बिलासपुर विश्वविद्यालय

बिलासपुर (छत्तीसगढ़)

पाठ्यक्रम

बी.एस.सी. भाग - 2

B. Sc. Part - II

परीक्षा : 2013

:: प्रकाशक ::

कुलसचिव बिलासपुर विश्वविद्यालय

बिलासपुर (छत्तीसगढ़)

:: मुद्रक ::

गीता पब्लिकेशन

महामाईपारा, रायपुर (छत्तीसगढ़)

मूल्य : 25/-

आधार पाठ्यक्रम (पेपर कोड 0841)

प्रश्न पत्र - प्रथम

हिन्दी भाषा

पूर्णांक - 75

खण्ड-क निम्नलिखित 5 लेखकों के एक-एक निबंध पाठ्यक्रम में सम्मिलित होंगे - अंक-30

1. महात्मा गांधी - सत्य और अहिंसा
2. विनोबा भावे - ग्राम सेवा
3. आचार्य नरेन्द्र देव - युवकों का समाज में स्थान
4. वासुदेव शरण अग्रवाल - मातृ-भूमि
5. भगवतशरण उपाध्याय - हिमालय की व्युत्पत्ति
6. हरि ठाकुर - डॉ. खूबचंद बघेल

खण्ड-ख हिन्दी भाषा और उसके विविध रूप अंक-20

- कार्यालयीन भाषा
- मीडिया की भाषा
- वित्त एवं वाणिज्य की भाषा
- मशीनी भाषा

खण्ड-ग अनुवाद व्यवहार : अंग्रेजी से हिन्दी में अनुवाद अंक-25

हिन्दी की व्यवहारिक कोटियाँ-

रचनागत प्रयोगगत उदाहरण, संज्ञा, सर्वनाम, विशेषण, क्रिया विशेषण, समास, संधि एवं संक्षिप्तियां, रचना एवं प्रयोगगत विवेचन ।

ENGLISH LANGUAGE

M.M. 75

(Paper Code - 0842)

The question paper for B.A./B.Sc./B.Com./B.H.Sc., English Language and cultural valuers shall comprise the following units :

UNIT-I Short answer questions to be assed by (Five short answer questions of three marks each) 15 Marks

UNIT-II (a) Reading comprehension of an unseen passage 05 Marks
(b) Vocabulary

UNIT-III Report-Writing 10 Marks

UNIT-IV Expansion of an idea 10 Marks

UNIT-V Grammar and Vocabulary based on the prescribed text book. 20+15 Marks

Note : Question on all the units shall asked from the prescribed text which will comprise specimens of popular creative/writing and the following it any

(a) Matter & technology
  (i) State of matter and its structure
  (ii) Technology (Electronics Communication, Space Science)

(b) Our Scientists & Institutions
  (i) Life & work of our eminent scientist Arya Bhatt. Kaurd Charak Shusruta, Nagarjuna, J.C. Bose and C.V. Raman, S. Rmanujam, Homi J. Babha Birbal Sahani.
  (iii) Indian Scientific Institutions (Ancient & Modern)

Books Prescribed :

Foundation English for U.G. Second Yaer - Published by M.P. Hindi Granth Academy, Bhopal.

NEW CURRICULUM OF B.SC. PART II

CHEMISTRY

The new curriculum will comprise of three papers of 33, 33 & 34 marks each and practical work of 50 marks. The curriculum is to be completed in 180 working days as per the UGC norms & conforming to the directives of the Govt. of Chhattisgarh. The Theory papers are of 60 hrs. each duration & the practical work of 180 hrs. duration.

PAPER - I

INORGANIC CHEMISTRY — M.M. 33

(Paper Code - 0845)

UNIT-I CHEMISTRY OF ELEMENTS OF FIRST TRANSITION SERIES

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

UNIT-II CHEMISTRY OF ELEMENTS OF SECOND & THIRD TRANSITION SERIES

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and streochemistry.

UNIT-III A. OXIDATION AND REDUCTION

Use of redox potential data analysis of redox cycle, redox stability in water-Frost, Latimert & Pourbaix diagrams. Principles involved in the extraction of the elements.

B. COORDINATION COMPOUNDS

Werner's coordination theory and its experimental verification, effective alomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, vcalencey bond theory of transition metal complexes.

UNIT-IV A. CHEMISTRY OF LANTHANIDE ELEMENTS

Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

B. CHEMISTRY OF ACTINIDES

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from uranium, similarities between the later actinides and the later lanthanides.

UNIT-V A. ACID AND BASES

Arrhenius, Bronsted-Lowry, the Lux-flood, solvent system and Lewis concepts of acids and bases.

N. NON-AQUEOUS SOLVENTS — **06 HRS.**

Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid ammonia and liquid sulphur dioxide.

REFERENCE BOOKS :

1. Basic Inorganic Chemistry, F.A. Cotton, G. Wilkinson and P.L. Gaus, Wiley

2. Concise Inorganic Chemistry, J.D. Lee, ELBS.
3. Concepts of models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chamistry, D.E. Shriver, P.W. Atkins and C.H. Langford, Oxford.
5. Inorganic Chamistry, W.W. Porterfield. Addison - Wesley.
6. Inorganic Chamistry. A.G. Sharp, ELBS.
7. Inorganic Chamistry, G.L. Miessler and D.A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Stayas Prakash.
9. Advanced Inorganic Chemistry, Agarwal & Agarwal.
10. Advanced Inorganic Chemistry, Puri & Sharma, S. Naginchand
11. Inorganic Chemistry, Madan, S, Chand
12. Aadhunik Akarbanic Rasayan, A.K. Shrivastav & P.C. Jain, Goel Pub.
13. Ucchattar Akarbanic Rasayan, Satya Prakash & G.D. Tuli, Shyamlal Prakashan
14. Ucchattar Akarbanic Rasayan, Puri & Sharma.
15. Selected topic in Inorgaic Chemistry by Madan Malik, & Tuli, S. Chand.

PAPER - II

ORGANIC CHEMISTRY

60 Hrs. MM. 33

(Paper Code - 0846)

UNIT-I ALCOHOLS

A. Dihydric alcohols - nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol - pinacolone rearrangement.

B. Trihydric alcohols - nomenclature and methods of formation, chemical reactions of glycerol.

PHENOLS

A. Structure and bonding, in phenols, physical properties and acidic character. Comparative acidic strength of alcohols and phenols, resonance stabilization of phenoxide Ion. Reactions of phenols, acylation and carboxylation.

B. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben - Hoesch reaction, Lederer - Manasse reaction and Reimer-Tiemann reaction.

EPOXIDES

Synthesis of epoxides. Catalysed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides. Anti 1,2 dihydroxylation of alkenes via epoxides. Crown eithers.

UNIT-II ALDEHYDES AND KETONES

A. Nomenclature and Structure of the carbonyls group. Synthesis of aldehydes and ketones using 1,3 - dithianes, synthesis of ketones from nitriles.

Mechanism of nucleophilic additions to carbonyls group Benzoin, Aldol, Perkin and Knoevenagel condensations. Condensations with ammonia and its derivateves, Wittig reaction, Mannich reaction.

B. Use of acetate as protecting group, Oxidation of aldehydes, Baeyer - Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen Condensation, Wolff-Kishner reaction, $LiAlH_4$ and NaBH4 reduction. Halogenation of enolizable ketones.

An introduction to α,β unsaturated aldehydes and ketones.

UNIT-III A. CARBOXYLIC ACIDS **05 HRS.**

Structure and bonding, Physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Hell-Volhard Zeilinsky reaction. Reduction of carboxylic acids. Mechanism of Decarboxylation.

Methods of formation and chemical reactions of unsaturated mono carboxylic acids. Di carboxylic acids : methods of formation and effect of heat and dehydrating agents.

B. SUBSTITUTED CARBOXYLIC ACIDS

Hydroxy and Halo-substituted Acids.

C. CARBOXYLIC ACID DERIVATIVES

Structure of acid chloredes, esters, amides and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution.

Mechanisms of acid and base catalyzed esterification and hydrolysis.

UNIT-IV ORGANIC COMPOUNDS OF NITROGEN

A. Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium.

B. Reactivity, Structure and nomenclature of amines, physical properties. Stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Prepatation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel - phthalimide reaction, Hofmann bromamide reaction, Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, azo coupling.

UNIT-V HETEROCYCLIC COMPOUNDS

A. Introduction

Molecular orbitl picture and aromatic character of pyrrole, furan, thiophene and pyridine, methods of synthesis and chemical reactions with emphasis on the mechanism of electrophilic substitution. Mechanism and nucleophilic substitution reaction in pyridine derivatives. Comparison of basicity of pyridine. Piperidine and pyrrole.

B. Preparation and reaction of Indole, quinoline and isoquinoline and with special reference to Fisher Indole synthesis and skraup synthesis and Bisher-Napieralski synthesis, Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

Amino acids and Peptides :

A. Classification, Structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reaction of α-amino acids.

B. Structure and nomenclature of peptides. Peptide synthesis, solid - phase peptide synthesis.

REFERENCE BOOKS :

1. Organic Chamistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chamistry, L.G. Wade Jr. Prentice-Hall.
3. Fundamentals of Organic Chamistry, Solomons, John Wiley
4. Organic Chamistry, Vol. I, II, III, S.M. Mukherjee, S.P. Singh and R.P. Kapoor, Wiley-Eastern (New-Age)
5. Organic Chamistry, F.A. Carey, McGraw Hill
6. Introduction to Organic Chemistry, Struiweisser, Heathcock and Kosover, Macmillan.
7. Organic Chamistry, P.L. Soni
8. Organic Chamistry, Bahi & Bahl
9. Organic Chamistry, Joginder Singh
10. Carbanic Rasayan, Bashi & Bahi
11. Carbanic Rasayan, R.N. Singh, S.M.I. Gupta, M.M. Bakodia & S.K. Wadhwa
12. Carbanic Rasayan, Joginder Singh

PAPER - III

PHYSICAL CHEMISTRY — 60 Hrs. M.M. 34

(Paper Code - 0847)

UNIT-I A. Thermodynamics - I — **12 Hrs.**

Fundamental of thermodynamics system, surroundings etc. Types of systems, intensive and extensive properties, state and path functions themodynamic operations Internal energy, enthalpy, Heat capacity of gases at constant volume and at constant pressure and their relationship.

First Law of Thermodynamics limitation of first law. Joule-Thompson expansion, inversion temperature of gases. Calculation of w,q, dU & dH for the liquification expansion of ideal gases under isothermal and adiabatic conditions.

B. Thermo chemistry

Standard state,- Hess's law of heat summation. Enthalpy of reaction at constant pressure and constant volume. Enthalpy of neutralizations. Enthalpy of combustion, Enthalpy of formation, Calculation of Bond enthalpy. Elirchhoff's equation.

UNIT-II A. Thermodynamics-II

Second Law of Thermodynamics : Spontaseous process need of second law, statements of Carnot cycle and effciency of heat engine, Carnot theorem. Thermodynamic state of temperature.

Concept of entropy : entropy change in a reversible and irreversible process, Entropy change in insothermal reversible expansion of an ideal gas, Entropy

change in isothermal mixing of ideal gases, physical signification of entropy.

B. Gibbs and Helmholtz free energy variation of G and A with pressure, volume temperature, Gibbs Helmholtz equation.

UNIT-III PHASE EQUILIBRIUM

A. Gibbs Phase rule, Phase components and degree of freedom, Limitation of phase rule.

Applications of phase rule to one component system - water system, suplhur system.

Application of phase rule to two component systems : pb-Ag system, Zn, Mg system, ferric chloride-water system, desilverization of ____ congruent and incongruent, melting point, eutectic point.

Three component systems : solid solution liquid pairs.

Liquid liquid mixture : (Partially miscible liquids) : phenol-water, trimethylamine-water nicotine systems, constant temperature, azeotrops.

B. Nerst distribution law, Henry's law, application, solvent extraction.

UNIT-IV ELECTROCHEMISTRY-I **10 HRS.**

A. Electrolytic Conductance : Specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, kohlrausch's law; application of kohlrausch's law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titration.

B. Theories of strong electrolytes : limitations of ostwald dilution law, weak and strong electrolyte, Debye-Huckel- Onsagar (DHO) equation for strong electrolyte, relaxation and electrophoretic effect.

C. Migration of ions : Transport number, definition and determination by Hittorf method and moving boundary method.

UNIT-V ELECTROCHEMISTRY-II **10 HRS.**

A. Electrochemical cell or Galvenic cell : reversible and irreversible cells conventional representation of electrochemical cells, EMF of the cell, effect of temperature on EMF of the cell, Nernst equation, calculation of ΔG, ΔH and ΔS for cell reaction.

B. Single electrode potential : standard hydrogen electrode, calomel electrode quinhydrone electrode, redox electrodes, electrochemical series.

C. Concentration cells with & without transport, liquid junction potential, application of concentration cell in determining valency of ions, solubility product, activity coefficient.

D. Determination of pH and pka using hydrogen and quinhydrone electrode potentiometric titrations, buffer solutions; Henderson-Hazel Equation, Hydrolysis of salts, Corrosion : type theories and prevention.

REFERENCE BOOKS :

1. Physical Chemistry, G.M. Barrow, International student edition-McGraw Hill
2. University general chemistry, C.N.R. Rao, Macmillan.

3. Physical Chemistry, R.A. Alberty, Wiley Eastern.
4. The elements of Physical Chemistry, Eastern.
5. Physical Chemistry through problems, S.K. Dogra & S. Dogra, Wiley Eastern.
6. Physical Chemistry, B.D. Khosla.
7. Physical Chemistry, Puri & Sharma
8. Bhoutic Rasayan, Puri, Sharma & Pathania, Vishal Publishing Company.
9. Bhoutic Rasayan, P.L. Soni
10. Bhoutic Rasayan, Bahl & Tuli
11. Physical Chemistry, R.L. Kapoor, Vol. I-IV

PAPER - IV

LABORATORY COURSE 180 Hrs.

Inorganic Chemistry

Calibration of fractional weights, pipettes and burettes. Preparation of standard solutions, Dilution-0.1 M to 0.01 M. solutions.

Quantitative Analysis

Volumetric Analysis

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

(b) Determination of alkali content-antacid tablet using HCl.

(c) Estimation of calcium content in chalk as calcium oxalate by permanganometry.

(d) Estimation of hardness of water by EDTA.

(e) Estimation of ferrous & ferric by dichromate method.

(f) Estimation of copper using thiosulphate.

Instrumentation

Colorimetry

(a) Job's method

(b) Mole-ratio method

Adulteration-Food Stuffs.

Effluent analysis, water analysis

Solvent Extraction

Separation and estimation of Mg (H) and Fe (H).

Ion Exchange Method

Separation and estimation of Mg (H) and Zn (H).

Organic Chemistry

Laboratory Techniques

A. Thin layer Chromatography

Determination of R_f values and identification of organic compounds.

