा, रेनू (2008), पर्यावरण शिक्षा, आस्था प्रकाशन, जयपुर
3. गोयल, एम. के. (2008), पर्यावरण शिक्षा, विनोद पुस्तक मंदिर, आगरा
4. बरौलिया, ए., पर्यावरणीय शिक्षा के नये आयाम, राधा प्रकाशन मन्दिर, आगरा
5. बरौलिया, ए. पराशर, राधिका एवं दुबे, श्री कृष्ण, पर्यावरण शिक्षा के नये आयाम, राधा प्रकाशन मंदिर, आगरा
6. राजस्थान पाठ्यपुस्तक मण्डल की कक्षा 11 से 12 तक की पुस्तकें
7. रावत, कमलेश, पर्यावरण शिक्षा, अलका पब्लिकेशन्स, अजमेर
8. श्री वास्तव, पंकज (2007), पर्यावरण शिक्षा, मध्यप्रदेश हिन्दी ग्रन्थ अकादमी,

BSE 707: Health and Physical

Objectives:

- ❖ To develop the organic system of the body.
- ❖ Development of understanding and appreciation of the techniques and strategies of sports
- ❖ To develop correct health habits.
- ❖ Attainment of knowledge of proper health procedure as related with physical exercise.
- ❖ The physical education program will allow the students to participate in developmentally appropriate activities.

Course Contents:

Unit- I Concept of Health Education

a) Meaning of Health education.
b) Environmental factor which promote and affect In Health.
c) Importance and objective of Health education.
d) General Exercises in school.

Unit- II Environment and Science of Living and Yoga

a) Importance of water to life and our environment.
b) Science of Living and yoga.
c) Role of Individual in improvement of sports environment.
d) Physical and physiological benefits of exercise on children.

Unit- III Physical Education, Balanced Diet and First Aid

a) Meaning and Importance of physical Education
b) Balanced Diet and Nutrition : Macro and Micro Nutrients
c) First Aid

Unit- IV History of Volleyball & Kabbadi

a) Historical Development of Volleyball
b) Measurement and Rule of Volleyball
c) Historical Development of Kho-Kho
d) Measurement and Rule of Kabbadi

Assignment & Practical Work

- Write a Term paper on a topic given in the course
- Skill of any one Team Game of choice from the given List

Learning Outcomes: After completion of this course students would able to:

- ❖ Develop the organic system of the body.
- ❖ Understand and appreciation of the techniques and strategies of sports
- ❖ Aware about correct health habits.
- ❖ Attain knowledge of proper health procedure as related with physical exercise

Suggested Readings:

1. Thorburn, M. (2000), Physical Education-Intermediate Course Notes, Leckie & Lechie Publisher.
2. कमलेश एवं संगरल, शारीरिक शिक्षा में शिक्षण विधियां, विनोद पब्लिकेशन, लुधियाना।
3. पाराशर, गीता एवं कुमार सुनील (2014), स्वास्थ्य शिक्षा तथा मनोरंजन।
4. सफाया, आर. के. स्वास्थ्य एवं शारीरिक शिक्षा, विनोद पब्लिकेशन, लुधियाना।
5. सिंह, बलदेव, स्वास्थ्य एवं शारीरिक शिक्षा, विनोद पब्लिकेशन, लुधियाना।
6. सिंह, परमजीत, राठौड़, भूपेन्द्र सिंह, बार्थोनिया, माया, खान, एम. ए. (2007), शारीरिक एवं स्वास्थ्य शिक्षा, कक्षा–9 माध्यमिक शिक्षा बोर्ड, राजस्थान अजमेर।

BSE 708 : Guidance and Counseling

Objectives:

- To educateion about the basics concept, nature and scope of Educational and Vocational guidance.
- To understand the aims objective of educational and vocational guidance.
- To make enable about the importance of educational and vocational guidance.
- To give knowledge of role and responsibilities of guidance workers in school.
- To understand the nature and types of guidance service & with reference to school education.
- To understand the concept, nature and types of counseling.

