CHHINDWARA UNIVERSITY

CHHINDWARA

Syllabus

for

Four Year

B.Sc. B.Ed. Degree Course

First Semester

Session 2019-20 Academic Year and Onwards

STRUCTURE OF THE COURSE

B.Sc. B.Ed.

First Semester

Subject/ Paper	Paper/ Practical	Intern.	Total	Pds. /week
B.Sc.Part: Foundation Course				
Moral Values	40	10	50	3
Language – Hindi	40	10	50	3
- English	40	10	50	3
Elective I + Practical	60+25	15	100	9
Elective II+ Practical	60+25	15	100	9
Elective III+ Practical	60+25	15	100	9
Total	**375**	**75**	**450**	
B.Ed. Part				
Human Dev.in Socio.-cult.Co.	40	10	50	3
School Education in India: Historical Perspective	40	10	50	3
Health, Physical Education. & Yoga	--	25	25	2
Work Education	--	25	25	2
Total	**80**	**70**	**150**	
Grand Total	**455**	**145**	**600**	

Second Semester

(2)

Foundation Course: Moral values

आधार पाठय□ म : नैतिक मूल्य

Contact Periods/week: 03
Internal: 10

कुल अंक – 40
प्रश्न एवं अंक निर्धारण
4 समीक्षात्मक / दीर्घउत्तरीय प्रश्न – 28 अंक (7 X 4 प्र.)
2 लघुउत्तरीय प्रश्न – 07 अंक (3.5 X 2 प्र.)
वस्तुनिष्ठ प्रश्न – 05 अंक (1 X 5 प्रश्न)
(व्याख्यात्मक एवं समीक्षात्मक प्रश्नों में आंतरिक विकल्प होंगे।)

Moral Values (नैतिक मूल्य)

इकाई 1.
1. नैतिक मूल्य परिचय एवं वर्गीकरण – डॉ. शशि राय
2. आचरण की सभ्यता – सरदार पूर्ण सिंह

इकाई 2.
1. बुद्ध की करूणा – डॉ. श्रद्धा तिस्स
2. शिकागो व्याख्यान – स्वामी विवेकानन्द

इकाई 3.
1. धर्म और राष्ट्रवाद – महर्षि अरविन्द
2. अप्प दीपो भव – स्वामी श्रद्धानंद

इकाई 4.
1. अंतर्ज्ञान और नैतिक जीवन – डॉ. सर्वपल्ली राधाकृष्णन
2. सादगी – महात्मा गांधी

इकाई 5.
1. भय से मुक्ति – जे. कृष्ण मूर्ति
2. सत्य के साथ मेरे प्रयोग – महात्मा गांधी की आत्मकथा का संक्षिप्त विद्यार्थी संस्करण (सारांश)

Foundation Course: Language – Hindi

आधार पाठय□ म : हिन्दी भाषा

प्रश्नपत्र – 1

Contact Periods/week: 03
Internal: 10

कुल अंक – 40
प्रश्न एवं अंक निर्धारण
4 समीक्षात्मक / दीर्घउत्तरीय प्रश्न – 28 अंक (7 X 4 प्र.)
2 लघुउत्तरीय प्रश्न – 07 अंक (3.5 X 2 प्र.)
वस्तुनिष्ठ प्रश्न – 05 अंक (1 X 5 प्रश्न)
(व्याख्यात्मक एवं समीक्षात्मक प्रश्नों में आंतरिक विकल्प होंगे। आंतरिक मूल्यांकन के लिए दस अंक निर्धारित हैं।)

इकाई 1
1. स्वतंत्रता पुकारती (कविता) – जयशंकर प्रसाद
2. जाग तुझको दूर जाना (कविता) – महादेवी वर्मा
3. उत्साह (निबंध) – रामचंद्र शुक्ल
4. शिरीष के फूल (ललित निबंध) – हजारी प्रसाद द्विवेदी

इकाई 2
1. नमक का दरोगा (कहानी) – प्रेमचंद
2. हार की जीत (कहानी) – सुदर्शन
3. भगवान बुद्ध (निबंध) – स्वामी विवेकानंद
4. लोकतंत्र एक धर्म है (निबंध) – सर्वपल्ली राधाकृष्ण

इकाई 3
1. कछुआ धर्म (निबंध) – चंद्रधर शर्मा गुलेरी

2. वह तोड़ती पथ्तर (कविता) – सूर्यकांत त्रिपाठी निराला
3. सपनों की उड़ान (प्रेरक निबंध)– ए. पी. जे. अब्दुल कलाम
4. चीफ की दावत (कहानी) – भीष्म साहनी

Foundation Course: Language English

Paper - 1

Internal Marks: 10
External Marks: 40

Contact Periods/week: 03

Distribution of Marks:

1. Four critical questions are to set be from unit I. Two questions are to be attempted. Each question will carry 5 marks. (5 X 2 = 10 marks).
2. Students are required to write a paragraph on a given topic in about 100-125 words. (4 X 1 = 4 marks).
3. Students are required to attempt five questions based on the given unseen passage. Each question will carry 2 marks. (2 X 5 = 10 marks)
4. Students are required to attempt 6 questions on vocabulary. Each question will carry one mark. (1 X 6 = 6 marks)
5. Students are required to attempt 10 questions on Grammar. Each question will carry one mark. (1 X 10 = 10 marks).

UNIT: I

John Keats – Ode to a Nightangle Rabindranath Tagore – Where the mind is without fear Rajgopalachari - Preface to the Mahabharta J.L. Nehru - Tryst with Destiny Walt Whitman – O Captain ! My Captain O Henry – The Last Leaf

UNIT: II

Paragraph Writing

UNIT: III

Comprehension of an unseen passage

UNIT: IV

Vocabulary Synonyms, Antonyms, Homophones, Homonyms.