(a) Separation of green leaf pigments (spinach leave may be used)

(b) Preparation and separation of 2, 4-dinitrophenyl hydrazones of acetone, 2-butanone, hexan-2 and 3-one using toluene and light petroleum (40:60)

(c) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5).

B Paper Chromatography : Ascending & Circular.

Determination of R_f values and identification of organic compounds.

(a) Separation of mixture of phenylalanine and glycine. Alanine and aspartic acid, Leucine and glutamic acid, Spray reagent-ninhydrin.

(b) Separation of mixture of D, L-alanine, glycine, and L-Leucine using n-butanol : acetic acid : water (4:1:5), Spray reagent-ninhydrin.

(c) Separation of monosaccharides- a mixture of D-galactose and d-fructose using n-butanol : acctone : water (4:5:1), Spray reagent-aniline hydrogen phthalate.

Qualitative Analysis

Identification of an organic compound through the functional group analysis, determination of M.Pt. and preparation of derivatives. (Aliphatic and Aromatic)

Physical Chemistry

Transition Temperature

Determination of the transition temperature of the given substance by thermometric/ dialometric method (e.g. $MnCl_2 . 4H_2O/SrBr_2.2H_2O$).

PHASE EQUILIBRIUM

1. To study the effect of asolute (e.g. NaCl, Succinic acid) on the critical solution temperature of two partially miscible liquide (e.g. Phenol-water system and to determine the concentration of that solute in the fiven phenol-water system.
2. To construct the phose diagram of two component system (e.g. diphenylamine-benzophenone) by cooling curve method.

THERMO CHEMISTRY

1. To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.
2. To determine the enthalpy of neutralisation of a weak acid / weak base versus strong base / strong acid and determine the enthalpy of ionisation of the weak acid weak base.
3. To determine the enthalpy of solution of solid calclum chloride and calculate the lattice energy of caloium ohiofide from ite enthaply data using Born Haber cycle.

Regerence Book -

1. Vogel's qualitative Analysis, revised Svehla, Orient Longman.
2. Standered method of chemical analysis, W.W.Scott, the Technical press.
3. Experimental Organic Chemistry, Vol. I & II, P.R.Singh, D.S. Gupta and K.S.Bajpai, Tata McGraw Hill.
4. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
5. Vogel's Text Book of Practical Organic Chemistry, B.S. Furnis, A.J. Hannaford, V.Rogers, P.W.G. S----ith and A.R. Tatchel, ELBS.
6. Experiments in General Chemistry C.N.R.Rao & U.C. Agrawal.
7. Experiments in Phyeical Chemistry R.C. Das & B.Behra, Tata McGraw Hill.
8. Advanced Practical Phvsical Chemistry, J.B. Yadav, Goel Publishing House.

5 Hrs. **PRACTICAL EXAMINATION** M.M. 50

Three Experiments are to be Performed.

1. Inorganic - One experiment from synthesis and analysis by preparing the standard solution be given. 12 marks

OR One Experiment from instrumentation either by colorimetry / solvent extraction/ion exchange method.

2. (a) Identification of the given organic compound & determine its M.Pt./B.Pt. 6 marks

   (b) Determination of R_f value and identification of organic compounds by paper chromatography. 6 marks

3. Any one physical experiment that can be completed in two hours inciuding calculations. 12 marks

4. Viva 10 marks

5. Sessional 04 marks

In case of Ex-Students one marks will be added to each of the experimets.

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PHYSICS

Objectives :

Present course is aimed to provide ample knowledge of basics of physics which are relevant to the understanding of modern trends in higher physics.

The first paper is aimed at preparing the background of thermodynamics and statistical physics essential for any advanced study of physics of condensed matter and radiations.

The second paper is mainly concerned with a course on geometrical and Physical optics and the laser Physics. It deals with important phenomenon like inter-ference, diffraction and polarisation with stress on the basic nature of light. It also introduces the basics of laser physics with some of its important applications.

The experiments are based mostly on the contents of the theory papers so as to provide comprehensive insight of the subject.

Scheme of Examination :

1. There shall be two theory papers of 3 hours duration each and one practical paper of 4 hours duration. Each paper shall carry 50 marks.
2. Each theory paper will comprise of 5 units. Two questions will be set from each unit and the student will have the choice to answer one out of two.
3. Numerical problems of about 30 percent will compulsorily be asked in each theory paper.
4. In practical paper each students has to perform experiments during examination.
5. Practical examination will be of 4 hours duration. The distribution of practical marks will be as follows :

Experiments	:	15 + 15 = 30
Viva-Voce	:	10
Internal Assessment .	:	10

PAPER - I

THERMODYNAMICS, KINETIC THEORY AND STATISTICAL PHYSICS

(Paper Code - 0843)

UNIT-I The laws of thermodynamics : The Zeroth law, concept of path function and point function, various indicator diagrams, work done by and on the system, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, carnot theorem and the second law of thermodynamics. Different versions of the second law. Claussius theorem inequality. Entropy, Change of entropy in simple cases (i) Isothermal expansion of an ideal gas (ii) Reversible isochoric process (iii) Free adiabatic expansion of an ideal gas. Entropy of the universe. Principle of increase of entropy. The thermodynamic scale of temperature, its identity with the perfect gas scale. Impossibility of attaining the absolute zero, third law of thermodynamics.

UNIT-II Thermodynamic relationships : Thermodynamic variables, extensive and intensive, Maxwell's general relationships, application to Joule-Thomson cooling and adiabatic cooling in a general system, Van der Waals gas, Clausius-Clapeyron heat equation.

Thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables. Cooling due to adiabatic demagnetization, production and measurement of very low temperatures. Blackbody radiation : Pure temperature dependence, Stefan-Boltzmann law, pressure of radiation, Special distribution of BB radiation, Wien's displacement law, Rayleigh-Jean's law, the ultraviolet catastrophy, Planck's quantum postulates, Planck's law, complete fit with experiment.

UNIT-III Maxwellien distribution of speeds in an ideal gas : Distribution of speeds and of velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines.

Transport phenomena in gases : Molecular collisions, mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure.

Liquifaction of gases : Boyle temperature and inversion temperature. Principle of regenerative cooling and of cascade cooling, liquifaction of hydrogen and helium. Refrigeration cycles, meaning of efficiency.

UNIT-IV The statistical basis of thermodynamics : Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space, canonical phase space, Gamma phase space and mu phase space. Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy. Transition to quantum statistics : 'h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator.

UNIT-V Indistinguishability of particles and its consequences, Bose-Einstein & Fermi-Dirac conditions, Concept of partition function, Derivation of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics Through Canonical partion function. Limits of B.E. and F-D statistics to M-B statistics. Application of BE statistics to black body radiation, Application of F-D statistics to free electrons in a metal.

TEXT AND REFERENCE BOOKS :

1. B.B. Laud, "Introduction to Statistical Mechanics" (Macmillan 1981)
2. F. Reif : "Statistical Physics" (Mcgraw-Hill, 1998).
3. K, Haung : "Statatistical Physics" (Wiley Eastern, 1988).
4. Thermal and statistical Physics : R.K. Singh, Y.M. Gupta and S. Sivraman
5. Physics (Part-2) : Editor, Prof : B.P. Chandra, M.P. Hindi Granth Academy.

PAPER - II

WAVES, ACOUSTICS AND OPTICS

(Paper Code - 0844)

UNIT-I Waves in media : Speed of transverse vaves on a uniform string, speed of longitudinal vaves in a fluid, energy density and energy transmission in waves, typical

measurements. Waves over liquid surface : gravity waves and ripples. Group velocity and phase velocity, their measruements.

Harmonics and the quality of sound ; examples. Production and detection of ultrasonic and infrasonic waves and applications.

Reflection, refraction and diffraction of sound : Acoustic impedance of a medium, percentage reflection & refraction at a boundary, impedence matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.

UNIT-II Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications.

Cardinal points of an optical system, thick lens and lens combinations. Lagrange equation of magnification, telescopic combinations, telephoto leneses.

Monochromatic aberrations and their reductions ; aspherical mirrors and schmidt corrector plates, aplanatic points, oil imersion objectives, meniscus lens.

Optical instruments : Entrance and exit pupils, need for a multiple lens eyepiece, common types of eyepieces. (Ramsdon and Hygen's eyepieces)

UNIT-III Interference of light : The principle of superpositions, two slit interference, coherence requirement for the sources, optical path retardations, lateral shift of fringes, Rayleigh refractometer Localised fringes ; thin films. Haldinger fringes : fringes of equal indination. Michelson interferometer, its application for precision defermination of wavelength, wavelength difference and the width of spectral lines, Twymann. Green interferometer and its uses, intensify distribution in multiple beam interference. Tolansky fringes, Fabry-Perot interferometer and etalon.

UNIT-IV Fresnel half-period zones, plates, straight edge, rectilinear propagation, Fraunhefer diffraction : Diffraction at a slit, half-period zones, phasor diagram and integral calculus methods, the intensity distribution, diffraction at a circular aperture and a circular disc, resolution of images, Rayleigh criterion, resolving power of telescope and microscopic systems.

Diffraction gratings : Diffraction at N parellel slits, intensity distribution, plane diffraction grating, relection grating and blazed gratings, Concave grating and different mountings, resolving power of a grating and comparison with resolving powers of prism and of a Fabry-Perot etalon.

Double refraction and optical rotation : Refraction in uniaxial crystals, Phase retardation plates, double image prism. Rotation of plane of polarisation, origin of optical rotation in liquids and in crystals.

UNIT-V Laser system : Purity of a spectral line, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, Types of Laser : Ruby and, He-Ne and Semiconductor lasers.

Application of lasers : Application in communication, Holography and non linear optics. (Polarization P including higher order terms in E and generation of harmonics).

TEXT AND REFERENCE BOOKS :

1. A.K. Ghatak, 'Physical Optics'
2. D.P. Khandelwal, Optical and Atomic Physics' (Himalaya Publishing House, Bombay,

1988)
3. K.D. Moltev ; 'Optics' (Oxford University Press)
4. Sears : 'Optics'
5. Jenkins and White : 'Fundamental of Optics' (McGraw-Hill)
6. B.B. Laud : Lasers and Non-linear Optics (Wiley Eastern 1985)
7. Smith and Thomson : 'Optics' (John Wiley and Sons)
8. Berkely Physics Courses : Vol.-III, 'Waves and Oscilations'
9. I.G. Main, 'Vibratiens and Waves' (Cambridge University Press)
10. H.J. Pain : 'The Physics of Vibrations and Waves' (MacMillan 1975)
11. Text Book of Optics : B.K. Mathur
12. B.Sc. (Part III) Physics : Editor : B.P. Chandra, M.P. Hindi Granth Academy.
13. F. Smith and J.H. Thomson, Manchester Physics series : optics (English language book soeiety and Jehu wiley, 1577)
14. Bern and Wolf : 'Opties'.

PRACTICALS

Minimum 16 (Sixteen) out of the following or similar experiments of equal standard.

1. Study of Brownian motion
2. Study of adiabatic expansion or a gas.
3. Study of conversion of mechanical energy into heat.
4. Heating efficiency of electrical kettle with varying voltages.
5. Study of temperature dependence of total radiation.
6. Study of termperature dependence of spectral density of radiation.
7. Resistance thermometry.
8. Thermoemf thermometry.
9. Conduction of heat through poor conductors of different geometries.
10. Experimental study of probability distribution for a two-option system using a coloured dice.
11. Study of statistical distributions on nuclear distintergration data (GM Counter used as a black box)
12. Speed of waves on a stretched string.
13. Studies on torsional waves in a lumped system.
14. Study of interference with two coherent sources of sound.
15. Chlandi's figures with varying excitation and loading points.
16. Measurement of sound intensities with different situation.
17. Characteristics of a microphone-loudspeaker system.
18. Designing an optical viewing system.
19. Study of monochromatic defects of images.
20. Determining the principal points of a combination of lenses.

21. Study of interference of light (biprism or wedge film)
22. Study of diffraction at a straight edge or a single slit.
23. Study of F-P elaton fringes.
24. Use of Deffraction grating and its resolving limit.
25. Resolving limit of a telescope system.
26. Polarization of light by reflection ; also cos-squared law.
27 Study of Optical rotation for any systems.
28. Study of laser as a monochromotor coherent sourec.
29. Study of a divergenee of a Laser beam.
30. Calculation of days between two dates of a year.
31. To check if triangle exists and the type of the triangle.
32. To find the sum of the sine and cosine series and print out the curve.
33. To solve simultaneous equations by elimination method.
34. To prepare a mark-list of polynomials.
35. Fitting a straight line or a simple curve to a given data.
36. Convert a given integer into binary and octal systems and vice-versa.
37. Inverse of a matrix.
38. Spiral array.

TEXT AND REFERENCE BOOKS :

D.P. Khandelwal	:	"Optics and Atomic Physics" (Himalaya Publishing House, Bombay 1988)
D.P. Khandelwal	:	"A Laboratory Manual for Undergraduate Classes" (Vani Publishing House, New Delhi)
S. Lipschutz and A Poe	:	"Schaum's Outline of Theory and Problems of Programming with Fortran" (McGraw-Hill Book Company 1986)
C. Dixon	:	"Numerical Analysis".

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MATHEMATICS

There shall be three compulsory papers. Each paper of 50 marks is divided into five units and each unit carry equal marks.

PAPER - I

ADVANCED CALCULUS

(Paper Code - 0848)

UNIT-I Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests, Cauchy's integral test, Ratio tests, Raabe's, logarithmic, De Morgan and Bertrand's tests. Alternating series, Leibnitz's theorem. Absolute and conditional covergence.

UNIT-II Continuity, Sequential continuity, Properties of continuous functions, Uniform continuity, Chain rule of differentiability, Mean value therorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives Taylor's theorem with various forms of remainders.

UNIT-III Limit and continuity of functions of two variables, Partial differentiation Change of variables, Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Jacobians.

UNIT-IV Envelopes, Evolutes, Maxima, minima and saddle points of functions, two variables, Lagrange's multiplier method.

UNIT-V Beta and Gamma functions, Double and triple integrals, Dirichet's integrals, Change of order of intergration in double integrals.

REFERENCES :

1. Gabriel Klaumber, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
2. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. R.R. Goldberg, Real Analysis, Oxford & I.B.H. Publishing Co., New Delhi, 1970.
4. D. Soma Sundaram and B. Choudhary, A First Course in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5. P.K. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi, 2000.
6. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
7. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co., New York.
8. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd., Allahabad.
9. S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd., New Delhi.
10. O.E. Stanaitis, An Introduction to Sequences, Series and Improper Integrals, Holden-Dey, Inc., San Francisco, California.
11. Earl D. Rainville, Infinite Series, The Macmillan Company, New York.
12. Chandrika Prasad, Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd., Allahabad.

13. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.
14. Shanti Narayan, A Course of Mathematical Analysis, S.Chand and Company, New Delhi.