Course Contents:

Unit- I Basics of Guidance

a) Meaning and Nature of Guidance.
b) Aims and Principles of Guidance.
c) Types of Guidance
d) Importance of Guidance in schools for individual and for society.
e) Process of Guidance.

Unit- II Basics of Counseling

a) Meaning, Nature and Principles of counseling
b) Types of Counseling.
c) Distinction between Guidance and Counseling.
d) Role and Responsibilities of Guidance workers in school.
e) Qualities of a good guidance programme.

Unit- III Area of Guidance

a) Educational guidance
b) Vocational guidance
c) Personal guidance
d) Guidance Implication in the current Indian scenario.
e) Problems of guidance in India.

Unit- IV Guidance Services

a) Introduction to Guidance Services.
b) Individual Inventory Service
c) Information Service
d) Cumulative Record
e) Placement Services
f) Follow up Service

Assignment & Practical Work (Any Two)

- Prepare a term paper on any topic of Educational, Vocational or Personal guidance
- Write an article on current educational problems, providing the solution.
- Observe an educational or co-curricular activity in a school or college and provide guidance for the improvement.
- Case study of two special children.

Learning Outcomes: After completion of this course students would able to:

- ❖ Understand the basic concept, Nature and scope of Educational and Vocational guidance.
- ❖ Describe aims objective of educational and vocational guidance.
- ❖ Understand importance of educational and vocational guidance.
- ❖ Identify nature and types of guidance service & with reference to school education.
- ❖ Understand the concept, nature and types of counseling.

Suggested Readings:

1. Bansal, Aarati (2007), Educational and Vocational Guidance, Sublime Publication, Jaipur
2. Chaturvedi, Ramesh, (2007), Educational and Vocational Guidance and Counseling, Crescent Publishing Corporation, New Delhi.
3. Nayak A. K., Rao V. K. (2007), Guidance and Career Counseling, APH Publishing Corporation, New Delhi.
4. Sharma, Shashi Prabha (2005), Career Guidance and Counseling (Principles and Technique), Kanishka Publishers, New Delhi.
5. Sharma, Sita Ram (2005), Evolution of Educational and Vocational Guidance, ABD Publishers, Jaipur.
6. Sharma, Yogendra K. (2005), Principles of Educational and Vocational Guidance. Kanishka Publishers, New Delhi.
7. Vashist, S. R. (2001), Methods of Guidance, Anmol Publication, Pvt. Ltd., N. Delhi
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11. सिंह, रामपाल, उपाध्याय, राधावल्लभ (2004), शैक्षिक एवं व्यवसायिक निर्देशन, विनोद पुस्तक मंदिर, आगरा

BSE 709 : Distance Education

Objectives:

- ❖ To provide an effective alternative path to wider opportunities in education and especially in higher education.
- ❖ To provide an efficient and less expensive education.
- ❖ To provide education facilities to all qualified and willing persons.
- ❖ To provide opportunities of academic pursuits to educate citizens willing to improve their standard of knowledge.
- ❖ To provide education facilities to those individuals who look upon education as a life-long activity.

Course Contents:

Unit-I Theoretical Prospective of Distance Education

a) Meaning and Definition of Distance Education.
b) Characteristics of Distance Education
c) Distance education as a discipline.
d) Need for establishing Distance Education as a discipline.

Unit-II Scenario of Distance Education Institutes

a) State wise situation of Distance Education Institutes in India.

b) Objectives of Indira Gandhi National Open University.
c) Main Theoretical Bases of Distance Education.
d) Theory of Independent study by CHARLES WEDEMEYER.

Unit-III Essential Elements of Developing in Distance Education

a) Essential Elements of Developing curriculum in Distance education.
b) Different services provided by Sanchar Kendra IGNOU.
c) Non- Print Instructional media in Distance Education: Educational RADIO.
d) Major educational Television projects in Distance education.