UNIT :V

Grammar & Usage Noun, pronoun, verbs, adjective, adverbs, conjunctions, preposition, articles.

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Elective I – Physics

Paper I: Elements of Mathematical Physics, Mechanics & Relativity

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 60
Min. Pass Marks – 20
Internal – 15 (Theory 10 & Practical 5)
Practical – 25 (External)

Note- At least one question will be set from each unit. 20% of the maximum marks will form simple numerical problems and another 20% would be for objective questions with a provision to provide reasoning. All Questions will have 100% internal Choice.

Objectives

After completion of this course the students will be able to

1. Acquaint themselves with different mathematical techniques and concepts useful in study of physics

2. Differentiate between scalar and vector fields
3. Explain the physical significance of gradient of scalar field and divergence and curl of vector fields
4. Understand the solutions of differential equations of two and three variables and relate those to applications in physics
5. Solve problems on applications of Newton's laws of motion the solution of a single particle under central force field and to a system of particles
6. Understand Keplers laws of Planetary Motion and generalize it to satellites
7. Solve problems of rigid and deformable bodies under gravitational, tensile and compressible force
8. Understand the concept of surface tension and viscosity
9. Understand the phenomena of relativity

Unit – 1: Mathematical Background

Concept of field; gradient of a scalar field and its geometrical interpretations; divergence and curl of a vector field; line, surface and volume integrals; flux of a vector field; Gauss divergence theorem; Green's theorem and Stokes theorem.

Unit -2: Mechanics

Motion in a uniform field; components of velocity and acceleration in different coordinate systems (Cartesian and Polar only); uniformly rotating frame; centripetal acceleration; pseudo forces; Coriolis force and its applications; Foucault pendulum.

Motion under central force; Kepler's law; gravitational law and field; potential due to a spherical body; Gauss and Poisson equations for gravitational self-energy.

Unit-3: Mechanics of Rigid Bodies

System of particles; constraints, degree of freedom; centre of mass; centre of mass and laboratory coordinates, equation of motion; conservation of linear and angular momentum; conservation of energy; rocket propulsion; elastic and inelastic collisions.

Rigid body motion; rotational motion; moments of inertia; calculation of moment of inertial of some regular bodies (rod, lamina, disc and sphere); principal moments and axes; gyroscope.

Unit-4: Properties of Matter

Elasticity: Elasticity; small deformations; Hooks law; elastic constants for an isotropic solid; bending moments; bending of beams; beams supported at both the ends, cantilever, torsion of a cylinder and shearing forces; Poisson's ratio; relation between different elastic modulli; elastic fatigue.

Surface Tension: Surface Tension, Angle of Contact, Capillary Rise method; Energy required to raise a liquid in capillary tube; Factors affecting Surface Tension; Applications of surface tension.

Viscosity and fluid mechanics: Concept of Viscous Forces and Viscosity; Steady and Turbulent flow; Reynolds number; Equation of Continuity; Eulers Equation; Bernoullis Principle; Signus effect; Stokes law.

Unit-5: Relativity

Reference systems; inertial frames; Galilean invariance and conservation laws, Propagation of light, Michelson-Morley experiment; search for ether; Minkowski diagram, Postulates of Special Theory of Relativity; Lorentz Transformations; Lorentz contraction; Time dilation; velocity addition theorem, variation of mass with velocity; mass energy equivalence, particle with zero rest mass; space-time diagram, invariance of laws of physics.

Physics Practical List

1. Acceleration due to gravity 'g' by compound pendulum.
2. Moment of Inertia of 'Fly wheel'.
3. Modulus of rigidity by Maxwell's needle.
4. Young's modulus by Searle's Apparatus.
5. Young's modulus by Searle's method.
6. Modulus of rigidity by Torsion pendulum (Dynamical Method).
7. Moment of Inertia of irregular body by torsional pendulum
8. To determine Young's modulus of the material of beam by the method of bending (using a spherometer.

9. Coefficient of viscosity of gear oil/glycerine.
10. Surface tension of water by capillary rise method.
11. To determine the Poisson's ratio for rubber.
12. Determination of Youngs Modulus, Modulus of rigidity, Poisson's ratio by Searl's method.

Suggested Readings:

- The Mathematics of waves and vibrations, R.K Ghosh, Macmillan
- Introduction to Special Relativity, Robert Resnik, John Wiley & sons (Asia) Pvt. Ltd.
- Classical Mechanics, Dr. J.C Upadhaya, Himalaya Publishing House.
- Introduction to Classical Mechanics, David Morin, Cambridge
- Classical Mechanics, John r. Taylor, University Science Books.

Elective I – Botany

Paper I: Diversity of Microbes and Cryptogams

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 60
Min. Pass Marks – 20
Internal – 15 (Theory 10 & Practical 5)
Practical – 25 (External)

Note: Two questions will be set from each unit and students are required to attempt one question from each unit.

Objective: To gain understanding of classification and structural and functional organization of viruses, bacteria, algae, fungi , bryophytes and Pteridophyts.

Unit I

Viruses: Discovery, structure, classification reproduction and diseases caused.
Bacteria: Structure, classification, nutrition, reproduction and economic importance and a general account of cyanobacteria and mycoplasmas.