PAPER - II

DIFFERENTIAL EQUATIONS

(Paper Code - 0849)

UNIT-I. Series solutions of differential equations- Power series method, Bessel and Legendre, Functions and their properties-convergence, recurrence and generating relations, Orthogonality of functions, Sturm-Liouville problem, Orthogonality of eigen-functions, Reality of eigen values, Orthogonality of Bessel functions and Legendre polynomials.

UNIT-II Laplace Transformation - Linearity of the Laplace transformation, Existence theorem for Laplace transforms, Laplace transforms of derivatives and integrals, Shifting theorems, Differentiation and integration of transforms, Convolution theorem, Solution of integral equations and systems of differential equations using the Laplace transformation.

UNIT-III Partial differential equations of the first order, Lagrange's solution, Some special types of equations which can be solved easily by methods other than the general method, Charpit's general method of solution.

UNIT-IV Partial differential equations of second and higher orders, Classification of linear partial differential equations of second order, Homogeneous and non-homogeneous equations with constant coefficients, Partial differential equations reducible to equations with constant coefficients, Monge's methods.

UNIT-V Calculus of Variations - Variational problems with fixed boundaries- Euler's equation for functionals containing first order derivative and one independent variable, Externals, Functionals dependent on higher order derivatives, Functionals dependent on more than one indepedent variable, Variational problems in parametric form, invariance of Euler's equation undercoordinates transformation.

Variational Problems with Moving Boundaries - Functionals dependent on one and two functions, One sided variations.

Sufficient conditions for an Extremum - Jacobi and Legendre conditions, Second Variation, Variational principle of least action.

REFERENCES :

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999.
2. D.A. Murray, Introductory Course on Differential Equations, Orient Longman, (India), 1967.
3. A.R. Forsyth, A Treatise on Differential Equations, Macmillan and Co. Ltd., London.
4. Lan N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill Book Company, 1988.
5. Francis B. Hilderbrand, Advanced Calculus for Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 1977.
6. Jane Cronin, Differential equations, Marcel Dekkar, 1994.

7. Frank Ayres, Theory and Problems of Differential Equations, McGraw-Hill Book Company, 1972.
8. Richard Bronson, Theory and Problems of Differential Equations, McGraw-Hill, Inc., 1973.
9. A.S. Gupta, Calculus of variations with-Applications, Prentice-Hall of India, 1997.
10. R. Courant and D. Hilbert, Methods of Mathematical Physics, Vots. I & II, Wiley-Interscience, 1953.
11. I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice-Hill, Englewood Cliffs (New Jersey), 1963.
12. A.M. Arthurs, Complementary Variational Principles, Clarendon Press, Oxford, 1970.
13. V. Kornkov, Variational Principles of Continuum Mechanics with Engineering Applications, Vol. I, Reidel Publ. : Dordrecht, Holland, 1985.
14. T. Oden and J.N. Reddy, Variational Methods in Theoretical Mechanics, Springer-Verlag, 1976.

PAPER - III

MECHANICS

(Paper Code - 0850)

STATICS

UNIT-I Analytical conditions of Equilibrium, Stable and unstable equilibrium, virtual work, Catenary.

UNIT-II Forces in three dimensions, Poinsot's central axis, Null lines and planes, Dynamics.

UNIT-III Simple harmonic motion, Elastic strings, velocities and accelerations along radial and transverse directions, Projectile, Central orbits.

UNIT-IV Kepler's laws of motion, velocities and acceleration in tangential and normal directions, motion on smooth and rough plane curves.

UNIT-V Motion in a resisting medium, motion of particles of varying mass, motion of a particle in three dimensions, acceleration in terms of different co-ordinate systems.

REFERENCES :

1. S.L. Loney, Statics, Macmillan and Company, London.
2. R.S. Verma, A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad.
3. S.L. Loney, An Elementary Treatise on the Dynamics of a particle and of rigid bodies, Cambridge University Press, 1956.

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BOTANY

PAPER - I

DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS

(Paper Code - 0861)

M.M. : 50

UNIT-I. 1. Characteristics of seed plants ; evolution of the seed habit ; seed plants with (angiosperms) and without (gymnosperms) fruits ; fossil and living seed plants.

2. General features of gymnosperms and their classification ; evolution and diversity of gymnosperms ; geological time scale, fossilization and fossil gymnosperms.

UNIT-II 3. Morphology of vegetative and reproductive parts ; anatomy of roots, stem and leaf, reproduction and life cycle of Pinus, Cycas and Ephedra.

UNIT-III 4. Angiosperms : origin and evolution, some examples of primitive angiosperms.

UNIT-IV 7. Classification of angiosperms ; salient features of the systems proposed by Bentham and Hooker and Engler and Prantl.

8. Major contributions of cytology, phytochemistry and taximetrics to taxonomy.

UNIT-V 9. Diversity of flowering plants : General account of the families Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, Apiaceae, Acanthaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Chenopodiaceae, Euphorbiaceae, Liliaceae and Poaceae.

PAPER - II

STRUCTURE DEVELOPMENT AND REPRODUCTION IN FLOWERING PLANTS

M.M. 50

(Paper Code - 0862)

UNIT-I. 1. The basic body plan of a flowering plant : modular type of growth.

2. Diversity in plant form in annuals, biennials and perennials ; convergence of evolution of tree habit in gymnosperms, monocotyledons and dicotyledons ; trees-largest and longest-lived organisms.

UNIT-II 3. The shoot system : the shoot apical meristem and its histological organization ; vascularization of primary shoot in monocotyledons and dicotyledons ; formation of internodes, branching pattern ; monopodial and sympodial growth ; canopy architecture ; cambium and its functions ; formation of secondary xylem, a general account of wood structure in relation to conduction of water and minerals ; characteristics of growth rings, sapwood and heart wood ; role of woody skeleton ; secondary phloem - structure-function relationships, periderm.

UNIT-III 4. Leaf : origin, development, arrangement and diversity in size and shape ; internal structure in relation to photosynthesis and water loss ; adaptations to water stress ; senescence and abscission.

5. The root system : the root apical meristem ; differentiation of primary and secondary tissues and their roles ; structural modification for storage, respiration, reproduction and for interaction with microbes.

UNIT-IV 6. Flower : a modified shoot ; structure, development and varieties of flower, functions, structure of anther and pistil, the male and female gemetophytes ; types of pollination ; attractions and rewards for pollinators ; pollen-pistil inter-

action, self incompatibility, double fertilization, formation of seed-endosperm and embryo ; fruit development and maturation.

UNIT-V 7. Significance of seed : suspended animation ; ecological adaptation ; unit of genetic recombination and replenishment, dispersal strategies.

8. Vegetative reproduction : vegetative propagation, grafting, economic aspects.

PRACTICAL SCHEME

Time : 4 Hrs. **M.M. : 50**

1.	Plant Description	08
2.	Gymnosperm	07
3.	Anatomy	07
4.	Embryology	04
5.	Spotting (1-5 Spots)	10
6.	Field Report (Local Flora : Rainy/Winter/Summer Season)	04
7.	Viva-Voce	05
8.	Sessional	05
	Total Marks :	**50**

BOTANY (PRACTICAL)
SUGGESTED LABORATORY EXERCISES

ANGIOSPERMS

The following species are suitable for study. This list is only indicative. Teachers may select plants available in their locality.

1. Ranunculaceae : Ranunculus, Delphinium
2. Brassicaceae : Brassica, Alyssum, Iberis, Coronoupus
3. Malvaceae : Hibiscus, Abutilon
4. Rutaceae : Murraya, Citrus
5. Fabaceae : Faboideae : Lathyrus, Cajanus, Melilotus, Trigonella, Caesalpinioideae ; Cassia, Caesalpinia ; Mimosoideae ; Prosopis, Mimosa, Acacia.
6. Apiaceae : Coriandrum, Foeniculum, Anethum
7. Acanthaceae : Adhatoda, Peristrophe
8. Apocynaceae : Vinca, Thevetia, Nerium
9. Asclepiadaceae : Calotropis
10. Solanaceae : Solanum, Withania, Datura
11. Euphorbiaceae : Euphorbia, Phyllanthus
12. Lamiaceae : Ocimum, Salvia
13. Chenopodiaceae : Chenopodium, Beta
14. Liliaceae : Asphodelus, Asparagus
15. Poaceae : Avena, Triticum, Hordeum, Poa, Sorghum

GYMNOSPERMS

CYCAS

i. Habit, armour of leaf bases on the stem (if specimen is not available show photograph), very young leaf (circinate vernation) and old foliage leaves, scale leaf, bulbils, male cone (specimen), microsporophyll, megasporophyll, mature seed.

ii. Study through permanent slides - normal root (T.S.), stem (T.S.) (if sections are not

available show photographs), ovule (L.S.).

iii. Study through hand sections or dissections - coralloid root (T.S.), rachis (T.S.), leaflet (V.S.), microsporophyll (V.S.), pollen grains (W.M.).

PINUS

i. Habit, long and dwarf shoot showing cataphylls and scale leaves, T.S. wood showing growth rings, male cone, 1st year, 2nd year female cones, winged seed.

ii. Study through permanent slides - root (T.S.), female cone (L.S.), ovule (L.S.), embryo (W.M.) showing polycotyledonous condition.

Study through hand sections or dissections - young stem (T.S.), old stem (wood) (T.L.S. and R.L.S.), needle (T.S.), male cone (L.S.), male cone (T.S.), pollen grains (W.M.).

EPHEDRA

i. Habit and structure of whole male and female cones.

ii. Permanent slides - female cone (L.S.)

iii. Hand sections/dissections-node (L.S.), internode (T.S.), macerated stem to see vessel structure, epidermal peel mount of vegetative parts to study stomata, male cone (T.S. and L.S.), pollen grains.

SUGGESTED LABORATORY EXERCISES :

Embryology, Anatomy and Vegetative Propogation etc.

1. Study of commonly occuring dicotyledonous plant (for example Solanum nigrum or Kalanchoe) to understand the body plan and modular type of growth.
2. Life forms exhibited by flowering plants (by a visit to a forest or a garden), study of tree like habit in cycads, bamboos, banana, traveller's tree (Ravenala madagasariensis) or yucca and comparison with ture trees as exemplified by conifers and dicotyledons.
3. L.S. shoot tip to study the cytohistological zonation and origin of leaf primordia.
4. Monopodial and Sympodial types of branching in stems (especially rhizomes).
5. Anatomy of primary and secondary growth in monocots and dicots using hand sections (or prepared slides), structure of secondary phloem and xylem, Growth rings in wood, Microscopic study of wood in T.S., T.L.S. and R.L.S.
6. Field study of diversity in leaf shape, size, thickness, surface properties, internal structure of leaf, structure and development of stomata (using epidermal peels of leaf).
7. Anatomy of the root, Primary and secondary structure.
8. Examination of a wide range of flowers available in the locality and methods of their pollination.
9. Structure of anther, microsporogenesis (using slides) and pollen grains (using whole mounts), pollen viability using in vitro pollen germination.
10. Structure of ovule and embryo sac development (using serial sections)
11. Test of self-incompatibility (using Petunia axillaris, Brassica campestris, B. olderacea or suitable available material) using field pollinations.
12. Nuclear and cellular endosperm, embryo development in monocots and dicots (using slides/dissections).
13. Simple experiments to show vegetative propagation (leaf cuttings in Bryophyllum, Sansevieria, Begonia, stem cuttings in rose, salix, money plant, sugarcane and Bougainvillea).
14. Germination of non-dormant and dormant seeds.

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ZOOLOGY

PAPER - I

ANATOMY & PHYSIOLOGY

M.M. : 50

(Paper Code - 0863)

UNIT-I Comparative Anatomy of various organ systems of vertebrates.

1. Integument and its derivatives : structure of scales, hair and feathers.
2. Alimentary canaland digestive glands in vertebrates.
3. Respiratory Organs

Gills and lung, Air-Sae in birds

UNIT-II

1. Endoskeleton-Limbs, girdles and vertebrae.
2. Circulatory System - Evolution of heart and aortic arches.
3. Urinogenital System - Kidney and excretory ducts.

UNIT-III

1. Nervous System - General plan of brain and spinal cord.
2. Endocaine glands - classification and histology.
3. Gonads and genital ducts.

UNIT-IV

1. Digestion and absorption of dietary components.
2. Physiology of heart, Cardiac cycle and ECG.
3. Blood Coagulation.
4. Respiration-Mechanism and control of breathing.

UNIT-V

1. Excretion-Physiology of excretion, Osmoregulation.
2. Physiology of Muscle contraction.
3. Physiology of nerve impulse, Synaptic transmission.
4. Ear and Eye - structure and function.

LIST OF RECOMMENDED BOOKS :

1. Conn, Stumpy RK, Bruening and D.C. : Outlines of Biochemistry.
2. Gaviong : Review of Medical Physiology.
3. Eckest, R. : Animal Physiology (W.H. Freeman)
4. Hildbrand : Analysis of Vertebrate structure
5. Kingsley : Outlines of Comparative Anatomy (Central Book Depot)
6. Rouer & Parsons : The Vertebrate Body, (Saunders)
7. Walta & Gyles : Biology of the Vertebrates (Macmillan)

PAPER - II

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

(Paper Code - 0864)

UNIT-I

1. General Characters of Hormones.
2. Hormone Receptor
3. Biosynthesis and secretion of thyroid, Adrnal ; Ovarian and testicular hormones.
4. Endocrine disorder due to hormones and other gland.

UNIT-II

1. Reproductive cycle in vertebrate.
2. Menustration, Lactation and pregnancy.
3. Mechanism of parturition.
4. Hormonal regulation of gametogenesis.
5. Extra embryonic membrane.

UNIT-III
1. Evidences of organic evolution.
2. Theories of organic evolution.
3. Variation, Mutation, Isolation and Natural selection.
4. Evolution of Horse.

UNIT-IV
1. Introduction to Ethology.
2. Patterns of Behaviour Taxes, Rellexes, Drives and Stereotyped Behaviour.
3. Reproductive Behavioural Patterns.
4. Hormones, Drugs and Behaviour.

UNIT-V
1. Aquaculture
2. Sericultural
3. Apiculture
4. Pisciculture
5. Poultry keeping
6. Elements of Pest Control -
   1. Chemical control
   2. Biological Control

PRACTICAL WORK

The practical work in general shall be based on the syllabus prescribed in theory. The students will be required to show the knowledge of the following.

1. Study of the representative examples of the different chordates (Classification and character)
3. Simple microscopic technique through unstained or stained permanent mounts.
4. Study of prepared slides histological, as per theory papers.
5. Study of limb girdles and vertebrae of frog, varanus, fowl and Rabbit.
6. Identification of species and individuals of honey bee.
7. Life cycle of honey bee and silkworm.