Unit-IV Counseling for Distance Learners

a) Organizing counseling Services for Distance Learners.
b) Various Types of Tele - Conferencing.
c) Format of the Text in Distance Education.
d) Distance Learners and Counseling

Assignment & Practical Work

- Write any one term paper on a topic with in the content.
- Make the list of Distance Education programme of various universities in India.

Learning Outcomes: After completion of this course students would able to:

- Provide an effective alternative path to wider opportunities in education and especially in higher education.
- Understand an efficient and less expensive education.
- Explain education facilities to all qualified and willing persons.
- Identify the opportunities of academic pursuits to educate citizens willing to improve their standard of knowledge.

Suggested Readings:

1. Datt, Ruddar (1985), Distance Education in India, Open School, New Delhi
2. Hillard, R. I., Writing for T.V. and Radio, N.Y. Hastings House
3. Parmaji, S. (1984), Distance Education, Sterling Publication, New Delhi
4. यादव, सियाराम (2008), दूरवर्ती शिक्षा, विनोद पुस्तक मंदिर, आगरा

BSE 710 : 5.1 Chemistry

Objectives:

- To gain the knowledge of Chemistry for secondary and senior secondary level.
- To improve the various skills of student teachers in practical work.
- To understand the practical and theoretical description of various content.
- To solve different problems related with the content of chemistry.
- To know importance and use of course content.
- To plan, equip and organize chemistry practical in the laboratory.
- To use various methods with appropriateness of content, level and class room situations.
- To develop scientific attitude and provide training in scientific method to their students.

Course Contents:

Unit- I Chemical Properties

a) Chemical Equation
b) Chemical Equilibrium

c) Types of Chemical Reactions
d) Acid and Base
e) Chemical Change

Unit- II Metal and Non Metals

a) Metal
b) Nonmetal
c) Chemical Properties of Metal
d) Hydrogen
e) Water

Unit- III Carbon

a) Bonding in Carbon
b) Saturated and Unsaturated Carbon Compound
c) Nomenclature of Carbonic Compound
d) Chemical Properties of Carbon Compound
e) Coal and Petroleum

Unit- IV Periodic Table

a) Periodic Table and Atoms
b) Atoms and Molecules
c) Atomic Mass and Mole Concept
d) Atomic Models
e) Isotopes and Isobars

Assignment & Practical Work (Any Two)

- Preparation of a term paper based on any above topic.
- Solve an examination question paper.
- Make a presentation based on any above topic.
- Conducting and reporting three experiments useful at secondary level.

Learning Outcomes: After completion of this course students would able to:

- ❖ Gain the knowledge of Chemistry for secondary and senior secondary level.
- ❖ Improve the various skills of student teachers in practical work.
- ❖ Understand the practical and theoretical description of various content.
- ❖ Solve different problems related with the content of chemistry.
- ❖ Know importance and use of course content.
- ❖ Plan, equip and organize chemistry practical in the laboratory.
- ❖ Use various methods with appropriateness of content, level and class room situations.
- ❖ Develop scientific attitude and provide training in scientific method to their students

Suggested Readings:

1. रसायन विज्ञान, (2014) भाग–1, कक्षा 11 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
2. रसायन विज्ञान, (2014) भाग–2, कक्षा 11 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर

3. रसायन विज्ञान, (2014) भाग–1, कक्षा 12 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
4. रसायन विज्ञान, (2014) भाग–1, कक्षा 12 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
5. विज्ञान, (2014) कक्षा 8 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
6. विज्ञान, (2014) कक्षा 9 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
7. विज्ञान, (2014) कक्षा 10 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
8. अग्रवाल वी. पी., सिडाना के., पारीक के, (2007), विज्ञान शिक्षण, शिक्षा के प्रकाशन, जयपुर
9. कुलश्रेष्ठ पी. के. (2006), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
10. नेगी जे. एस., नेगी आर, (2000), रसायन विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
11. रावत डी. एस. (2009), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
12. शर्मा एस. आर. (2008), विज्ञान शिक्षण, अर्जुन पब्लिशिंग हाउस, नई दिल्ली
13. सूद जे. के. (2007), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
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BSE 710 : 5.2 Physics