Unit II

Algae: General characters, classification and economic importance. Important features in life history of
Chlorophyta : *Volvox, Oedogonium , Coleochete*
Xanthophyta : *Vaucheria*
Phaeophyta : *Ectocarpus, Sargassum*
Rhodophyta : *Polysiphonia*

Unit III

Fungi : General characters, classification and economic importance. Important features in life history of
Mastigomycotina: *Pythium, Phytophthora*
Zygomycotina: *Mucor*
Ascomycotina: *Saccharomyces, Eurotium, Peziza*
Basidiomycotina: *Puccinia, Agaricus*
Deuteromycotina: *Cercospora, Colletotrichum,* General account of Lichens

Unit IV

Bryophyta: General characters, outline classification of Bryophyta. Structure and life history of
Hepaticopsida:*Marchantia*
Anthocerotopsida: *Anthoceros*
Bryopsida: *Funaria*

Unit V

Pteridophyta: General characteristics and outline classification. Important characteristics of Psilopsida, Lycopsida, Sphenopsida and Pteropsida. Structure and reproduction in Rhynia, Lycopoduim, Selaginella, Equisetum, Pteris and Marsilea. Stelar system in pteridophytes.

Practical

Objectives:

- to develop skills of staining **of prokaryotes** and cryptogamus plant to impart skills of temporary and permanent slide preparations

(i) To enhance ability to identify the **of** prokaryotes and cryptogamic plant

(ii) To familiarize the students with diseases and their causative agents.

Microbes and Bryophytes

1. Study of the genera included under algae and fungi.
2. Study of morphology, reproductive structures and anatomy of the examples cited in theory under Bryophytes and Pteridophyta
3. Observation of disease symptoms in hosts infected by fungi, viruses and mycoplasma. Section cutting of diseased material and identification of the pathogens as per the theory syllabus.
4. Gram staining of bacteria (milk, curd, root nodules).
5. Study of crustose, foliose and other types of lichen thalli.

Scheme of Practical Examination

1.	Microscopic preparation and identification (Algae/Fungi)	4
2.	Identification of diseased specimen and its anatomical preparation.	4
3.	Section cutting and staining (Bryophytes)	4
4.	Section cutting and staining (Pteridophytes.)	4
5.	Comment on the spots (1-5)	5
6.	Practical Record/Sessional	4
7.	Internal evaluation	5

Suggested Readings

1. Vashishta, B.R. and A.K. Sinha 2007. Fungi .S. Chand and Co. Ltd.
2. Thakur, Anil K. and Susheel K. Bassi 2007. Diversity of Microbes & Cryptogams. S. Chand & Co. Ltd.
3. Vashishta, B.R., A.K. Sinha and V.P. Singh. 2005. Algae . S. Chand & Co. Ltd.
4. Ingraham, John L. and Catherine A. Ingraham. 2004 . Introduction to Microbiology. 3rd edition. Thomson Asia P. Ltd.
5. Sharma, O.P.1992. Text Book of Thallophytes Tata McGraw Hill Publishing Co.
6. Sharma, P.D.1991. The Fungi, Rastogi & Co. Meerut
7. Dube, H.C.1990. An Introduction to Fungi Vikas Publishing House Pvt. Ltd.
8. Puri, P. 1980. Bryophytes Atma Ram & Sons Delhi
9. Clifton, A. 1958. Introduction to Bacteria McGraw Hill & Co. New York
10. Sharma, O.P. 1990, Text Book of Pteridophyta Mcmillan India Ltd.
11. Varhishta,B.R.2015, Pteridophytes S. Chand Co. New Delhi
12. Sporne K.R.The Morphology Of Bryophytes, Hutchinson, London.
13. Perkier N.S.The Pteridophytes

Elective II – Chemistry
Paper I

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 60
Min. Pass Marks – 20
Internal – 15 (Theory 10 & Practical 5)
Practical – 25 (External)

Note: Two questions will be set from each Unit and the candidates will be required to attempt one:

Objectives

After the end of 1st semester the students should be able to:

(i) acquire the background of mathematical knowledge needed for better understanding of chemical principles and derivations and also to apply in solving problems.

(ii) illustrate how a scientific model can be constructed based on the experimental observations of the behaviours of gases and to explain the properties in terms of microscopic organization.

(iii) explain the properties of liquid state using inter- molecular forces and to differentiate the colloidal state from true solutions in terms of size of the particles and to relate this attribute with their properties with the number of particles to the colligative properties.

(iv) appreciate the importance of phenomenon of colloidal chemistry in daily life.

(v) explain the importance of quantum chemistry in the developing the model of the atom.

(vi) acquire competency to predict the patterns in the properties exhibited by the elements.

(vii) acquire the knowledge of correlating the properties of matter in the solid state to the structure.

(viii) explain the macroscopic behaviour in terms of microscopic properties.

(ix) predict the structure of molecules by studying certain physical properties.

Instructional Strategy:

The teacher in addition to the lecture method may also use assignment-cum-discussion mode for transaction of such topics which the learner has already learnt in the higher secondary stage. The use of ICT in transaction of solid state may also be adopted by the teacher. In describing the shape of molecules and the interplay of Intermolecular forces as they affect the properties of the substances, the teacher may explore the possibility of the use of Ausubel's advance organizer model.

Unit-I **Mathematical Concepts**

Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like k_x, e^x, x^n, sin x, log x; maxima, partial differentiation and reciprocity relations.Integration of some useful/relevant functions; permutations and combinations.Factorials.Probability.

Gaseous States

Postulates of kinetic theory of gases, deviation from ideal behavior, van der Waals equation of state.

Critical Phenomena: PV isotherms of real gases, continuity of states, the iso-therms of van der Waals equation, relationship between critical constants and van der Walls constants, the law of corresponding states, reduced equation of state.

Molecular velocities: Root mean square, average and most probable velocities.

Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases (based on Joule-Thomson effect).

Liquid State & Colloids

Intermolecular forces, structure of liquids (a qualitative description).

Structural differences between solids, liquids and gases.

Liquid Crystal : Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases.Thermography and seven segment cell.

Colloids- classification & properties of sols (optical &electrical),emulsions & gels.