PRACTICAL WORK - DISTRIBUTION OF MARKS

3.	Permanent mount	09
4.	Spotting-8 (Slides-4, bones-2, specimens-2)	16
5.	Viva	05
6.	Sessional marks	**Total : 50**

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MICROBIOLOGY

B.SC. PART II

SCHEME OF EXAMINATION

Paper	-	Title	
First	-	Microbial Physiology and Genetics	50
Second	-	Principles of Bioinstrumentation and Techniques	50
Practical	-		50
			Total : 150

PAPER - I

MICROBIAL PHYSIOLOGY AND GENETICS

(Paper Code - 0869) **M.M. : 50**

UNIT-I Plasma membrane and transport across membrane, Energy transformation, Physiology of bacterial growth, phases of growth, growth conditions, differentiation in bacterial cells-sporulation, germination; bacterial cell division replication of chromosome, partition of chromosome into daughter cell.

UNIT-II Primary and Secondary metabolism.

UNIT-III Bacterial plasmids; structure and properties, replication, incopatibility, plasmid amplification.

Bacteriophages; lytic development cycle - T4; lytic and lysogenic development of phage, single stranded DNA phage.

Transposition; Structure of bacterial transposons, types of bacterial transponsons. Mechanism of antibiotic resistance and speard of antibiotic resistance.

UNIT-IV Genetic recombination; requirements, molecular basis, genetic analysis of recombination in bacteria.

UNIT-V DNA Repair and restriction; Types of repair systems; restriction endonuclease, various types of restriction enzymes, dam and dcm methylases.

Text Book :

1. Gene Cloning by T.A. Brown.
2. General Microbiology by Power and Daganiwala.
3. Zinssers Microbiology by KJ Wolfgang, McGraw- HJill Company.
4. Microbial Genetics by RM Stanley, F David and EC John.
5. Bacteriological Techniques by FJ Baker.

PAPER II

PRINCIPLES OF BIONISTRUMENTATION AND TECHNIQUES

(Paper Code - 0870) **M.M. : 50**

UNIT-I Colorimetry and spectrophotometry.

Spectrofluorimoty, turbidometry, nepholometry, luminometry.

pH metery.

UNIT-II Chromatography; adsorption partition, column, gas, ion-exchange, gel filtation, and affinity, Chromatography, HPLC, FPLC.

UNIT-III Centrifugation and ultracentrifugation.

Microscopy- light, phase-contrast, fluorescence, dark field, electron microscopy. Laser, confocal, microscopy and digital image analysis

UNIT-IV Tissue culture techniques; Principal and requirements of animal tissue culture, Decontamination, sterilization and disinfection.

UNIT-V Electrophoreses techniques- types and their application; Electrophoresis of proteins and mucleic acids. Immunoelectrophoresis
Sequencing of proteins and nucleic acids.
Redioisotope techniques; nature of radioactivity, detection measurement, counter, safety aspects.
Enzyme purification and assay techniques.

Text Books :

1. Introduction to Istrumental analysis by Robert Braun.
2. Instrumental Techniques by Upadhyay and Upadhyay.
3. Instrumental Methods of Chemical Analysis by BK Sharma.

PRACTICAL

M.M. - 50

Determination of growth phase of *E.coli* by measurement of OD and colony froming units.

Rrelationship between OD and Cfu measurements.

Measurement of growth by dry weight and wet weight - *Penicillium* spp.

Determination of antibiotic resistance by plating method.

Assaying of microbial enzymes; Catalase, Proteases, Peroxidases, Cellulase, Cellobioases, Amylase, Diastase.

Exercise on colourimeter/spectrophotometer/pH metery.

Exercise on paper, thin layer, column chromatography.

Exercise on paper and gel electrophoresis.

Exercise on tissue culture techniques.

Absorbance curve for dyes.

Testing of Beer's law

SCHEME OF PRACTICAL

Time - 4 hors **M.M.: 50**

1.	Exercise on spectrophotometry / colorimetry / pH metery	08
2.	Exercise on Chromatography / Electrophoresis	07
3.	Measurement of microbial growth / microbial Enzymes / antibiotic sensitivity test	10
4.	Spotting (1-5)	10
3.	Viva-Voce	05
4.	Sessional	10
	Total	50

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विषय - भू-विज्ञान

सैद्धांतिक प्रश्न पत्र - 1

भू-गतिकी एवं संरचनात्मक भू-विज्ञान

पूर्णांक - 50

(पेपर कोड - 0851)

इकाई-1
1. पृथ्वी की भू-भौतिकी स्थिति : गुरूत्व, चुम्बकीयता तथा पुराचुम्बकीयता ।
2. समस्थिति की अवधारणायें एवं सिद्धांत ।
3. पर्वतीय एवं महादेशभवनी गतियां । वैश्विक पर्वतनिर्माणकारी गतिविधियां ।
4. पर्वतनिर्माणकारी, कायानतरण, चुम्बकत्व एवं धातुनिर्मितीकालों में अन्तर्सम्बन्ध ।
5. महाद्वीपीयविस्थापन एवं समुद्रतलविस्तारण के साक्ष्य एवं सिद्धांत ।

इकाई-2
1. मध्य समुद्री पर्वत, खाइयों, द्वीपीयचापों की उत्पत्ति, वितरण एवं महत्व ।
2. प्लेट-विवर्तनिकी के सिद्धांत । प्लेट सीमाओं की प्रकृति एवं प्रकार ।
3. समुद्रों तथा महाद्वीपों का उद्विकास ।
4. महाद्वीपीय सीमाओं की विवर्तनिकी : महाद्वीपीय शैल्प, अपसरितटट, सक्रियतट एवं सीमांतीय द्रोणियाँ।
5. नवविवर्तनिकी : सक्रियभ्रंश, भू-आकृतिक संसूचक, अपवाहपरिवर्तन, पुनर्धारा भूकम्पीयता ।

इकाई-3
1. विषमविन्यासों का अभिनिर्धारण एवं भू-वैज्ञानिक महत्व ।
2. वलन आकारिकी एवं ज्यामितिक वर्गीकरण ।
3. वलन का जननिक वर्गीकरण ।
4. वलन का यांत्रिकी एवं कारण ।
5. मानचित्र एवं स्थल में वलयों का अभिनिर्धारण । वलन का दृश्यांश पर प्रभाव ।

इकाई-4
1. भ्रंश का ज्यामितिक एवं जननीय वर्गीकरण ।
2. भ्रंश का दृश्यांशों पर प्रभाव ।
3. संधियां : ज्यामितिक एवं जननीय वर्गीकरण । लवण-गुम्बद ।
4. पत्रण : वर्णनात्मक शब्दविज्ञान, उत्पत्ति एवं दीर्घ संरचनाओं से सम्बन्ध ।
5. रेखण : वर्णनात्मक शब्दविज्ञान, प्रकार एवं उत्पत्ति तथा दीर्घ संरचनाओं से संबंध ।

इकाई-5
1. प्राथमिक आग्रेय एवं अवसादी संरचाओं के आधार पर अधों एवं शीर्ष की अभिनिर्धारण ।
2. शैल विरूपण की प्रारमिभक जानकारियां । प्रतिवल एवं विकृति की अवधारणाएं । प्रतिबल एवं विकृति दीर्घवृत्तज ।
3. भ्रंशयांत्रिकी की मूलभूत जानकारियाँ ।
4. स्टिरियोग्राफिक प्रक्षेपण एवं संरचनात्मक भू-विज्ञान में अनुप्रयोग ।
5. भारत की विवर्तनिकी संरचना ।

REFERENCE :

1. Keary F. & Vine, F.J. 1990 : G;pna; Tednic, Blackwell.
2. Storetyedt, K.N. 1997 : Our Evolving planet : Earth's Histror in New perspective.
3. Summesfield, M.A. 2000 : Geomorphology and Global Tectonics, Spinges-verlag.
4. Stanislave, M. 1984 : Introduction to applied Geophysics, Reidel publ.
5. Vogalsan. D. 1995 : Environmental Geophysics - A Practical Guide, Spinges Verlag.
6. Bryant, E. 1985 : Natural hazords, Cambridge, University press.
7. Patwardhan, A.. 1999 : The Dynastic Earth system - Practice Hall
8. Bell, F.G. 1999 : Geological Hazards. Roulledge, London.

9. Smith, K. 1992 : Invironmental Hazards : Routledge, London
10. वल्दिया, ख. सिंह, 19971 : सामान्य भू-विज्ञान, कुछ ज्वलंत समस्यायें, उ.प्र. हि.ग्रंथ अकादमी, लखनउ ।
11. Mch, P & Duff, D, 1994 : Holm's Principles of physical Geology 1st ed. ELES. U.K.

BOOKS RECOMMENDED :

1. Hobbs, B.E. Means, M.D. & Williams 1976 : Structural Galogy.
2. Davis, G.R. 1984 : Structural Geology of Rocks & Region - Jhonwiky.
3. Ramsay, J.G. and Hober, M.I. 1987 : Modern Structural Geology Vol. I-II,
4. Price, N.J. and Cosgove, I.W. 1990 : Analysis of Geological structure, Cambridge Uni. Press.
5. Ghosh, S.K. 1995 : Structural Geology fundamentals of modern Developments
6. संरचनात्मक भू-विज्ञान : एस.डी. के. श्रीवास्तव, म.प्र. हि.ग्रंथ, अकादमी भोपाल
7. भारत सिंह राठौर - संरचनात्मक भू-विज्ञान : म.प्र. हि. ग्रंथ अकादमी, भोपाल

सैद्धांतिक प्रश्न पत्र - 2

शैलिकी एवं भू-इतिहास

पूर्णांक -50

(पेपर कोड - 0852)

इकाई-1
1. दिक्काल में शैल-संलग्नता । शैल ग्रंथियों की अवधारणा, तंत्र-प्रावस्था एवं घटक ।
2. साम्यावस्था - उष्मागतिकी के मूल सिद्धांत । द्वि एवं त्रिघटकीय सिलिकेट तंत्र में प्रावसी साम्य (ऐल्बाइट-एनार्थाइट). (डायोप्साइड - एनार्थाइट) (डायोप्साइड-एल्बाइट-एनार्थाइट)
3. अम्लीय आग्नेय शैलों का शिलावित्रणात्मक अध्ययन।
4. शारीय एवं अल्पसिलिक आग्नेय शैलों का शिलाविवरणात्मक अध्ययन ।
5. अत्यल्पसिलिक आग्नेय शैलों का शिलाविवरणात्मक अध्ययन ।

इकाई-2
1. कायात्तरण प्रक्रियाओं की साम्य एवं असाम्य अभिक्रियाएं ।
2. पेराजिनेटिक आरेख : प्रक्षेपीय विश्लेषण, ए.सी.एफ. एवं ए.के.एफ. आरेख ।
3. ताप-दाब-संगठन के संदर्भ में मृण्मय शैलों का उद्विकास ।
4. ताप-दाब-संगठन के सन्दर्भ में अल्पसिलिक तथा चूनामय शैलों का उद्विकास ।
5. अपक्षय प्रक्रियाओं की रासायनिकी : स्थलजात एवं रासायनिक अवसासों का प्रसंघनन ।

इकाई-3
1. वायूढ़, जलोढ़, तटीय एवं गंभीर समुद्री विक्षेपणीय वातावरण की गतिकी ।
2. अवसादी एवं स्तरविज्ञानी संलक्षणाओं की अवधारणायें ।
3. पुरापर्यावरण एवं पुराजलवायु विश्लेषण के मूलभूत सिद्धांत ।
4. संस्तरविज्ञानी वर्गीकरण एवं सहसंबंधन ।
5. स्तरविज्ञानी आंकड़ें एकत्रीकरण की विधियां : स्तरविज्ञानी संस्पर्श एवं विषम विन्यासों का अभिनिर्धारण ।

इकाई-4 वर्गीकरण, भौगोलिक वितरण, शैलकीय लक्षण, संचित जीवाश्म तथा आर्थिक महत्व निम्न स्तर विज्ञानी समुद्रों का-
1. धारवार, सिंहभूम, बस्तर, अरावली के महासंघ के पूर्व क्रेम्बियन शैल ।
2. सासर, कड़प्पा, विन्ध्य, छत्तीसगढ़ महासंघ के पूर्व केम्ब्रियन शैल ।
3. साल्ट रेंज के पुराजीवी शैल एवं गोंडवाना महासंघ ।
4. स्पिटी, कच्छ, विचनापल्ली के मध्यजीवी महाकल्पीय शैल, डेक्कन ट्रेप्स और अन्तरट्रेपीय संस्तर ।
5. आसाम के तृतीयक शैल एवं शिवालिक संघ । हिम. नदीय युग, हिम नदीय युगों के कारण, व हिम-नदी स्थिति ।

इकाई-5 1. व्यक्तित्व एवं जीवाश्म समूहन में विभिन्नता, चित्रण, वर्गीकरण एवं क्रमबद्ध नामकरण ।

2. स्तरविज्ञान, पुरापारिस्थितिकी एवं पुरा-भूगोल के अध्ययन में जीवाश्मविज्ञान का महत्व ।

3. मोलस्का एवं ब्रेक्रियोपोडा जीवाश्मों की अकारिकी, पर्यावरण तथा भू-वैज्ञानिक वितरण ।

4. इकाइनोडरमेटा, आर्थोपोडा एवं एन्थोजोआ वर्ग के जीवाश्मों की आकारिकी, पर्यावरण तथा भू-वैज्ञानिक वितरण।

5. सूक्ष्मजीवाश्म विज्ञान एवं सूक्ष्मजीवाश्मों के अध्ययन की मूलभूत जानकारियाँ । पृष्ठरज्जुकधारी एवं पादप जीवाश्मों का संक्षिप्त अध्ययन ।

प्रायोगिक

1. प्राकृतिक स्थूलदर्शी नमूनों एवं कृत्रिम संरचनात्मक प्रादर्शों में संरचनाओं का सचित्र वर्णन ।
2. भू-वैज्ञानिक नक्शों में परिच्छेदिका, भू-वैज्ञानिक काट की रचना एवं विवेचना।
3. संरचनात्मक आंकड़ों के लिये स्टिरियोग्राफिक प्रक्षेपण की निर्मिती ।
4. स्थलाकृतिक मानचित्रों से आकार मितिक विश्लेषण ।
5. सैद्धांतिक पाठ्क्रम में शामिल जीवाश्म संघों के प्रमुख जीवाश्मों की आकारिकी का अध्ययन ।
6. भारत के मानचित्र पर मुख्य स्तर वैज्ञानिक एवं शैलविवर्तनिक इकाई का वितरण दर्शाना ।
7. मुख्य आग्नेय, अवसादी एवं कायान्तरित शैलों के स्थूलदर्शी नमूनों का अध्ययन ।
8. मुख्य आग्नेय, अवसादी एवं कायान्तरित शैलों के काटों का सूक्ष्मदर्शी अध्ययन ।

भू-वैज्ञानिक क्षेत्रीय अध्ययन :

10 दिवसीय भू-वैज्ञानिक मानचित्रण कार्य एवं आर्थिक खनिज निक्षेपों का अध्ययन ।
नमूना संग्रहण (अयस्क, शैल, जीवाश्मों के रूप में) एवं उनका विशेष अध्ययन ।

BOOKS RECOMMENDED : FOR PAPER II

1. Jurner, F.J. 1980 - Metamorphic Petrology, Megraw Hill, New York
2. Best, M.G. 1986 - Igneous Petrology - CBS Publication
3. Bose, M.K. 1997 - Igneous Petrology - World Press
4. Sengupta, S. 1997 - Introduction to sedimentology-oxford-IBH
5. Readings, H.G. 1996 - Sedimentary Environments, Blackwell
6. Bhattacharya, A. and Chakraborti, C. 2000 - Analysis sedimentary successions, Oxford
7. Ravindra Kumar - Statigraphi of India
8. S. Anantharaman - Palaeontology
9. Claskson, E.N.K. 1998 - Investitrate palaconlogy and evolution-IV edi., Blackwell
10. Boggs, Sam Jr. 1995 - Principles of sedimentology and statigraphy, practics hall.
11. Naqvi S.M. and Roger, J.J.W. 1987 - Pre. Geology of India, Oxford-uni Press.
12. Nordstorn, D.K. and Manoj, J.L. 1986 - Geochemical, Thermodynamics, Blackwell

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ANTHROPOLOGY

PAPER - I

ARCHAEOLOGICAL ANTHROPOLOGY

(Paper Code - 0865)

AIM : The main aim of this course is to introduce the students about the basic elements of Prehistoric Archaeology.