Objectives:

- To gain the knowledge of concepts of physics.
- To improve the various skills of student teachers in practical work.
- To understand the practical and theoretical description of various content.
- To able for solving different problems related with the content of physics.
- To plan, equip and organize physics practical in the laboratory.

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Course Contents:

Unit- I Electric field

a) Electric charge
b) Conductor and non conductor
c) Charge through induction
d) Characteristics of electric charge
e) Coulomb's law

Unit- II Optics

a) Mirror reflection, refraction
b) Spherical mirror
c) Total internal reflection
d) Lens
e) Power of lens

Unit- III Characteristics of matter

a) Elasticity of solids
b) Stress
c) Pressure
d) Viscosity
e) Surface energy and surface tension

Unit- IV Gravitation and Energy

a) Gravitation
b) Work
c) Energy

d) Power
e) Sound

Assignment & Practical Work (Any Two)

- Preparation of a term paper based on any above topic.
- Solve an examination question paper.
- Make a presentation based on any above topic.
- Conducting and reporting three experiments based on above topics.

Learning Outcomes: After completion of this course students would able to:

- ❖ Gain the knowledge of physics for secondary and senior secondary level.
- ❖ Improve the various skills of student teachers in practical work.
- ❖ Understand the practical and theoretical description of various content.
- ❖ Solve different problems related with the content of physics.

Plan, equip and organize physics practical in the laboratory

Suggested Readings:

1. भौतिकी, (2014) भाग 1, कक्षा 11 के लिए पाठ्य पुस्तक राजस्थान राज्य पाठ्य पुस्तक मण्डल, जयपुर
2. भौतिकी, (2014) भाग 2, कक्षा 11 के लिए पाठ्य पुस्तक राजस्थान राज्य पाठ्य पुस्तक मण्डल, जयपुर
3. भौतिकी, (2014) भाग 1, कक्षा 12 के लिए पाठ्य पुस्तक राजस्थान राज्य पाठ्य पुस्तक मण्डल, जयपुर
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5. विज्ञान, (2014) कक्षा 8 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
6. विज्ञान, (2014) कक्षा 9 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
7. विज्ञान, (2014) कक्षा 10 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर

BSE 710 : 5.3. Mathematics

Objectives:

- ❖ To gain the knowledge of Mathematics.
- ❖ To know different methods for solve mathematical problems.
- ❖ To understand the mathematics formulas and use them appropriately.
- ❖ To solve various types of mathematical problems

Course Contents:

Unit- I Number System

a) Irrational numbers
b) Real numbers and their decimal expansions
c) Operation on real numbers
d) Laws of exponents for real number
e) Fundamental theorem of arithmetic

Unit- II Plane Geometry

a) Angles and lines at a point
b) Angles made by a transversal with two lines
c) Classification of triangles on the basis of sides and angles
d) Square, Rectangle and Circle
e) Congruence of triangles

Unit- III Algebra

a) Linear equations (in two variables)
b) Polynomials in one variable
c) Zeros of a polynomial
d) Factorization of polynomial
e) Quadratic equation

Unit- IV Trigonometry

a) Introduction
b) Trigonometric ratio
c) Trigonometric ratio of various angles
d) Surface area
e) Statistics –mean, mode , median

Assignment & Practical Work (Any Two)

- Preparation of a term paper based on any above topic
- Solve an examination question paper
- Make a presentation based on any above topic.