Unit-II **Atomic Structure**

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

Periodic Properties

Atomic and ionic radii, ionization energy, electron affinity and electronegativity-definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behaviour.

Unit-III **SolidState**

Definition of space lattice, unit cell.

Laws of crystallography-(i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry, Symmetry elements in crystals. X-ray diffraction by crystals.Derivation of Bragg equation.Determination of crystal structure of NaC1, KC1 and CsC1 (Laue's method and powder method).

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

Unit-IV **Chemical Bonding**

Convalent Bond-Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, ICl_2^- and H_2O. MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Weak Interactions-Hydrogen bonding, van der Waals forces.

Unit-V

(A) **Physical Properties and Molecular Structure:** Optical activity, polarization (Clausius-Mossoti 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 molecules, magnetic properties-paramagnetism, diamagnetism and ferromagnetics.

(B) **Solutions, Dilute Soluctions and Colligative Properties:** Ideal and non-ideal solutions, methods of expressing concentrations of solutions,activity& activity coefficient.

Dilute solutions, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmatic pressure.Elevation of boiling point and depression of freezing point.Thremodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.Experimental methods for determining various colligative properties.

Abnormal moloar mass, degree of dissociation and association of solutes.

Suggested Readings:

1. Atkins, P.W. & Julio De Paula , Physical Chemistry , OxfordUniversity Press
2. Silbey, R.J. andAlberty , R.A.. , Physical Chemistry John Wiley & Sons, Inc.
3. Castellan, G.W. Physical Chemistry ,Narosa Publishing House
4. Coulson ,C.A., Valence, OxfordUniversity Press
5. Chanda ,Manas ,Chemical Bonding ,TMH Publication
6. Raj Gurudeep, Advanced Physical Chemistry ,Goel Publishing House
7. Puri, Sharma &Pathania , Physical Chemistry ,ShobanLalNagin Chand & Company
8. Rakshit , P.C. , Physical Chemistry, New Age International
9. Lee , J.D. ,Inorganic Chemistry , ELBS
10. Cotton &Willkinson , Inorganic Chemistry, Wiley International

PRACTICALS

1. Analysis of Inorganic mixture containing two cations and two anions including typical combinations.

   anions: CO_3^{2-}, CH_3COO^-, NO_2^-, SO_3^{2-}, S^{2-}, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}

   cations: NH_4^+, Ag^+, Pb^{2+}, Hg_2^{2+}, Cu^{2+}, Hg^{2+}, Bu^{3+}, Cd^{2+}, As^{3+}, Sb^{3+}, Sn^{4+}, fe^{3+}, Cr^{3+}, Al^{3+}, CO^{2+}, Ni^{2+}, Zn^{2+}, Mn^{2+}, Ba^{2+}, Ca^{2+}, Sr^{2+}, Mg^{2+}.

   Insoluble and interfering ions are to be excluded.

2. Titremetric Methods

   (a) Mixture of Na_2CO_3 and $NaHCO_3$ with HCl.

(9)

(b) Estimation of ferrous and ferric by dichromate method.
(c) Estimation of copper using thiosulphate.

3. Physical Chemistry
   (a) Determination of surface tension of given liquid using stalgmometer.
   (b) Determination of viscosity coefficient of amyl alcohol in water at different concentrations and to calculate excess viscosity of these solutions.
   (c) Determination of refractive indices of given set of liquids and calculation of their molar refractions.

Scheme of Examination:

Experiments

(1)	Mixture analysis	-	6
(2)	Titration	-	4
(3)	Physical experiment	-	5
	Internal assessment	-	5
	Viva	-	5

Elective III – Zoology

Paper I: NONCHORDATA, PROTOCHORDATA AND HEMICHORDATA

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 60
Min. Pass Marks – 20
Internal – 15 (Theory 10 & Practical 5)
Practical – 25 (External)

Objective - To gain knowledge of classification of Nonchordates and Protochordates, their structure organization and reproductive animals.

Unit-1

1. Classification of lower invertebrates.
2. Classification of higher invertebrates.
3. Protozoa- type study of *Plasmodium.*
4. Parasitic protozoa & diseases.
5. Porifera - Type study of *Sycon.*

Unit-2

1. Coelenterata -Type study of *Obelia*.
2. Polymorphism in coelenterates.
3. Coral and coral Reefs.
4. Helminthes - Type study of Liver Fluke.
5. Helminthic and Nematoda parasites (*Ascaris, Ancylostoma, Dracunculus, Wucheria* and *Trichinella spiralis).*

Unit-3.

1. Annelida – Type study of Earthworm.
2. Metamerism & Trochophore Larva of *Nereis.*
3. Arthropoda – Type study of Prawn.
4. Sting apparatus of Honey Bees.
5. Mouth parts of Arthropods (biting, sucking, chewing and lapping)

Unit-4

1. Mollusca – Type study of *Pila*.
2. Larval Forms in Mollusca.
3. Echinodermata – Type study of Star Fish.
4. Ambulacral system in Echinoderms.

Unit-5

1. Classification & affinities of Protochordata (Urochordates & Cephalochordates)
2. Urochordata – Type study of *Herdmania* (Excluding development)
3. Cephalochordata – Classification & affinities.

02/11/19

04/11/19

5. Type study of *Balanoglossus*.

10

PRACTICAL

Objective – To develop the skill of identification, staining and study of life cycle of various Protozoan & Helminthic parasites.

1. Study of museum specimens, slides relevant to the type study in theory, from Protozoa upto Hemichordata.
2. Mouth parts of Cockroach.
3. Ctenidium and osphradium of *Pila.*
4. Salivary gland of Cockroach.
5. Sting apparatus of Honey Bees.
6. Mounting of velum & wheel organ of *Amphioxus*.
7. Radula of *Pila*.
8. Study of various Protozoa in pond water.
9. Study of life cycle of various Protozoan & Helminthic parasites (as mentioned in theory syllabus) through charts & models.