UNIT-I Meaning and scope of the different kinds of Archaeology : Classical Archaeology, Historical Archaeology, Prehistoric Archaeology and Protohistoric Archgeology as Anthropology, Differences between the Old world and New world Dating, Archgeology Traditions. Absolute Dating Relation Dating..

UNIT-II Geological time scale. The Great Ice Age. Stratigraphy and other evidences of Ice Age : River terraces, Moraines etc. Alpine and Himalayan glaciations. Pluvials and interpluvials, Stone Age tools : Types and Technology.

UNIT-III Age of palaeolithic savegery : European lower, plaeolithic period : Stone tools and culture, Indian lower Palaeolithic period : Sohan Culture, Madrasian Culture. European Middle Palaeolithic Period : Tools & culture. Flake took complex in India. European Upper Palaeolithic period ; Tools and Culture. Main characteristics of the European Palaeolithic Home and Cave art and its significance.

UNIT-IV Mesolithic complex in North Europe. Mesolithic complex in Western Europe. Mesolithic Culture in India. Chief feature of Neolithic revolution. Neolithic complex in India.

UNIT-V Metal Age : Copper, Bronze and Iron age : General feature of Urban revolution. The Chief characteristics and the decay of Indus valley civilization. Megalithic culture in India.

RECOMMENDED READINGS :

1. Auchin, B. and Allchire R. (1968) : The birth of Indian Civilization
2. Rorder, F. (1970) : The Old Stone Age
3. Burkitt, M. : The Stone Age
4. Burkitt, M. : Our Early Ancestors
5. Childe, V.G. (1970) : Man Makes Himself
6. Oakley, K.P. (1972) : Man the Tool maker
7. Shaprio, H.L. (Editor) : Man Culture and Society
8. Bhattacharya, D.K. : Prehistoric Archaeology
9. Misra, V.N. & M.S. mate (eds) : Indian Prechistory : 1964
10. Sankalia, H.D. : Prehistory and Portohistory of Indian & Pakistan
11. Wheeler, R.E.M. (1968) : The Indus civilization
12. Sankalia, H.D. (1964) : Stone Age Tools : Their Techniques Names & Functions.
13. मजूमदार डी.एन. तथा शरणजी : प्रागैतिहासिक
14. चौबे रमेश : पुरातात्विक मानवविज्ञान

PAPER - II

TRIBAL CULTURE OF INDIA

(Paper Code - 0866)

AIM : The main aim of this course is to introduce the students about the basic-cultural life of Indian tribes.

UNIT-I Define tribe and scheduled tribe, Geographical distribution of Indian tribes and their social and linguistic classification. Anthropological contribution in the study of Indian tribes. Sacred complex, Universalisation and parochialisation, Sanskritisation and westernisation dominant caste. Tribe & caste difference between S.C. and S.T. characteristic features. Primitive tribes of Chhattisgarh (Kamar, Birhor, Hill Korwa, Abujhmarh, Baisa)

UNIT-II Tribal economy : Hunting, food gathering, fishing, shifting and settled agriculture of property and ownership in tribal societies, problems of tribal people : land alienation, bonded labour, indebtedness, shifting, cultivation, irrigation, forest and tribals, unemployment, agricultural labour, the inter relationship of tribals with agricultural merchants, money lenders, excise officers and forest contractors, stage of tribal economy.

UNIT-III The problems of culture contact : problems due to urbanisation and industrialisation, regionalism economic and psychological folk traditions, tribal religion : origin & function, animistic, totemistic, concept and practices : Magic and witchcraft, shamanism, head hunting.

UNIT-IV Political and social organisation of Indian tribes : Political organisation of Indian tribes, Distinction between state and stateless society, law in primitive society, matriarchal and patriarchal family, lineage and clan. Ways of acquiring mates in tribal societies. Youth dormitories : Type, organisation and functions.

UNIT-V Tribal development : History of tribal development, the constitutional safeguards for the scheduled tribes, tribal problem : isolation, migration, acculturation, detribalizations, policies, plans and programmes of tribal development and their implements, tribal revolts in India, Response of the tribal people to the Governmental measures meant for them, the role of anthropology in tribal development.

PAPER - III

PRACTICAL

OBJECTIVES

The objective of this practical course is to introduce the students with the primitive material culture and technology used by primitive man and the students will be introduced with various techniques commonly used by social anthropology.

MATERIAL CULTURE :

PART-I **Identification and technological descriptions of the following.**

1. **Implements for food gathering, hunting, fishing and agriculture.**
2. **Five making implements.**
3. **Types of habitations**

4. Land and water transport

PART-II Sketching, identification and the description of palaeolithic, mesolithic and neolithic tools.

(It is essential that students should draw at least five tools of each age)

RESEARCH TOOLS :

Construction of schedules, Geneology and Questionnaire :

Each student should collect information through above tools from 05 Repodents.

The student will be required to maintain practical records of all work done in the practical class.

RECOMMENDED BOOKS :

1. Beals, R. and Hoijar, N. : Introduction to Anthropology
2. Leakey, L.S.B. : Adam's Ancestors
3. Sankalia, H.L. : Prehistoric tools and their techniques
4. Murdock, G.P. : Outlines of cultural material
5. Shapiro, H.L. (Editor) : Man, culture and society (Eng. & Hindi)
6. चौबे, रमेश : पुरातात्विक मानव विज्ञान
7. विद्यार्थी व सिंग : भौतिक-संस्कृति के आदित्य चरण

RECOMMENDED READINGS :

1. Bose, N.K. : Tribal India : National integration
2. Bose, N.K. : Tribal life of India
3. Elwin, V. : A new deal of Tribal India
4. Fuchs, S. : The Aboriginal Tribes of India
5. Government of India : Adivasi
6. Ghurye, G.S. : The scheduled tribes
7. Mamvria : Tribal demography
8. Vidyarthi, L.P. : The tribal culture of India
9. नदीम हसनैन : जनजातीय भारत
10. Verma, R.C. : Indian tribes through ages
11. उपाध्याय तथा शर्मा : भारत की जनजाति संस्कृति
12. तिवारी शिवकुमार : मध्यप्रदेश की जनजातियाँ
13. श्रीवास्तव, ए.आर.एन. : जनजाति विकास के चार दशक

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STATISTICS

PAPER - I (Paper Code - 0853)

STATISTICAL METHODS

UNIT-I Sampling from a distribution : Definition of a random sample, simulating random sample from standard distributions, concept of a derived distributions of a function of random variables. Concept of a statistic and its sampling distribution, Point estimate of a parameter, Concept of bias and standard error of an estimate. Standard errors of sample mean, sample proportion. Sampling distribution of sum of binomial, Poisson and mean of normal distributions. Independence of sample mean and variance in random sampling from a normal distribution (without derivation).

UNIT-II Statistical Tests and Interval Estimation : Null and alternative hypotheses, Types of errors, p-values, Statement of chi-square, t, and F statistics. Testing for the mean and variance of univariate normal distribution, testing of equality of two means and testing of equality of two variances of two univariate normal distributions. Related confidence intervals. Testing for the significance of sample correlation coefficient in sampling from bivariate normal distribution and for the equality of means and equality of variances in sampling from bivariate normal distributions.

UNIT-III Large Sample Tests : Use of central limit theorem for testing and interval estimation of a single mean and a single proportion and difference of two means and two proportions, Fisher's Z transformation and its uses. Pearson's chi-square test for goodness of fit and for homogeneity for standard distributions. Contingency table and test of independence in a contingency table.

UNIT-IV Nonparametric tests : Definition of order statistics and their distributions, Non-parametric tests, Sign test for univariate and bivariate distributions, Wilcoxon-Mann-Whitney test, Run test, Median test and Spearman's rank correlation test.

UNIT-V Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES -

- Freund, J.E. (2001) : Mathematical Statistics, Prentice Hall of India.
- Goon A.M., Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. I, World Press, Calcutta.
- Hodges J.L. and Lehman E.L. (1964) : Basic Concepts of Probability and Statistics, Holden Day.
- Mood A.M., Graybill F.A. and Boes D.C. (1974) : Introduction to the Theory of Statistics, McGraw Hill.

ADDITIONAL REFERENCES -

- Bhat B.R. Srivenkatramana T and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd.
- Rohatgi V.K. (1967) : An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
- Snedecor G.W. and Cochran W.G. (1967) : Statistical Methods. Lowa State University Press.

PAPER - II (Paper Code - 0854)

A - SAMPLE SURVEYS

UNIT-I Sample Surveys, Concepts of population and sample, need for sampling, Census

and sample survey, basic concepts in sampling, organizational aspects of survey sampling, sample selection and sample size.

Some basic sampling methods - simple random sampling (SRS) with and without replacement.

UNIT-II Stratified random sampling, Systematic sampling, ratio and regression methods of estimation under SRS.

Non sampling errors, acquaintance with the working (questionnaires, sampling design, methods followed in field investigation, principal findings etc.) of NSSO, and other agencies undertaking sample surveys.

B - ANALYSIS AND DESIGN OF EXPERIMENTS

UNIT-III Analysis of variance for one way and two-way classifications.

Need for design of experiments, fundamental principles of design, basic designs-CRD, RBD, LSD and their analysis.

UNIT-IV Factorial designs - 2^n designs, illustrations, main effects and interaction effects and confounding in 2^3 design.

UNIT-V Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES -

- Cochran W.G. and Cox G.M. (1957) : Experimental Designs, John Wiley and Sons.
- Das M.N. and Giri (1986) : Design and Analysis of Experiments, Springer Verlag.
- Murthy M.N. (1967) : Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
- Sampath S. (2000) : Sampling Theory and Methods, Narosa Publishing House.
- Sukhatme B.V. (1984) : Sample Survey Method and its Applications, Indian Society of Agricultural Statistics.

ADDITIONAL REFERENCES-

- Des Raj (2000) : Sample Survey Theory, Narosa Publishing House.
- Goon A.M., Gupta M.K., Das Gupta B. (1986) : Fundamentals of Statistics, Vol.II, World Press, Calcutta.
- Kempthorne O. (1965) : The Design and Analysis of Experiments, Wiley Eastern.

PRACTICAL

1. Drawing random samples from standard univariate discrete and continuous distributions such as binomial, Possion, Normal, Cauchy and Exponential.
2. Tests of significance based on t, chi-square, F. Testing of significance of sample correlation coefficient, Use of Z transformation. Testing of equality of means and equality of variances in sampling from bivariate normal.
3. Large sample tests for means and proportions, tests of goodness of fit and independence of attributes in contingency tables.
4. Nonparametric Tests : Sign, Run, Median and Wilcoxon-Mann-Whitney tests, Selection of sample and determination of sample size, Simple random sampling, Stratified SRS, and systematic sampling, Allocation problems in stratified SRS, Ratio and Regression methods of estimation in SRS.
5. Analysis of variance for one-way and two-way classifications, Analysis of CRD, RBD, and LSD, Analysis of 2^2 and 2^3 factorial designs.

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DEFENCE - STUDIES

PAPER - I

WESTERN MILITARY HISTORY

(Paper Code - 0867)

Note : The aim of this paper is to give a historical, political & social back ground of the state engaged in the conflicts under study and the factors influencing the development of different forms of warfare and weapons system.

Note : Question will be set from each unit there will be only Internal choice.

UNIT-I Age of Valour

1. Military System of Greek; Tactics of Phalanx.
2. Alexander the Great and his reforms.
3. Military system of Roman; Tactics of Legion, Jullius Caesar.
4. Battle of Arbela 311 B.C.
5. Battle of cannae 216 B.C.

UNIT-II Age of chivalry

1. Emergence and decline of cavalry.
2. Battle of Adrianopole 378 A.D.
3. Battle of Hastings 1066 A.D.
4. Cavalry tactics of Zenghiz Khan.
5. Battle of Cracee 1346 A.D.

UNIT-III Age of Gun Powder & Steam

1. Impact of Gun Powder in war.
2. Contribution of Gustavas adolphus & Fredrik the Great.
3. The Revolution in tactics - Causes of war of american Independence 1775-83.
4. The Revolution in tactics - Causes of French Revolution.
5. Nepoleanic art of warfare and his military reforms.

UNIT-IV World War - I & II

1. First World War - Causes of W.W., Policies and Strategic plans of the powers.
2. Role of Air Force with reference to theory of Douhet.
3. Role of Navy with reference of theory of Mahan.
4. Second World War - Causes of W.W., Objective and Strategy of Allied and Axis forces.
5. Personalities of Rommel.

UNIT-V World War - II

1. Armament and Mechanical warfare with reference to the theories of J.F.C. Fuller and Liddell Hart.
2. Role of air power, weapons, doctrines, tactics.
3. Role of naval power, weapons, doctrine tactics.

4. Tactics of Second World War.
5. Advent of Nuclear weapons and their impact on warfare.

SELECTED READING :

1. Harkabi Y. : Nuclear war and Nuclear peace
2. Earl E.M. : Makers of Modern strategy.

PAPER-II

THEORY AND PRACTICE OF WAR

(Paper Code - 0868)

Aim : The aim of this paper it to acquaint the students with the concepts of theory and practice of war.

Note : Questions will be set from each unit and there will be only internal choice.

UNIT-I
1. Sunt Zu - Founderof MilitaryTheory and philosophy.
2. Clausewitz - War and its relationship with politics.
3. Macheavelli - Renaissance of Art of war.
4. Jomini- Concept of mass armies.