Learning Outcomes: After completion of this course students would able to:

- ❖ Gain the knowledge of Mathematics.
- ❖ Know the different methods for solve mathematical problems.
- ❖ Understand the mathematics formulas and use them appropriately.
- ❖ Solve various types of mathematical problems

Suggested Readings:

1. गणित, (2014), कक्षा 7 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
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7. जैन, एस. एल. (2007), गणित शिक्षण, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
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10. सिंह एस. (2005), गणित शिक्षण, विनोद पुस्तक मंदिर, आगरा

BSE 710 : 5.4. General Science

Objectives:

- To develop knowledge of General Science for secondary and Senior Secondary level
- To improve various skills of student teachers in practical work
- To understand the practical and theoretical description of various content
- To solve different problems related with the content of science
- To make student teachers to know importance and use of course content
- To plan, equip and organize physics practical in the laboratory.
- To use various methods with appropriateness of content, level and class room situation.
- To develop scientific attitude and provide training in scientific method to their students.

Course Contents:

Unit- I Matter in Our Surroundings

a) Matter
b) States of matter
c) Change in state of matter
d) Mixture and solution
e) Physical and chemical changes

Unit- II Atoms and Molecules

a) Laws of chemical combination
b) Molecule
c) Atom
d) Chemical formula
e) Mole concept

Unit- III Motion

a) Displacement
b) Velocity
c) Acceleration
d) Force
e) Laws of motion

Unit- IV Atomic Structure

a) Atomic structure
b) Chemical bonding (Ionic bond and covalent bond)
c) IUPAC nomenclature
d) Periodic table
e) Acid - base concept

Assignment & Practical Work (Any Two)

- Preparations of term paper based on any above topic
- Solve an examination question paper
- Make a presentation based on any above topic
- Conducting and reporting three experiments based on above topics.

Learning Outcomes: After completion of this course students would able to:

- ❖ Gain the knowledge of General Science for secondary and Senior Secondary level
- ❖ Improve various skills of student teachers in practical work
- ❖ Understand the practical and theoretical description of various content
- ❖ Different problems related with the content of science
- ❖ Make student teachers to know importance and use of course content
- ❖ Plan, equip and organize physics practical in the laboratory.
- ❖ Use various methods with appropriateness of content, level and class room situation.
- ❖ Develop scientific attitude and provide training in scientific method to their students.

Suggested Readings:

1. भौतिकी, (2014) भाग 1, कक्षा 11 के लिए पाठ्य पुस्तक राजस्थान राज्य पाठ्य पुस्तक मण्डल, जयपुर
2. भौतिकी, (2014) भाग 2, कक्षा 11 के लिए पाठ्य पुस्तक राजस्थान राज्य पाठ्य पुस्तक मण्डल, जयपुर
3. रसायन विज्ञान, (2014) भाग–1, कक्षा 11 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
4. रसायन विज्ञान, (2014) भाग–2, कक्षा 11 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
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6. विज्ञान, (2014) कक्षा 9 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
7. विज्ञान, (2014) कक्षा 10 के लिए, पाठ्यपुस्तक, राजस्थान राज्य पाठ्य पुस्तक मंडल, जयपुर
8. अग्रवाल वी. पी., सिडाना के., पारीक के, (2007), विज्ञान शिक्षण, शिक्षा के प्रकाशन, जयपुर
9. कुलश्रेष्ठ पी. के. (2006), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
10. रावत डी. एस. (2009), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा
11. शर्मा एस. आर. (2008), विज्ञान शिक्षण, अर्जुन पब्लिशिंग हाउस, नई दिल्ली
12. सूद जे. के. (2007), विज्ञान शिक्षण, विनोद पुस्तक मंदिर, आगरा

BSE 710 : 5.5. Biology

Objectives:

- ❖ To understand the various concepts related to Biology.
- ❖ To facilitate the development of Scientific Temper in learner.
- ❖ To provide critical and analytical knowledge to student teacher.
- ❖ To enhance creativity, skillfulness and teaching abilities among trainees to teach the school level students.
- ❖ To develop the skills related to problem solving, critical analysis and awareness to solve various health problems of community.
- ❖ To stimulate curiosity, application of knowledge and constructive thinking among the student teacher for whole biosphere.