SCHEME OF PRACTICAL EXAMINATION

1.	Spotting	-	10
2.	Mounting	-	05
3.	Study of Protozoan/Life cycle of Parasites	-	03
4.	Practical Records	-	03
5.	Viva-voce	-	04
	Total	-	**25 Marks**

Referred books -:

1. Textbook Of Zoology Vol I (Invertebrate) Vol II (Vertebrate)-Parker & Haswell
2. Animal Biology (Vol I & Vol II) -Adhikari, Ganguly & Sinha
3. Textbook of Invertebrates -R.L Kotpal
4. Textbook of Vertebrates- R.L Kotpal
5. Practical Zoology Invertebrates & Vertebrates -S.S.Lal
6. Practical Zoology of Chordates and Non-chordates-P.S. Verma

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Elective III – Mathematics

Contact Periods/week: 05 + 4 Practicum

Maximum Marks – 30+30=60
Min. Pass Marks – 20
Internal – 15 (Theory 10 & Practicum 5)
Practicum – 25 (Internal)

Paper M - 1.1: ALGEBRA, TRIGONOMETRY AND VECTOR ANALYSIS

NOTE : Two questions will be set from each unit with Internal choice

Objectives:

- To develop understanding of matrices, operations in Matrices and solving equations
- To develop understanding of trigonometric functions and summation of series
- To develop understanding of basic concepts of product of scalar and vector product of three vectors
- To develop understanding of vector differentiation including curl, gradient and Divergence

Unit - I Matrices- symmetric, skew symmetric, Hermitian and skew Hermitian matrices. Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, column rank and rank of a matrix, Equivalence of column and row ranks.

Eigenvalues, eigenvectors and the characteristics equation of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix. Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Theorems on consistency of a system of linear equations.

Unit - II Relations between the roots and coefficients of general polynomial equation in one unknown.Transformation of equations. Descart's rule of signs.Solution of cubic equations (cardon method),Biquardratic equations.

Unit - III Demoivre's theorem and its applications. Direct and Inverse circular and Hyperbolic functions.

Unit - IV Logarithm of a complex quantity, Expansion of trigonometrical functions, Gregory's series, summation of series

Unit-V Scalar and vector product of three vectors, Product of four vectors, Reciprocal Vectors. Vector differentiation, Gradient, divergence and curl.

Content as in:

1. H.S. Hall and S.R. Knight : Higher Algebra H.M. Publication
2. S.L. Loney : Plane Trigonometry Part II Mc Millan & Co.
3. B.R. Thakur, Nigam, Sinha, Saran Vector Analysis
4. Manglik and Seth : Vector Calculus

Paper M - 1.2: CALCULUS AND GEOMETRY

NOTE: Two questions will be set from each unit with Internal choice

Objectives:

- To develop understanding of fundamentals of Differential and Integral Calculus
- To make them familiar with the mechanism of deriving equations of surfaces in 2 and 3 dimensions.

Unit - I Epsilon – delta definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuities. Differentiability.

Unit - II Successive differentiation. Leibinitz's theorem. Maclaurin and Taylor series expansions.

Unit - III Asymptotes. Curvature. Tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in cartesian and polar coordinates.

Integration of irrational algebraic functions and transeendantal functions. .Reduction formulae. Definite integrals.

Unit - IV Quadrature. Rectification. Volumes and surfaces of solids of revolution.

Unit- V The straight line and the plane, sphere, cone and cylinder.

Content as in :

1. Thomas & Finney : Calculus, Pearson Education Pvt. Ltd.
2. R.J.T. Bell : Elementary Treatise on Coordinate Geometry of 3 Dimension Mcmilan
3. S.L. Loney : Elements of Coordinate Geometry

M - 1.3 Mathematics Practicum

List of Activities:

- Activity oriented problem solving / Experiments using Mathematical software or computer programming language based on the content studied in semester I Mathematics papers M-1.1 and M-1.2.
- Mathematics seminar.

Education Component:

Human Development in Socio-cultural Context

Contact Periods/week: 03

Maximum Marks – 40
Min. Pass Marks – 13
Internal – 10

Objectives:

- To develop a contemporary understanding of human development: its meanings, processes and perspectives in socio cultural context.
- To acquire theoretical perspectives and develop an understanding of dimensions of human development with special reference to adolescent learners.
- To develop an understanding about the impact/influence of socio cultural context in shaping adolescent development.
- To make them cognizant of specific issues of adolescent behavior in schools and the critical role in dealing with children of diverse abilities.

Course Content:

Unit-I: Human Development and the Contexts

- Human development: Meaning, Nature and Dimensions
- Role of Heredity and Environment in Development
- Socio-cultural Contexts: Meaning, Nature and its Influences on Human Development: Culture, Caste, Class, Religion and Gender - their bearing on development
- Family: Child rearing practices
- School: School Culture, Climate, School Ethos, Teacher Values and Peer groups

Unit-II: Socio-cultural aspects of personality Development

- Cognitive Development (Piaget, Vygotsky & Bruner)
- Psycho-Social Development (Erikson)
- Moral Development (Piaget & Kohlberg)
- Character Development
- Culture and Personality

Unit-III: Understanding Adolescents

- Nature of Adolescence: stage of development, Socio-cultural context
- Characteristics and concerns of Adolescents
- Biological : Physical, Sexual, Emotional
- Cognitive : Abstract Thinking, Meta-cognition
- Psychological : Identity, Individuation, and Sense of Independence
- Social : Adolescents expectation, Social expectation Parental expectation, Skepticism, Peer culture, Role model
- Challenges and opportunities during adolescence: Role of Guidance and Counseling