UNIT-II
1. Churchil.
2. Mahatma Gandhi.
3. Kautilya.
4. A. Hitler.

UNIT-III
1. Mao Tse Tung.
2. Che Guevara.
3. Economic and Psychological war.
4. Collective Security.

UNIT-IV
1. Indo-China War - 1962 Causes of war, political & military lesson.
2. Indo - Pak War - 1965 Causes of war, political & military lesson.
3. Indo - Pak War - 1971 Causes of war, political & military lesson.
4. Kargil Conflict 1999.

UNIT-V
1. Internal & External threats of National Security.
2. Insurgency and Counter-Insurgency.
3. Terrorism-Problem and Solution.
4. Naxalism - Problem and solution.

REFRENCE BOOKS :

1. Howard M. : Theory and Practice of war
2. ---,,--- : Clausewitz
3. Mao Tse Tung : Guerilla war fare
4. Palit, D.k. : The lightning War Tadit Yudh
5. Mankekar : War of 1971

6. आर.सी. जोहरी : पाश्चात्य सैन्य विचारक

7. शर्मा व निगम : सैन्य विचारक

PRACTICAL

There shall be a practical examination of 3.5 hours duration carrying 50 Marks. The division of marks shall be as follow :

(a) Exercise based on Map-reading	:	15 marks
(b) T.W.E.S.T.	:	15 marks
(c) Sessional work	:	10 marks
(d) Viva-Voce	:	10 markss

PART - A

Map-reading :

1. Scales - Definition, method of expressing, construction of simple, time, diagonal and comparative.
2. Relief and its representation.
3. Slopes and Gradient.
4. Visibility and inter-visibility by Gradient, proportionate and section method.
5. Re-section and inter-section.
6. Grid system-Map reference, Indexto map. Four figure and Six figure.

PART - B

7. Organisation and equipment of infantry Platoon and Section.
8. Section Formation.
9. Indication of Target by various methods.
10. Fire control order.
11. Patrols.
12. Battle Procedures (ROFT).
13. Verbal Order.
14. Message-Writing.

BOOKS RECOMMENDED :

1. Manual of Map Reading : London Her.
2. युद्ध स्थल कला : चौ, नरेन्द्र सिंह
3. एन.सी.सी. परिचय : विष्णु कान्त शर्मा

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INDUSTRIAL CHEMISTRY

PAPER - I M.M. 34

(Paper Code - 0871)

UNIT-I **Material Science :** Mechanical Properties of materials and change with respect to temperature. 02L

Material of constructions used in Industry :

Metals and Alloys : Important metals & alloys; iron, copper, aluminium lead, nikel, titanium and their alloys- Mechanical and chemical properties and their applications. 06L

Cement : Types of cement, composition, manufacturing process, setting of cement. 04L

Ceramics : Introduction, Types, Manufacturing process, Applications. Refractories. 04L

UNIT-II **Polymeric Mateials :** Industrial polymer and comoposite materials- Their constitution, Chemical and physical properties, Industrial applications. 06L

UNIT-III **Glass :** Types, composition, manufacture, physical and chemical properties, Applications. 04L

Corrosion : Various types of corrosion relevant to chemical Industry-Machanism, Preventive methods. 04L

UNIT-IV **Pollution :** Air, Oxygen, nitrogen cycle, water, Biosphere, flora and fauna, Energy, soil. 05L

Pollutants and their statutory limits, pollution evaluation methods. 04L

UNIT-V Air pollution-various pollutants. water pollution-organic/inorganic pollutants, Noise pollution, sewage analysis, pesticide pollution, Radiation pollution, green house effect, future. 10L

Books Recommended :

1. Pollution control in chemical & Allied Industries, S.P. Mahajan.
2. Poolution Control in Industries, A Sories of Books by Jones, H.P.
3. Air Pollution - Vol.1 to 4, Editor, STERN, A.C.; Academic Press.
4. Environmental Engineering, G.N. Pandey, Tata McGraw Hill.
5. Homd Book of Air Pollution, A. Parker, Tata McGraw Hill.
6. Science of Ceromic chemical Processing, Hench, L.L.
7. Science of Ceramics, Stewarts, G.H.
8. Chemistry of Cement.
9. Properties of Glass, Morcy, G.W.
10. Chemistry of Glasses, Paul, A.
11. Corrosion, causes & Prevention, Spellur, F.N.

PAPER - II M.M. 33

(Paper Code - 0872)

UNIT-I Unit processes in organic chemicals manufacture -

Nitration : Introduction - Nitrating agents, Kinetics and mechanism of nitration processes such as nitration of :

i. Paraffinic hydrocarbons
ii. Benzene to nitrobenzene and m-dinitrobenzene
iii. Chlorobenzene to o and p nitrochloro benzenes.

iv. Acetanilide to p-nitroacentanilide

v. Toluene

Continous vs batch nitration. 12L

UNIT-II **Helogenation :** Introduction-Kintics of helogenation reactions reagents for helogenation, Helogenation of aromatics-side chain and nuclear helogenations, commercial manufacture of chlorobenzenes, chloral, monochloracetic acid and chloromethanes, dichloro fluormethane. 09L

UNIT-III **Sulphonation :** Introduction-sulphonating agents, chemical and physical factors in sulphonation, Kinetics and mechanism of sulphonation reaction, commercial sulfonation of benzene, naphthalene, alkyl benzene, Batch vs continous sultphonation. 09L

UNIT-IV **Effluent Treatment and waste Management :** Principles and equipments for aerobic, anaerobic treatment, adsorption, filtration, sedimentation. 09L

UNIT-V Bag fillters, electrostatic precipitator, mist eliminators, wet scrubbers, absorbers, solid waste management, industrial safety. 09L

Books Recommended :

1. Unit process in Organic synthesis P.M. Groggins, McGraw Hill.
2. Effluent Treatment in process Industries - Inst. of Cham. Engg.
3. Effluent Treatment and waste Disposal - Inst. of Chem. Engg.
4. Effluent Treatment and Disposal - Inst. of Chem. Engg.

PAPER - III

M.M. 33

(Paper Code - 0873)

UNIT-I **Oxidation :** Introduction-Types of oxidation reactions, oxidizing agents, kinetics and mechanism of oxidation of organic compounds liquid phase oxidation, vapor phase oxidation, commercial manufacture of benzoic acid, maleic anhydride, phthalic anhydride, acrolein, acetaldehyde, acetic acid. 07L

UNIT-II **Hydrogenation :** Introduction-Kenetics and thermo-dynamics of hydrogenation reactions, catalysts for hydrogenation reactions, hydrogenation of vegetable oil. manufacture of methanol from carbon monoxide and hydrogen, hydrogenation of acids and esters to alcohols, catalytic reforming. 07L

Alkylation : Introducton; Types of alkylation, Alkylating agents, Thermodynamics and mechanism of alkylation reactions, manufacture of - alkyl benzenes (for detergent manufacture), ethyl benzene, phenyl ethyl alcohol, N-alkyl anilines (mono and di-methyl anilines) 03L

UNIT-III **Esterification :** Introduction; Hydrodynamics and kinetics of esterification reactions, Esterification by organic acids, by addition of unsaturated compounds, esterification of carboxy acid derivaives, commercial manufacture of ethyl acetate, dioctyl phthalate, vinyl acetate, cellulose acetate. 04L

Amination : (A) By reduction : Intoduction, Methods of reduction-metal and acid, catalytic, sulfide, electrolytic, metal and alkali sulfites, metal hydrides, sodium metal, concentrated caustic oxidation, reduction, commercial manufacture of aniline, m-nitroaniline, p-amino phenol.

(B) By aminolysis : Introduction, aminating agents, factors affecting. 09L

Hydrolysis : Introduction; hydrolysing agents, kinetics, thermodyanics and mechanism of hydrolysis. 02L

UNIT-IV **Procees Instrumentation :** concept of measurement and accurcy **12L**

Principle, construction and working of following measuring instruments.

Temperature : Glass thermometers, bimetallic thermometer pressure spring thermometer, vapour filled thermometers resistance thermometers. radiation pyrometers.

Pressure : Manometers, barometers, bourdon pressure gauge ; bellow type, diaphragm type pressure gauges, macleod gauges, pirani gauges, etc.

UNIT-V **Liquid level :** Direct-indirect liquid level measurement, Float type liquid level gauge, ultrasonic level gauges; bubbler system, density mesurement, viscocity measurement. **07L**

Books Recommended :

1. Unit process in organic synthesis, P.M. Groggins, McGraw Hill.
2. Industrial Instrumentation, Bekmen, D.P., John wrleys.
3. Applied Instrumentation in process Industries, Vol. I, II & III, Andrews, W.G., Gulf Publication.
4. Instrumentation and Control for the process Industries, Borer, S. Elsevier Applied Science Publishers.
5. Chemical Enggineer's Hand book, Perry, J.H. and Green, D. McGraw Hill.

Time : 4 Hours **PRACTICALS** **M.M. 50**

Unit Process : One to two examples of each of the following unit processes.

Nitration, sulphonation, friedel-crafts reaction, esterification, hydrolysis, oxidation, Halogenation, chloro-sulfhonation, reduction, polymerization, reactions of diazonium salts.

Instrumental methods of analysis : Use of colourimeter pH meter, potentiometer, conductometer, refractometer, polarimeter

Material testing : Testing of alloys identification of plastics/rubber estimation of yield point, young's modulus, flaredness; Optical, thermal mechanical and electrical properties.

Process Instrumentation : Transducers of different types. use of Tranducer for measuring flow control. Determinatiaon of flash point and ignition points of liquids.

Water analysis : Solid contents, Hardness, COD and other tests as per industrial specifications.

Flow measuring devices : Floats

Monographs of reprsentative raw materials such as sulphuric acid, toluene, sodium, carbonate, sodium hyroxide, carbon tetrachloride benzoic acid (5-6 compounds).

Limit tests for heavy metals Pb, AS, Hg, Fe and ash content.

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VOCATIONAL COURSE IN ELECTRONIC EQUIPMENT MAINTENANCE

SCHEME OF EXAMINANTION

		Max. Marks	Min. Pass Marks
Paper - I	Operational Principles of Audio	50	17
Paper - II	Microprocessor Based Instrumentation and Control	50	17
	Practicals	50	17

1. **SUBJECT OBJECTIVE :**

   The objective of this syllabus is to femiliarize students with the fundamentals of electronics and prepare him/her to keep in track with fast change in this field so that he/she is prepared to takenup advance studies or go for self employment. It is proposed to give the students an idea of basics of all the developments in the field of electronics. Efforts are directed to impart some knowledge of computer hardware and software too, which fall in the realu of electronics so that the students become aware of fast changing scene of information superhigh wey also.

2. **JOB POTENTIALS :**

   The students in (by) taking up this course may find adequta job- opportunities in industries or manufacturing firms. They may opt for setting up their own small scale industries of electronics, thus enhancing self employment.

3. **Contents :**

   As per attached syallbus.

4. Subject scheme.
5. On the job training will be imparted in Summer days.
6. As detailed out in the prospectus.
7. As per the draft given in the syllabus.
8. Permissible combination of subject Physics, Mathemetics & Electonic equipment mathematics.

PAPER - I

(Paper Code - 0859)

OPERATIONAL PRINCIPLES OF AUDIO AND VIDEO EQUIPMENTS M.M. 50

UNIT-I Revision of All and FH, communication bands, signal sources, Basic Principles of propagation of e.m. wave through atmosphere and ionosphere; ground waves, sky waves, space waves, dead zones etc.

RECEIVING ANTENNAE : Antenna Parameters like gain, radiation pattern, effective aperture. Ferrite AE. Type of antennae like wire, loop, dish, Yagi, telescopic, their construction and operating principles.

SUPERHETERODYNE RECEIVERS : Principles, advantages, block diagram, RF input and AE co upling arrangments, RF amplifiers, mixer, local oscillator, IF amp. detector, audio amplifier, loud speaker, power requirements, tuning/aligning of receivers, waveforms and voltages at different check points. Circuit reading of various radio sets, repair and trouole shooting, automobile radios.

UNIT-II **ELEMENTS OF A TELEVISION SYSTEM :** Picture transmission, sound transmission, picture reception, sound reception, synchronisation.

TYPE VIDEO SIGNAL : Scanning sequence details, sync details of the 625 line system, channel bandwidth, vestigial sideband transmission, reception of vestigial sidepand signals, frequency modulation, FH channel band-width, channel bandwidth for colour transmission, allocation of frequancy bands for television bandwidth for colour transmission, allocation or frequancy bands for television signel transmission, television standards.

Picture tubes- monochrome and colour : Beam deflection, face plate, picture tube charecteristics, picture tube circuit controls.

UNIT-III **TELEVISION RECEIVERS :** Types of television receivers, receiver sections, videc detector, video section fundamantals, video emplifiers-design principles, video amplifier circuits, autometic gain control and noise cancelling circuits, syno seperation circuits, syno-processing and AFC circuits, deflection circuits, sound system, RF tuner, video IF amplifiers, receiver power supplies, television receiver antennae, colour television antennae.

TELEVISION APLICATIONS : Television broadcasting, cable television, closed circuit television, theatre television, picture phone and facsimile, video tape recording (VTr, television via satellite, TV games, HDTV, flatoanel TV teleconferancing.

UNIT-IV **TAPE RECORDERS :** Principles of magnanic recording, characteristies of magnetism, the hysterists loop, recording head, recorded wave-length, response of head during reply, the effect of gap length, low frequency loss, other losses, equalization, the effect of non-linear characeristic of magnification recording bias, A.C. bias, erasin the tape, block diagram of audio tape recorder.

Oscillator, preamplifier, dolby, amplifier, record (play back) head, erase head, tapes (metal polymer), mechanical transport system, stereo recording, double deck, single deck, microphones (RF, Cable), noise, maintenance of mechanial parts, head cleaners, head alignment, graphic equalisers.

UNIT-V **TELEPHONES :** Modulation, demodulation, modem, subscribar frequency allotment, channel organisation, signalling, svitching, manual exchanges, STD, ISD, EFABX, Intercom-stress on equipment and EPABX, Value added services like FAX E mail.

MEASURING INSTRUMENTS : Multimeters analog/digital, oscilloscopes, signal generators, noise and sound level meters, frequency counters, error sources and precautions during measurement.

GENERAL NOTE : Familiarisation with catalogues, standard specification, knowledge about companies referring to service manual.

PAPER - II

MICROPROCESSOR BASED INSTRUMENTATION AND CONTROL

(Paper Code - 0860)

M.M. 50

UNIT-I **MICROCOMPUTER FUNDAMENTALS :** Introduction, simplified microcomputer architecture, simplified memory organization, instruction set, simplified CPU

organisation, microcomputer operation, Personal computer organization and Word Processor.

Data sheet descriptions, pin diagram and function, microprocessor architecture, using the data/address register, using the stack pointer.