Course Contents:

Unit- I Growth and Development

a) Cell structure and cell cycle (Mitosis, Meiosis).
b) Tissues : Types and functions, Internal structure of Monocot and Dicot root, Secondary Growth process, Tissue culture
c) Taxonomy of plants, Structure of flower, Floral formula & Floral diagram.
d) Photosynthesis: Pigment, Light & Dark reaction, C3 and C4 cycle, Calvin cycle & affecting factors, Crassulacean acid Metabolism

Unit- II Reproduction and Genetics

a) Reproduction : Types, System, Procedure and Reproductive health issues in animals
b) Genetics and Evolution: Molecular basis, Mendelism, Gene cloning, Gene transfer
c) Embryology - Stages and Growth, Organogenesis and Test tube baby
d) Biotechnology : Recombinant DNA technology, Gene mapping

Unit- III Physiology and Regulation

a) Respiration : Types, System and process in animals, Glycolysis, Kerb cycle, Oxidative phosphorylation and Fermentation
b) Human physiology : Various system, Related process (Digestion, Circulation, Excretion)
c) Regulation in Animals : Nervous system, Endocrine system

Unit- IV Biodiversity and New Trends

a) Neo Darwinism, Palentogical & Morphological evidences, Hardy-winberg law.
b) Biodiversity and Ecology : Types of pollution, Global Warming, Alnino effect, Ecological Pyramids, Bio-geo-chemical cycles
c) Community and Diseases : Malaria, AIDS, Polio, Cancer, malnutrition etc
d) New Trends and contribution of Eminent Indian Scientist in Biology

Assignment & Practical Work (Any Two)

- Preparation of planning with concept mapping and teaching learning process belongs to five topics in any above unit
- Solve an examination question paper
- Make a power point presentation based on any above topic in units
- Prepare a report related to diseases in local area and organize a awareness campaign in school

Learning Outcomes: After completion of this course students would able to:

- Understand the various concepts related to Biology.
- Facilitate the development of Scientific Temper in learner.
- Provide critical and analytical knowledge to student teacher.
- Enhance creativity, skillfulness and teaching abilities among trainees to teach the school level students.
- Develop the skills related to problem solving, critical analysis and awareness to solve various health problems of community.

- ❖ Stimulate curiosity, application of knowledge and constructive thinking among the student teacher for whole biosphere.

Suggested Readings:

1. Gregaire, L., Gallagher, P. (1992), Life Science, SMD Educational, Publishers, Leiden, The Netherlands.
2. Nair, P. K. G., Hegde, M. J., Prabhu, S. G. (1998), A Text book of Biology (Vol.2), Himalaya Publishing House, Mumbai
3. Naumov, D. (1987) , Zoology, Mir Publishers, Moscow
4. Rajendra, K., D' Silva Precilla., Dernandes, Anita (2004), Biology, Boscos Publications, Mangalore
5. Scott, Peter Physiology and Behaviour of Plants, John Wiley & Son's Ltd. West Sussex, England.
6. ''जीव विज्ञान'' पाठ्य पुस्तकें कक्षा 11 एवं 12 : राष्ट्रीय शैक्षिक एवं अनुसंधान परिषद्, नई दिल्ली
7. शुक्ल, बी. आर. के. व रस्तोगी, सुधा (1994), मानव उद्विकास, सुलभ प्रकाशन, लखनऊ

Semester VIII

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU-801	Knowledge and Curriculum (part-A)	**CC** Any one	**4**	**30**	**70**	**100**
EDU -802	Knowledge and Curriculum (part-B)					

EDU 801: Knowledge and Curriculum (part-A)

Objectives:

- ❖ To know the concept objective and principles of curriculum.
- ❖ To develop the idea and bases of curriculum.
- ❖ To understand various types of curriculum.