Unit-IV: Socio-cultural Context Shaping Human Development

- Nature of Socio-culture and Environment.
- Physical Environment
- Influence of Educational Technology
- Media Exposures
- Dealing with learners from varied socio-cultural context and creating culturally compatible classroom

Transactional Modes:

- Class presentations
- Readings and class discussions
- Assignments
- Survey to study child rearing practices
- Case study analysis to understand contextual influence on development

- Exercises on self concept and personality development
- Use of online videos related to cognitive and moral development
- Case study of an adolescent

Suggested Readings:

- Aives, Phillippe (1962). Centuries of Childhood: A Sociology of Family Life, Knops, New York.
- Ambron, S.R. (1983). Child Development, Holt Rinehart & Winston, New York.
- Atkinson, Richard C. et.al. (1983). Introduction to Psychology. Harcourt Brace Jahonovich Inc. New York.
- Barry, Johnson (1964). Classroom Group Behavior, Macmillan New York.
- Bhargava, Mahesh (1994). Introduction to Exceptional Children, Sterling Publishers Pvt. Ltd. New York.
- Bourne, L.E. (1985): Its Principles and Meaning Holt, Rinehart Land Winston, New York.
- Christian, Jyoti (1984). Classroom Group Dynamic, Anu Books, Meerut.
- DeCecco, John P. (1977). The Psychology of Learning and Instruction Prentice Hall of India Pvt. Ltd. New Delhi.
- Gessel, A.L. & Allagh, F.H. (1946). The Child from Five to Ten, Harper & Brothers, New York.
- Hurlock, E.B., (1964). Child Development, Mcgraw Hill Book Co. New York.
- Klausmeier, Herber, J. (1985). Educational Psychology. Herper and Row, New York.
- Kochar, S.K. (1989). Guidance and Counselling in Collegeand Universities, Sterling Publishers Pvt.Ltd., New Delhi.
- Lindern, H.C. (1980). Educational Psychology in the Classroom (sixth ed.). Oxford University Press, New York.
- Mathur S.S. (1988). A Sociological Approach to Indian Education, Vinod Prakashan, Agra.
- Pastrcha, prem, (1976). Guidance and Counselling in India Education NCERT, New Delhi.
- Smith Ronald E. Sarason, I.G. and Sarason, Barbara R. (1982). Psychology: The frontiers of Behaviour. Harper and Row Pub. New York.
- Shrivastava, G.N.P. (1986). Recent Trends in Personality study. Agra Psychological Research Cell, Balangunj, Agra.
- Shrivastava, G.N.P. (1999). Shiksha Manovigyanb, Naveen Vikkchardharayen Concept Publishing Company, New Delhi.

School Education in India: Historical Perspective

Contact Periods/week: 03

Maximum Marks – 40
Min. Pass Marks – 13
Internal – 10

Course Description

The course 'School Education in India' seeks to develop an understanding of processes of how and why education system in India evolved over a period of time. It gives an understanding of the socio-historical evolution of Indian education system by drawing attention on history of formal education system. The course will trace the dimensions of basic understanding of culture, politics and economics that impacted school / university education in light of Vedic, Buddhist, Islamic and British education systems.

Course Objectives

- To introduce the systems of education in historical perspective to appreciate education and its relation to socio-political, cultural and economic context
- To explain about formal school system in India in socio-historical context and its institutionalization.
- To appreciate the change and continuities in educational purposes, processes and practices in Indian education
- To develop historical perspective on contemporary educational issues and problems

Unit-I Understanding Educational Systems of Ancient India: Vedic Education

- Understanding 'India' of Ancient times: Economic Activities, Cultural Practices and Social System

- Social Foundation of education during Vedic period
- Origin and development of formal education during the period
- Vedic education system: Critical understanding of Aims, knowledge and educational practices and agencies
- Relevance of Vedic educational practices to contemporary times

Unit-II Understanding Educational Systems of Ancient India: Buddhist Education

- Social development stage during Buddhist Period: Economic Activities, Development of commerce, Cultural Practices and Social System
- Development of Education system and higher learning centers
- Social Foundation of education during Buddhist period
- Buddhist education system: Critical understanding of Aims, knowledge and educational practices and agencies
- Relevance of Buddhist educational practices to contemporary times
- Comparative study of Vedic and Buddhist education systems

Unit –III Development of Islam education during medieval period

- Understanding 'India' of Middle Ages: Economic activities, Commerce, cultural practices, social systems and political formations
- Origin and development of Islam education
- Islam education system: Critical understanding of Aims, knowledge and educational practices and agencies

Unit – IV Education during Colonial period: British education

- Understanding 'India' of Modern period: Economic activities, commerce, cultural practices, social systems and political formations
- The orientalist and anglicist Conflict
- Development of British education in India through 1813 Act, 1835 McCauley Minutes, 1854 Woods Despatch, 1882 Hunter Commission, 1943-44 Sargent Report
- Efforts and Movement by Indians for compulsory education in India – Mahatma Jyotiba Phule, Gokhale Bill(1910), Basic education (1937)
- British education system: Critical understanding of Aims, knowledge and educational practices and agencies
- Contribution of British to Indian education

Transactional Modes:

- Class presentations
- Readings and class discussions
- Assignments
- Survey to study historical places
- Case study analysis to understand contextual influence on historical development
- Use of online videos related to the history of development of education in India

Suggested Readings:

Altekar, A. S. (1965). *Education in ancient India*. Varanasi: Nand Kishore.

Arnold, D. (1993). *Colonizing the body: State medicine and epidemic disease in nineteenth-century India*. Berkeley: University of California Press.