UNIT-II **THE INTEL 8080/8085 MICROPROCESSOR :** Introduction, the 8085 pin diagram and functions, the 8085 architecture, addressing modes, the 8080/8085 instructions set, the 8080/8085 date transfer instructions, the 8080/8085 arithmatic instructions, the 8080/8085 logical instructions, the 8080/8085 stack, I/O, and machine control instructions.

UNIT-III **PROGRAMMING THE MICROPROCESSOR :** Machine and assembly languages, simplified instruction set, instruction set, arithmetic operations, instruction set-logical operations, instruction set-date transfar operations, instruction set branch operations, instruction set-subroutne all and return operations, instruction set-miscellaneous operations, writing a program, addressing modes, program branching, program looping using subroutines.

Programming the 8080/8085 microprocessor : Introduction, straight-line programs, looping programs, mathematical programs.

UNIT-IV **INTERFACING THE MICROFROCESSOR :** Introduction, interfacing with ROM, interfacing with RAM, input/output interfacing basics, interfacing with practical I/O ports, synohronizing I/O data transfers using interrupts. address decoding.

UNIT-V **Application to illustrate the use of microprocessor in :**

(i) Traffic control

(ii) Tempereture control

(iii) Digital clock

(iv) Stepper motor control

(v) Washing machine control

PRACTICALS

A student is required to do atleast 12 experiments in an academic year, and one month Summer Training. The scheme of practical examination will be as follows :

(i) One experiment of 3 hours duration and one Month Summer Training.

(ii) Marks

Experiment	**:**	**25 Marks**
Sessional	**:**	**10 Marks**
One Month Summer Training	**:**	**15 Marks**
	Total	**50 Marks**

- **The marks for summer training will be awarded by the thachers teadhing the students on the basis of the certificate issued by the external supervisor of the summer training.**

LIST OF PRACTICALS

1. Development of soldering skill by constructing a fewcircuits and testing.
2. PCB making.
3. Study of modulator.
4. Study of oscillator.
5. Tape recorder-testing, assembly and dis-assembly.
6. Radio receiver-testing.
7. Study of PA system and i.s. testing.
8. Study of EPABK, wiring and connectivity with telephone instruments.
9. Familiarisation with 8085 Based microprocessor trainer kit. Location of 8085, 8279, 8253 keyboard, display fields, EPROM Programmer, expansion s lot, TTY and serial lines.
10. Entering and executing an assembly language program, codes for insertion, deletion, memory move, block fill, setting and examining ragisters and memory, single step execution of a program.
11. Writing of a prgram to add. subtract and multiply two numbers stored in memory (nnnn & nnnn * 1) and place the result in the subsequent memory, (nnn * 2).
12. Writing of a program to test R.H. for errors by writing O's & 1's in altornaco location and reading it for chaecking.
13. Making of a board with a 3LED's and four switches to connect to the 8085 kit on the expansion slot (8279).
14. Making of a board with a 8 LED's and four switches to connect to the 8-85 kit on the expansion slot (8255).
    (a) Program the 8255 to glow/switch of LED's.
    (b) Program the 8255 to switch on and OFF the LED's every few second according to a given pattern (Hint : The pattern can be 01010101 and 10101010 or 001001100, or any other).

Reference Books :

1.	Fundamentals of acoustics	:	Kinsler & Frey
2.	System trouble shooting Handbook	:	Luces K, Faulken Berry (John Wiley & Sons)
3.	Monochrom & Colour Television	:	P.R. Gulati
4.	Television Engineering	:	Dhake
5.	Microprocessor	:	Gaonkar
6.	Microprocessor	:	B. Ram
7.	Microprocessor	:	Shaum Saries

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COMPUTER SCIENCE

PAPER - I

COMPUTER HARDWARE

(Paper Code - 0855)

Duration 3 hours **Max.Marks 50**

AIM - The emphasis in on the desing concepts & organisational details of the common PC, leauing the complicated electronics of the system of the computer Engineers.

OBJECT OF THE COURSE -

1. To introduce the overall organisation of the microcomputers.
2. To introduce the common peripheral devices used in computers.
3. To introduce the hardware components, use of micro processor and function of various chips used in microcomputer.

N.B. : Since the computer organisation study is very vast & complicated, so the study is restricted to only the description and understanding part, fence the paper setter is requested to keep this important factor in mind.

UNIT-I CLASSIFICATION AND ORGANIZATION OF COMPUTERS

Digital and analog computers and its evolution. Major components of digital computers; Memory addressing capability of CPU; word length and processing speed of computes. Microprocessors single chip microcomputers; large and small computers. Users interface Hardware software and firmware. multi programming multi user system. Dumb smart and intelligent terminals computer network and multi processing, LAN parallel processing. Flinn's classification of computers. Computer flow and data flow computers.

UNIT-II CENTRAL PROCESSING UNIT.

CPU organization, ALU control unit registers. Instructions for INTEL 8085, Instruction word size, Various addressing mode interrupts and exceptions, some special Control signals and I/O devices. Instruction cycle fetch and execute operation, time Diagram, data flow.

UNIT-III MEMORY OF COMPUTERS.

Main memory secondary memory, backup memory, cache memory; real and virtual Memory Semiconductor memory. Memory controller and magnetic memory; RAM; disks, optical disks Magnetic bubble memory; DASD, destructive and non destructive. readout. Program of data Memory and MMU.

UNIT-IV I/O DEVICES.

I/O devices of micro controller; processors. I/O devices, printer, plotter, other out put devices, I/O port serial data transfer scheme, Micro controller, signal processor, I/O processor I/O processor arithmetic processor.

UNIT-V SYSTEM SOFTWARE AND PROGRAMMING TECHNIQUE.

ML, AL, HLL, stac subroutine debugging of programs macro, micro programming, Program Design, software development, flow & chart multi programming, multiuser, multi tasking Protection, operating system and utility program, application package.

RECOMMENDED BOOKS :

1. Computer Fundamentals : Architecture and Organization - By B.Ram (Wilwy Eastern Ltd.)
2. Computers Today - By Donal H. Sanders
3. Computers Fundamental - By Rajaraman.
4. IBM PC - XT Clones - By Govinda Rajalu

PAPER - II

SOFTWARE

(Paper Code - 0856)

AIM - Introduction to the web-language-HTML & problem solving throgh the concept of object oriented programming.

OBJECT OF THE COURSE -

1. To introduce the internet & web related technology & learn the intricacies of web-page designing using HTML.
2. To introduce the object oriented programming concept using C++ language.
3. To introduce the problem solving methodology using the C++ programming features.

N.B. : Examiners are requested to prepare unit-wise Questions papers.

UNIT-I HTML BASICS & WEB SITE DESIGN PRINCIPLES

Concept of a Web Site, Web Standards, What is HTML? HTML Versions, Naming Scheme for HTML Documents , HTML document/file, HTML Editor , Explanation of the Structure of the homepage , Elements in HTML Documents ,HTML Tags, Basic HTML Tags, Comment tag in HTML, Viewing the Source of a web page, How to download the web page source? XHTML, CSS, Extensible Markup Language (XML), Extensible Style sheet language (XSL), Some tips for designing web pages, HTML Document Structure. HTML Document Structure-Head Section, Illustration of Document Structure,<BASE> Element,<ISINDEX> Element,<LINK> Element ,META, <TITLE> Element,<SCRIPT> Element ,Practical Applications, HTML Document Structure-Body Section:-Body elements and its attributes: Background; Background Color; Text; Link; Active Link (ALINK); Visited Link (VLINK); Left margin; Top margin, Organization of Elements in the BODY of the document: Text Block Elements; Text Emphasis Elements; Special Elements — Hypertext Anchors; Character-Level Elements; Character References ,Text Block Elements: HR (Horizontal Line); Hn (Headings) ; P (Paragraph); Lists; ADDRESS ; BLOCKQUOTE; TABLE; DIV (HTML 3.2 and up) ; PRE (Preformatted); FORM ,Text Emphasis Elements, Special Elements — Hypertext Anchors ,Character-Level Elements: line breaks (BR) and Images (IMG), Lists , ADDRESS Element, BLOCKQUOTE Element, TABLE Element, COMMENTS in HTML ,CHARACTER Emphasis Modes, Logical & Physical Styles, Netscape, Microsoft and Advanced Standard Elements List, FONT, BASEFONT and CENTER.

UNIT-II IMAGE, INTERNAL AND EXTERNAL LINKING BETWEEN WEBPAGES

Netscape, Microsoft and Advanced Standard Elements List, FONT, BASEFONT and CENTER Insertion of images using the element IMG (Attributes: SRC (Source),

WIDTH, HEIGHT, ALT (Alternative), ALIGN),IMG (In-line Images) Element and Attributes; Illustrations of IMG Alignment, Image as Hypertext Anchor, Internal and External Linking between Web Pages Hypertext Anchors ,HREF in Anchors ,Links to a Particular Place in a Document ,NAME attribute in an Anchor ,Targeting NAME Anchors ,TITLE attribute, Practical IT Application Designing web pages links with each other, Designing Frames in HTML. Practical examples.

UNIT-III INTRODUCTION TO OOP

Advantages of OOP, The Object Oriented Approach, Characteristics of object oriented languages- Object, Classes, Inheritance, Reusability, Polymorphism and C++.

Function: Function Declaration, Calling Function, Function Defines, Passing Argument to function, Passing Constant, Passing Value, Reference Argument, returning by reference, Inline Function, Function Overloading, Default Arguments in function.

UNIT-IV OBJECT CLASSES AND INHERITANCE

Object and Class, Using the class, class constructor, class destructors, object as function argument ,copy constructor ,struct and classes , array as class member, Static Class Data, Static Member Functions, , Friend function, Friend class, operator overloading. Type of inheritance, Base class, Derive class. Access Specifier: protected. Function Overriding, member function, String, Template Function.

UNIT-V POINTERS AND VIRTUAL FUNCTION

pointers: & and * operator pointer variables, .pointer to pointer, void pointer,pointer and array, pointer and function, pointer and string, memory management, new and delete, pointer to object, this pointer Virtual Function: Virtual Function, Virtual member function, accesses with pointer,pure virtual function

Fiie and Stream: C++ streams, C++ Manipulators, Stream class, string I/O, char I/O, Object I/O, I/O with multiple object, Disk I/O,

RECOMMENDED BOOKS :

1.	Introduction to HTML	:	Kamlesh Agarwala, O.P.Vyas, Prateek A. Agrawala (Kitab Mahal Publication)
2.	Let us C++	:	Y. Kanetkar B.P.B Publication
3.	Programming in C++	:	E. Balaguruswami
4.	Mastering in C++	:	Venu Gopal
5.	Object Oriented Programming in C++	:	Lafore R, Galgotia Publications.

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ELECTRONICS

PAPER - I (Paper Code - 0857)

DIGITAL ELECTRONICS

M.M. 50

UNIT-I Number Systems : Binary numbers, binary to decimal conversion, decimal to binary conversion, Binary additions, binary substraction, L'S Complements, 2S Complements, binary multiplication and division, Octal and Hexadecimal numbers, BCD code and gray cone. Logic Gates : OR, AND, NOT NAND, NOR, X OR X-NOR gates, positive and nigative logic, universal building blocks.

UNIT-II Booleam Algebra : De Morgan's theorem, Laws and theorems of Boolean algebra, sum of product and product of sums sumplification, equivalence between AND, OR AND NAND-NAND and equivalence between OR-AND, AND NOR-NOR networks. Karnaugh map simplification.

Arithmetic circuits : Half and full adders, half and full substractors, binary adders, 8421 adders, 2's complement adder Subractor.

UNIT-III Logic familiers : Various logic families RTL, DTL, TTL, ECL, MOS, I^2L, (MOS) and their characteristics, basic gates used in these families. Flip flop, D flip flop, JK flip flops, possitive and negative edgetriggered flip flops, JK master slave vlip lop, idea of astable and monostable multivibrators.

UNIT-IV Registers and counters : Data register, shiuft registers, synchronous counter, ripple counter, up-down counter, ring counter, decade counter. A/D and D/A converters : basic D/A converters, Ladder method, counter methods of A/D converter.

UNIT-V Memoris : Volatile and Non-Volatile memories, ROM, PROM, EPROM, RAM, dynamic and static RAMS floppy disc. Microprocessor : Interoduction to a microprocessor, and popular digital IC's of 8085 family. INTEL 8085-A-Architecture and pin out diagrams, The programme, CPU, Processing of instruction inside a CPU, Timing in CPU, CPU used in a system, Instruction set for 8085 Microprocessor.

PAPER - II (Paper Code - 0858)

ELECTRONIC INSTRUMENTS

M.M. 50

UNIT-I **Regulated Power Supplies :** Power supply characteristics, Zener regulator, series voltage regulator, series regulator with pass transistor to large load currents, Shunt regulator, idea of Darlington pair, Regulator with Op-amp, inverting, non-inverting, Amplifiers, Zener reference, IC regulated circuits (IC 78XX series).

Regulator features : Current I.imiting, short circuit shut down, fold back, precision regulator.

UNIT-II CRO : Block diagram, basic operation, electro-static focussing, electrostatic deflection, screens for CRT, CRT circuits, Horizontal defelection system, Sweep generator, Synchronizing the wave, vertical deflection system, vertical amp., Lissajous figures, frequency and phase measurement, Introduction to storage CRO, dual trace dual beam, samp CRO.

UNIT-III Signal Generators : Sweep frequency Gerenator, pulse and aquare wave generator, pulse charactoristics and terminoloty, astable multivibrator, block diagram of pulse generation function, 555 timer for frequency generation, Blocking Oscillator wave generator, Introduction to IC 8038 as omplete function generator.

UNIT-IV O Meter : Basic circuit; Measuring methods, direct series and parallel connections, sources of errors, Electronic Voltmeter, D.C. Voltmeter direct coupled amp. and

Chopper type D.C. amp., A.C. Voltmeter, true RMS responding Voltmeter, multirange voltmeter sensitivity.

Power meter : Single phase, double phase and three phase Watt-meter Watt hour meter.

Digital Voltmeter: LED's digital display seven segment display, integrating DVM, Ramp DVM, Stair case Ramp, Successive approximation DVM, Sample and hold circuits.

UNIT-V Analog/Digital Multimeter : Analog multimeter, AC and DC measurment, conversion of analog output to digital form (A/D), Dual ramp A/D converter, digital measuring system, multimeter block diagram, voltage, current and resistance measurments. Frequency counter : Elements of electronic counter, decade counting assembly temperature compensated prystal oscillator, universal counter, measurement modes; frequency measurement, period measurement, time interval measurement, measurement errors : gating errors, time base error, trigger level error.

ELECTRONICS
PRACTICAL

M.M. 50

Antudent is required to do ntleast 14 experiments in an academic year. ---- setl---- of Practical examination will be as follows :

(i) One Experiment in 3 hours.