Course Contents:

Unit- I Knowledge and Curriculum Concept

a) Knowledge : Concepts, Characteristics, Sources of Acquiring, Methods of Acquiring
b) Curriculum: Meaning, Definition, Characteristics, Aims Importance
c) Difference between old and new concepts of curriculum
d) Principle of curriculum construction and Knowledge

Unit- II Bases of curriculum

a) Sociological bases
b) Scientific bases
c) Philosophical bases
d) Psychological bases

Unit- III Types of curriculum

a) Activity centred and life centred curriculum
b) Subject centred and core centred
c) Experience centred and work based curriculum
d) Hidden Curriculum

Unit- IV National curriculum

a) Concept and Characteristics of National curriculum
b) Curriculum reform in India
c) NCF-2005 (School education)
d) NCFTE-2009(Teacher education)

Assignment & Practical Work (Any Two)

- One term paper on the topic related with the unit.
- Preparation of any one term paper on curriculum .
- Review of present curriculum (Optional subject related)
- Curriculum framework for 10th class.

Learning Outcomes: After completion of this course students would able to:

- Understand the concept, objective and principles of curriculum.
- Develop the idea and bases of curriculum.
- Evaluate the relevancy of curriculum.
- Describe various approaches to curriculum construction

Referances :

1. अग्निहोत्री, रवीन्द्र , आधुनिक भारतीय शिक्षा
2. अग्निहोत्री, रवीन्द्र, भारतीय शिक्षा की वर्तमान समस्याएँ, रिसर्च पब्लिकेशन
3. अग्निहोत्री, रवीन्द्र (2007), आधुनिक भारतीय शिक्षा और समाधान, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
4. ओड, एल. के., शिक्षा के नूतन आयाम, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
5. गुप्ता, एस. पी. (2005), भारतीय शिक्षा का अतिहास, विकास एवं समस्याएँ, शारदा पुस्तक भवन, 11 यूनिवर्सिटी रोड़, इलाहाबाद
6. त्यागी, निरंजन, माध्यमिक विद्यज्ञलयों में पाठ्यक्रम शिक्षण, हिन्दी ग्रन्थ अकादमी
7. पाण्डेय, बृजेश (2002), पाठ्यक्रम अनुदेशन, भारतीय आधुनिक शिक्षा,
8. पाठक, पी. डी. (1995), भारतीय शिक्षा और उसकी समस्याएँ
9. यादव, सियाराम संगीता, सिन्धू पूनम (2008), दूरवर्ती शिक्षा, विनोद पुस्तक मंदिर, आगरा
10. यादव, संगीता, सिन्धू पूनम (2014), पाठ्यक्रम विकास और अनुदेशन, अर्जुन पब्लिशिंग हाऊस, 4837/24, प्रहलाद गली, अंसारी रोड़, दरियागंज, नई दिल्ली–2
11. रावत, प्यारेलाल, प्राचीन एवं आधुनिक भारतीय शिक्षा का इतिहास, भारत पब्लिकेशन, आगरा
12. सक्सैना, एन. आर. स्वरूप, शिक्षा सिद्धान्त, सूर्या पब्लिकेशन, आर. एल. कुक डिपो, मेरठ
13. सिंह, कर्ण (2006), भारत में शिक्षा प्रणाली का विकास, गोविन्द प्रकाशन, लखीमपुर
14. सिंघल, महेशचन्द्र, भारतीय शिक्षा की वर्तमान समस्याएँ, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
15. National Curriculum Frame work NCFTE (2009), for Teacher Education, NCTE, New Delhi
16. National Curriculum Frame work NCF (2005), for Scholl Education, NCTE, New Delhi

EDU 802 : Knowledge and Curriculum (part-B)