Blackwell, F. (2004). *India: A global studies handbook*. Santa Barbara, CA: ABC-CLIO.

Chatterjee, P. (1993). *Nationalist thought and the colonial world: A derivative discourse*. Minneapolis: University of Minnesota Press.

Dharampal. (1983). *The beautiful tree: Indigenous Indian education in the eighteenth century*. New Delhi: Biblia Impex.

Ghosh, S. C. (2001). *The history of education in ancient India, c. 3000 BC to AD 1192*. New Delhi: Munshiram Manoharlal Publishers.

Ghosh, S. C. (2009). *The history of education in modern India, 1757-2007*. New Delhi: Orient Blackswan.

Kumar, D. (2006). Science in a Colony: Concept and Contours. *Science and the Raj*, 1-31. doi:10.1093/acprof:oso/9780195687149.003.0001

Kumar, D. (n.d.). India. *The Cambridge History of Science*, 669-687. doi:10.1017/chol9780521572439.029
Mookerji, R. (1951). *Ancient Indian education: (Brahmanical and Buddhist)*. London: Macmillan.
R N. (1975). *Society and culture in India*. Meerut: Rajhans Prakashan Mandir.
Thapar, R. (2000). *Cultural pasts: Essays in early Indian history*. New Delhi: Oxford University Press.
Thapar, R. (2014). *The past as present: Forging contemporary identities through history*.

Health, Physical Education & Yoga - I

Contact Periods/week: 2 Practical

Maximum Marks – 25
Min. Pass Marks – 08
Internal – 25

Unit I

Physical Education – Meaning Scope, Aims & Objectives of Physical Education. Health Education and recreation to general education. Concept and Importance of Health, Personal and Environmental Hygiene. Nutrition and Balance Diet.

Unit II

Physical Fitness, Motor Fitness, Component of Physical Fitness. Effect of Exercise on different Body Systems.

Unit III

Measurements and Evaluation in Physical Education. Different types of Physical Fitness Test and Motor Fitness Test.

Unit IV

Common Sports Injuries and Their Rehabilitation. First Aid. Snake Bite and its First Aid.

Unit V

Yoga Harmony of Body and Mind. Instrument of Yoga- Pranayama, Yogasana, Surya Namaskara, Meditation and Mental Health.

Work Education – I
Option I: Electricity and Electronics

Contact Periods/week: 2 Practical

Maximum Marks – 25
Min. Pass Marks – 08
Internal – 25

Introduction:

Importance of Work Education has been highlighted in the Nation Policy of Education in 1986 and subsequently in NCF 2005.It has been emphasized that the Work Education should be in the form of well structured, graded programme comprising activities to crater the needs of students. The level of knowledge and skills should be upgraded with the advancement in stage of education. The experience would be helpful to the student on his entry into work force.

Objectives:

On the complication of the course the students will be able to:

- Understand the concept of electricity and to define the term electrons, charge, current, voltage, resistance, power and energy.
- Recognize the importance of safety precaution and cause for electrical accidents.
- Identify and apply safe procedure in actual work situations and the step to be observed in electrical shock treatment.
- Acquire knowledge about tools and instrument required in electrical and electronics field.
- Develop the awareness of series and parallel circuit.
- Acquire knowledge about selecting wire, cables and fuse wires etc.

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- Acquaint with functional aspects of various electrical and electronics accessories.
- Identify common measuring instrument.
- Learn connection of different common measuring instrument in the circuit.
- Acquire knowledge about working principal, operation and application of various domestic electrical and electronics appliances.
- Develop skills for dismantling, reassembling and testing of various domestic electrical and electronics appliances.
- Examine schematic layout, wiring diagram and product data of small electrical and electronics project.
- Install DTH, Public Address System (PAS),antenna and repair of T.V. and DVD player.

Learning Outcomes: The student will:

1. Develop practical skills, problem solving skills, experimental skills in him.
2. Get exposed to different processes / methods used in electrical and electronic devices.
3. Develop creative thinking for preparing new electrical and electronics devices.
4. Dismantle and assemble electrical and electronics devices.
5. Locate faults in these devices and repair them.
6. Understand the basic electrical quantities.
7. Recall safety precautions during electrical operations.
8. Rewire the fuse.
9. Understand the principles of functioning of electrical appliances.
10. Measure various electrical quantities.
11. Develop practical skills in repairing, maintaining, and making electronic devices used in day-to-day life.
12. Develop problem-solving skills related to electronic devices.
13. Develop creative thinking in the area of electronics.
14. Develop understanding of basic electrical and electronics science.
15. Identify and test electronic components.
16. Develop skill of soldering to construct electronic devices.
17. Locate fault of electronic devices by various methods i.e.
    i. Testing individual components
    ii. By signal flow method
    iii. By measuring voltages at testing points
18. Installation and use P.A. system.

Syllabus:

Unit 1: Basic Electricity

Definitions of basic electrical quantity electrons, charge, current, voltage, resistance, and power and its unit formula and calculations using simple circuits .A.C. and D.C. and graphical representation of amplitude, frequency, phase difference, wave length, Effect of electric current. Test the supply if A.C. / D.C. Single phase and 3 phase system.

Unit 2: Safety Precaution

Presentation and treatment of shock – cause and effect. First aid treatment To perform an exercise on artificial respiration. To remove person from electrical contact Common tools, description, precaution, care and maintenance of tools used for electrical work and personal safety, shock treatment. Rescue and first aid. Sign and symbol their importance and abbreviation.

Unit 3: Electrical Circuit

Close circuit. Open circuit, Leakage circuit, Short circuit, Series circuit, Parallel circuit, Series- Parallel circuit, Ohms Law, Resistance Specific Resistance, effect of temperature on resistance, Power and Energy Formula and calculations using

Simple circuits. Draw a wiring diagram of a 2 room set consisting of four points –

Bulb, tube light, ceiling fan and three pin plug. Making of a switchboard.

Unit 4: Generation Transmission and Utilization of Electrical Power

Basic principal of electrical generation, Principle of Electro-magnetic Induction, Faraday's Law, Lenz's law. Principle of generator, A.C. and D.C. generator Fleming's right hand rules, Transmission of electrical

power single phase and three phase system, Types of transformer study of single phase transformer working principle, types, material used, construction, testing and specifications, Elementary idea about A.C. Generator Distribution of electrical energy, transmission at high voltage, energy losses during transmission. Types of insulator, pole and tower for transmission line, over head and underground distribution, relay and circuit breaker, uses of electrical power in house, factory, farm etc.

Unit 5: House Wiring

Types of wiring system, General rule for electrical wiring, wiring accessories, cleat, casing-capping, CTS or TRS wiring, Lead sheathed wiring, conduit pipe wiring, wiring materials, load calculation of house. Types of wires & cables standard wire gauge. Classification of wires & cables-insulation and voltage grades, Fuse and its importance, general guideline for fuse, types of fuse and MCB. Earthling and its importance and their type, earth resistance fuse and earthling materials. Different types of wiring connection like staircase, Go-down wiring, Call –bell connection, different connection of bulb, tube- light connection etc. Arrangement of bulbs for a decorative series used in festivals, Make a switch board for one room set consisting of four points –Bulb, tube-light, ceiling fan and socket on the board.

Distribution of marks (25)

1. Internal Exam – 10 marks
2. Practical Exam - 10 marks
3. Record and Viva Vice - 05 marks

Suggested Reading:

1. Basic Electrical Engineering by M.L. Anwani published by Dhanpat Rai and Sons, New Delhi.
2. Elementary Electrical Engineering by M.L. Gupta published by New Hights Karol Bagh, New Delhi.
3. A Text Book of Electrical Technology by B.L. Theraja and A.K. Theraja published by S.Chand & Company Ltd. Ram Nagar New Delhi - 110055
4. Basic Electrical and house wiring published by G.T. Publication(Lab) India,Jaipur,Rajestan.
5. Principal of Electronics by V.K.Mehta and Rohit Mehta by S.Chand & Company Ltd. Ram Nagar New Delhi – 110055
6. The art of Electronics by Thomas C. Hayer and Paul Horowitz , Cambridge University Press , International Sales Department, The Edinburgh Building, Cambridge , U.K

Option II: Agriculuure

Contact Periods/week: 2 Practical

Maximum Marks – 25
Min. Pass Marks – 08
Internal – 25

Introduction:

The importance of Work Education has been highlighted in the National Policy of Education in 1986 and subsequently in NCF 2005. It has been emphasized that the Work Education should be in the form of well structured, graded programme comprising activities to cater the needs of students. The level of Knowledge and skills should be upgraded with the advancement in stages of education. The experience would be helpful to the students on his entry into work force.

Objectives/ Learning outcomes: On completion of the course students will be able to:

- Identify different types of ornamental plants, flowers and gardening tools.
- Propagate plant sexually and asexually.
- Identify different types of garden and its component and understand design & features of garden.
- Demonstrate the knowledge of floriculture.
- Establish and maintain lawn and kitchen garden
- Demonstrate the ability to grow and maintain Vegetable and Fruit crops.
- Identify and categorize fruits and vegetable crops.
- Understand application of manures and fertilizers.
- Demonstrate the control of Insect pest and diseases in kitchen garden.
- Demonstrate the ability for preservation and processing of Horticulture produce.

ORNAMENTAL HORTICULTURE

Unit–I Identification and study of gardening tools, equipments, seasonal flowers, Ornamental trees, Shrubs, Climbers, Creepers and Indoor plants.

Unit–II Knowledge of preparation of seed bed, Transplanting of seedlings, Pot Filling, Potting, Repotting, Various methods of plant propagation, Training, Pruning, Staking and Desucking etc.

Unit-III Principles of design and layout along with their different styles, various types, Important parts and special features of Ornamental Garden.

Unit-IV Commercial cultivation of Rose, Chrysanthemum, gladiolus, marigold and other flower species with reference to improved varieties, Propagation methods nutrition and irrigation requirements with pre and post harvest management practices.

Unit-V Establishment and Maintenance of lawn in ornamental garden.

SCHEME OF EXAMINATION

1. Identification of seasonal flowers, trees, shrubs, climbers, garden tool with comments - 05 mark.
2. Drawing layout Plan of a Ornamental Garden - 05 marks
3. Knowledge of different styles, various types, important parts & special features of ornamental garden. - 05 marks
4. Cultivation of Important Ornamental Plants. - 05 marks
5. Viva and Practical Record - 05 marks

Suggested Readings:

1. Gardening in india, Bose, T.K. and Mukherjee; Oxford and IBH, New Delhi.
2. Floriculture and landscaping,Bose, T.K. and Maiti R.G; NayaPrakash Calcutta.
3. Floriculture in india, Ramdhawa, G.S. and Mukopadhyay, A.K; Allied publishers, New Delhi.
4. Introductory Ornamental Horticulture, Arora, J.S; Kalyani publishers, New Delhi.
5. Planing and Planting Design for Home Gardens, Desai, B.I., I.C.A.R., New Delhi.
6. Flowering Trees, Randhawa,M.S; N.B.T., New Delhi.
7 Garden Flowers, Swarup V;N.B.T., New Delhi.
8. Home Gardening, Trivedi , P; I.C.A.R., New Delhi.
9. Rose, Pal, B.P., I.C.A.R., New Delhi.