Objectives:

- To develop ideas of philosophical bases of curriculum
- To various Sociological bases of curriculum
- To develop various psychological bases of curriculum
- To develop Educational New Trends of curriculum

Course Contents:

Unit- I Philosophical bases of curriculum development

a) Idealism, Naturalism, Pragmatism and curriculum
b) Jain philosophy , Geeta Philosophy , Buddhism Philosophy and curriculum
c) M. K. Gandhi, Vivekanand , R. N. Tagore and curriculum

Unit- II Sociological basis of curriculum development

a) Social change and curriculum
b) Social Mobility and curriculum
c) Social development and curriculum
d) Culture and curriculum

Unit- III Psychological bases of curriculum development

a) Structruralism and curriculum
b) Behaviourism and curriculum
c) Associationism and curriculum
d) Gestaltism and curriculum

Unit- IV Educational New Trends of curriculum

a) Skill and curriculum
b) Values and curriculum
c) NCF-2005(School Education)
d) NCFTE-2009(teacher Education)

Assignment & Practical Work (Any Two)

- Preparation of One term Paper.
- One abstracts of Educational New trends article published in some standard Journals
- Preparation of curriculum Design (any subject related)
- Curriculum frame work for B.Ed. programme.

Learning Outcomes: After completion of this course students would able to:

- ❖ Describe various philosophical bases of curriculum
- ❖ Understand various Sociological bases of curriculum
- ❖ Acquire various psychological bases of curriculum
- ❖ Develop Educational New Trends of curriculum

Suggested Readings:

1. अग्निहोत्री, रवीन्द्र , आधुनिक भारतीय शिक्षा
2. अग्निहोत्री, रवीन्द्र, भारतीय शिक्षा की वर्तमान समस्याएँ, रिसर्च पब्लिकेशन
3. अग्निहोत्री, रवीन्द्र (2007), आधुनिक भारतीय शिक्षा और समाधान, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
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9. यादव, सियाराम संगीता, सिन्धू पूनम (2008), दूरवर्ती शिक्षा, विनोद पुस्तक मंदिर, आगरा
10. यादव, संगीता, सिन्धू पूनम (2014), पाठ्यक्रम विकास और अनुदेशन, अर्जुन पब्लिशिंग हाऊस, 4837/24, प्रहलाद गली, अंसारी रोड़, दरियागंज, नई दिल्ली–2
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Semester VIII

Course Code	Course Title	Course Category	Credit	C.I.A.	Theory	Total
EDU -803	Post Internship	**CC**	**16**	**160 Internship+ 120+120=240 Practical (Two Subjects final lesson)**		**400**

Objectives:

- ❖ To develop unit plan and lesson plan
- ❖ To write objective in behavioural terms
- ❖ To observe the lessons of the school teachers.
- ❖ To prepare schedule of various activities for studetns.
- ❖ To organize different co-curricular activities in the school.
- ❖ To prepare blue pring and test paper for different classes.

Learning Outcomes: After completion of this course students would able to:

- Develop unit plan and lesson plan
- Write objective in behavioural terms
- Observe the lessons of the school teachers.
- Prepare schedule of various activities for studetns.
- Organize different co-curricular activities in the school.
- Prepare blue pring and test paper for different classes.

Post Internship distribution

Sr.no	Content
1.	Regular Practice Teaching including - Unit Plan and Blue Print (Atleast Each Subject of 25 lessons)
2.	Observation
3.	**Block Teaching** School Admission Time Table Morning Assembly Classroom Mangement Oraganization of Various Activities Physical Activities Cultural Activities Leterary Activities Yoga Exercies Field Trips/Picnic Counducting of Meeting Maintenance of Garden/School Action Research Preparation of Register Liberary Management Other Work of School
4.	**Community Service** Swachhata Abhiyan S.U.P.W Environment Related Work Final Lesson (Two teaching Subject)