(ii) Marks :

Experiment	-	30
Viva-Voce	-	10
Sessional	-	10
Total	-	**50**

1. Sqare Wave response of amplifer.
2. Verification of :
   (i) Truth tables of basic logic gates. (ii) De Morgens theorem.
3. Study of half adders and full adders using IC's.
4. Study of RS flip flops.
5. Study of JK Master slave flip flop.
6. Study of the decade counter and divided by N. circuits.
7. Study of D/A Converter.
8. Study of A/D Converter.
9. Study of OP Amp : inverting and non invertind amplifiers of different gains.
10. Study of OP-Amp adder, subtractor, integrator and differentiator.
11. Study of IC regulated power supply.
12. Study of astable and distable multivibrator using 555 timer.
13. Study of 8083 based function generator.
14. Addition of two binary number with microprocessor (8035).
15. Data transfer from memory to register and vice versa using 8085 microprocessor.
16. Study of frequency by Wien's bridge.

Note : Other experiments of equal standard may also be set.

REFERENCES :

1. Microprocessor by Gaonkar
2. Electronic & Electrical Instruments by Sawhoe
3. Fundamental of Microprocessors by B. Ram
4. Digital Electronics by R.P. Jain
5. Digital Electronics by Flloyd

INFORMATION TECHNOLOGY

PAPER - I

DIGITAL CIRCUITS & COMPUTER H/W

(Paper Code - 0874)

UNIT-I (A) Number Systems :

Octal and hexadecimal number, decimal rep., complements, addition, subtraction, multiplication, division, fixed point rep, floating point rep., other binary code-gray code, excess 3 gray, excess-3, 2421, etc. error detection code.

(B) Boolean Algebra :

Laws, demorgan's theorm, Simplification boolean expression & logic diagram, positive & negative logic, K-map and simplification of K-map.

UNIT-II Combinational circuits :

Half adder, full adder, flip-flop : SR, JK, D,T, sequential circuits : encoder, decoder, multiplexer, shift resister, binary counters, BCD adder.

UNIT-III Multivibrator circuits :

Monostable, astable, bistable, smitt trigger, clocked RS, master-slave flip-flop, edge triggered flip-flop, latch.

Intergrated circuits :

RTL, DITL, TTL, CMOS, MOS.

UNIT-IV (A) Central Processing Unit :

Introduction, register organisation, stack organisation, Instruction formats, Addressing modes.

(B) I/O organisatin :

I/O interfaces, Data transfer, types and modes, interrupts, DMA, IOP.

UNIT-V Memory organisation :

Memory hierarcy, main memory, Auxiliary memory, Associative memory, cache memory, virtual memory, memory management techniques.

REFERENCE TAXT BOOK :

1. Integrated Electronics - Millman & Halkias
2. Principle of Electronics - V.K. Mehta
3. Digital Electronics - R.P. Jain
4. Computer System Architecture - Morris Mano
5. Digital Electronics & Computer Hardware - Morris Mano

PAPER - II

(Paper Code - 0875)

UNIT-I Ingroduction to OPP : Advantages of OPP, the Object oriented approach, characteristics of object oriented languages : object, classes, inheritance, reusability, polymorphism and C++.

UNIT-II Function : function declaration, calling function, function definition, passing arguments to function, passing constant, passing value, fegerence argument, returning by reference, inline function, function overloading, default arguments in function.

UNIT-III Object and olasses, using the olasses, olass oonstruotor, class destructor, object as function argument, copy constructor, struct and classes, array as class member, static class data, static member funotions, friend funotion, friend class, operator overloading, type of inheritance, bass class derive class, access percifier, protectedc, member function.

UNIT-IV Pointers : & and * operator pointer variables, pointer to pointer, void pointer, pointer and array, pointer and functions, pointer and string, memory management, new and delete, pointer to object, this pointer, virtual function : virtual function, virtual member function, accesses with pointer, pure virtual function.

UNIT-V File and stream : C++ steams, C++ manipulators, Stream class, string I/O, char I/O; object I/O, I/O with multiple objects, disk I/O.

REFERENCE TEXT BOOKS :

1. Programming in C++ - E. Balaguruswami
2. Mastering in C++ - Venu Gopal
3. Object Oriented Programming in C++ - Robert Lafore
4. Let us C++ - Y. Kanetkar

PRACTICAL WORK

1. The sufficient Practical work should be done for understanding the paper 2.
2. At least five programs on each unit from unit 2 to unit 5 be prepared.
3. All practical works should be prepared in form of print outs and be valuated while practical examination.

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INDUSTRIAL MICROBIOLOGY

Paper	Title	Time	Marks
First	Environmental Microbiology and Biostatistics	3 hrs.	50
Second	Microbial Physiology and Immunobiotechnology	3 hrs.	50
	PRACTICAL Examination	4 hrs.	50
	(including sessionals)		(40+10)

Note : During Two months Summer Vacation, students will visit some Industries. He/She will submit "Summer Job-Training Report" in B.Sc. IIrd Year Viva Voce Exam.

PAPER - I

ENVIRONMENTAL MICROBIOLOGY AND BIOSTATISTICS M.M.50

(Paper Code - 0876)

UNIT-1 Our environment : Soil, water and air. Concept of environment in relation to microbes. Environment included physiological adaptations in microorganisms. Nature of microbial population in soil, water and air. Biogeochemical cycling - Carbon, Nitrogen, Sulphur and Phosphorus.

UNIT-2 Population interactions : Neutralism, Commensalism, Synergism, Mutualism, Antagonistic relationships. Mycorrhizal associations. VAM and its importance.

UNIT-3 Nitrogen fixation by symbiotic and non-symbiotic microorganisms. Use of microorganisms as biofertilizers. Mass cultivation of Rhizobium and Azotobacter. Use of blue-green algae as biofertilizers.

UNIT-4 Liquid waste disposal. Nature of domestic and municipal waste and sewage. Sewage treatment. Solid waste disposal. Methods of disposal of Agricultural waste.

UNIT-5 Basic idea of probability, normal, binomial and poisson distribution. Mean, Mode and Median. Chi-Square test. Exponential and Logarithemic Functions.

PRACTICALS

1. Isolation of Microorganisms from Air.
2. Isolation of Microorganisms from Water.
3. Isolation of Microorganisms from soil.
4. Determination of MPN of faecal contaminants in water.
5. Measurment & confirmation of E. coli in water sample.
6. Biochemical tests for identification of enteric bacteria.
7. Study of Rhizobium from root nodules.
8. Study of symbiotic and non-symbiotic blue-green algae.
9. Problems based on the determination of Mean, Madian and Mode.
10. Problems on Chi-Square Test.
11. Experiments to demonstrate Symbiotic, Antagonistic acticvities and relations amongst microbes and their interactions with plants.

RECOMMENDED BOOKS :

1. Introduction to Soil Microbiology by Martin Alexander.
2. General Microbiology by Pelczar, Reid & Chan.

3. Biofertilizers in Agriculture by N.S. Subba Rao.
4. Statistics by Mishra & Mishra.
5. General Microbiology, Vol. II, by Power & Daginawala.

PAPER - II

MICROBIAL PHYSIOLOGY AND IMMUNABIOTECHNOLOGY M.M. 50

(Paper Code - 0877)

UNIT-1 Diffusion, gaseous exchange, Osmosis, Plasmolysis, Biochemical properties of membernes, Passive and Active trnaport mechanism. Role of ionophores, group translocation across the memberanes.

UNIT-2 Photosynthetic microbes, Osygenic and non-oxygenic reaction centre. Electron transport, Photophosphorylation, Calvin Cycle. Photorespiration and its significance. Effect of various factors on rate of photosynthesis.

UNIT-3 Respiration mechanisms - Breakdown of carbohydrates through glycolysis, Kreb's cycle. Fermentation. Pentose Phosphate Pathway. Fermentation of alcohol, Citric acid and acetic acid.

UNIT-4 Methanogens and Methylotrophs. Sulphur utilizing bacteria. Sulphate reduction pathway. Economic importance of Methylotrophs and sulphur utilizing bacteria.

UNIT-5 History and Scope of immunology, Types of immunity. Antigen-Antibody reactions. Immunoglobulins - Structure and functions.

Production of Vaccines and Monoclonal antibodies.

PRACTICAL

1. Isolation of photosynthetic bacteria and cyanobacteria from soil.
2. Isolation and characterisation of Methanogens.
3. Study of Hydrogen-production by bacteria.
4. Measurement of nitrate uptake by microorganisms.
5. Study of nitrate and nitrite reduction by microorganisms.
6. Demonstration of O_2 evolution during photosynthesis.
7. Demonstration of plasmolysis, osmosis, active and passive transport mechanism.
8. Testing of Blood Groups.
9. Titration of Antigen and Antibody.
10 Precipitation reaction of antigens and antibodies.

BOOK RECOMMENDED :

1. Cell Biology by Pawar.
2. General Microbiology, Vol. II, by Power and Daginawala.
3. Immunology by Davis.
4. Immunology by G.P. Talwar.

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BIOCHEMISTRY

PAPER - I

ENZYMOLOGY

M.M. 50

UNIT-I INTRODUCTION

History, general characteristics, nomenclature, IUB enzyme classification (rationale, over view and specific examples), significance of numbering system. Definitions with examples of holoenzyme, apoenzyme, coenzymes. cofactors, activators, inhibitors, active site (identification of groups excluded), metallo-enzymes, units of enzyme activity, specific enzymes, Isoenzymes, monomeric enzymes, oligomeric enzymes and multienzyme complexes. Enzyme specificity.

Hostorical perspective, nature of non-enzymatic and enzymatic catalysis. Measurement and expression of enzyme activity-enzyme assays. Definition of IU, Katal, enzyme turn over number and specific acitivity. Role of non-protein organic molecules and inorganic ions coenzyme, prosthetic groups. Role of vitamins as coenzymes precursors (general treatment).

UNIT-II ENZYME CATALSIS

Role of cofactors in enzyme catalysis : NAD/NADP+, FMN/FAD, coenzyme A, biocytin, cobamide, lipoamide, TPP, pyridoxal phosphate, tetrahydrofolate and metal ions with special emphasis on coenzyme functions. Acid-base catalysis, covalent, proximity and orientaton effects, strain and distortion theory. Mechanism of action of chymotrypsin, carboxypeptidase, ribonuclease and lysozyme.

UNIT-III ENZYME PURIFICATION

Methods for isolation, purification and characterization of enzymes.

UNIT-IV ENZYME KINETICS

Factors affecting enzyme activity : enzyme concentration, substrate concentration, pH and temperature. Derivation of Michaelis-Menten equation for uni-substrate reactions. Km and its significance. Line weaver-Burk plot and its limitations. Importance of K_{cat}/K_m. Bi-substrate reactions-brief introduction to sequential and ping-pong mechanism with examples.

Kinetics of zero and first order reactions. Significance and evaluation of energy of activation and free energy.

Reversible and irreversible inhibition, competitive, non-competitive and uncompetitive inhibitions. determination of K_m & V_{max} in presence and absence of inhibitor. Allosteric enzymes.

UNIT-V INDUSTRIAL AND CLINICAL APLLICATION OF ENZYME.

Immobilization of enzyme and their industrial applications. Production of glucose from starch, cellulose and dextran; use of lactase in dairy industry; production of glucose-fructose syrup from sucrose; use proteases in food, detergent and leather industry; medical application of enzymes. use of glucose oxidase in enzyme electrodes.

PAPER - II

INTERMEDIARY METABOLISM

M.M. 50

UNIT-I INTRODUCTION TO METABOLISM

General features of metabolism, experimental approaches to study metabolism; use of intact organism, becterial mutants, tissue slices, stable and radioactive isotopes.

CARBOHYDRATE METABOLISM

Reactions and energetics of glycolysis. Alcoholic and lactic acid fermentations. Entry of fructose, galactose, mannose etc. Reactions and energetics of TCA cycle. Gluconeogenesis, glycogenesis and glycogenolysis, Reactions and physiological signifacance of pentose phosphate pathway. Regulation of glycolysis and TCA cycle. Photosynthesis, a brief review.

UNIT-II ELECTRON TRANSPORT CHAIN AND OXIDATIVE PHOSPHORYLATION

Structure of mitochondria, sequence of electron carriers, sites of ATP production, inhibitors of electron transport chain. Hypothesis of mitochondrial oxidative phosphorylation (basic concepts). Inhibitors and uncouplers of oxidative phosphorylation. Transport of reducing potentials into mitochondria.

UNIT-III LIPID METABOLISM

Introduction, hydrolysis of triacylglycerols, transport of fatty acids into mitochondria. β – oxidation of saturated fatty acids, ATP yield from fatty acid oxidation. biosynthesis of saturated and unsaturated fatty acids. Metabolism of ketone bodies, oxidation of unsaturated and odd chain fatty acids. Biosynthesis of triglycerides and important phospholipids, glycolipids, sphingolipids and cholesterol. Regulation of cholesterol metabolism.

UNIT-IV AMINO ACID METABOLISM

General reactions of amino acid metabolism : transmination, oxodative deamination and decarboxylation. Urea cycle. Degradation and biosynthesis of amino acids. Glycogenic and ketogenic amino acids.

UNIT-V NUCLEOTIDE METABOLISM

Sources of the atoms in the purine and pyrimidine molecules. Biosynthesis and degradation of purines and pyrimidines. Regulation of purine and pyrimidine biosynthesis.

PORPHYRIN METABOLISM

Biosynthesis and degradation of porphyrins. Production of bile pigments.

PRECTICAL

1. Separation of Blood Plasm and Serum
   a. Estimation of proteins from serum by biuret and lowry methods.
   b. Determination of albumin and A/G ratio in serum.
2. Estimation of bilirubin (conjugated and unconjugated) in serum.
3. i. Estimation of total lipids in serum by vanillin method.

ii. Estimation of cholesterol in serum.

4. Estimation of lipoproteins in plasma.
5. Estimation of lactic acid in blood before and after exercise.
6. Estimation of blood urea nitrogen from plasma.
7. Separation and identification of amino acids by (a) paper chromatography and (b) thin-layer chromatography.
8. Separation of polar and non-polar lipids by thin-layer chromatography.
9. Estimation of SGPT and SGOT in serum.
10. a. Assay of serum alkaline phosphatase activity.
    b. Inhibition of alkaline phosphatase activity by EDTA.
    c. Effect of substrate concentration on alkaline phosphatase activity and determination of its K_m value.
11. a. Effect of temperature on enzyme activity and determination of activation energy.
    b. Effect of pH on enzyme activity and determination of optimum pH.
    c. Effect of enzyme concentration on enzyme activity.
12. a. Preparation of starch from potato and its hydrolysis by salivary amylase.
    b. Determination of achromatic point in salivary amylase.
    c. Effect of sodium chloride onamylases.

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BIOTECHNOLOGY

PAPER - I

MOLECULAR BIOLOGY & BIOPHYSICS

M.M. 50

UNIT-I 1. DNA : Structure, types and replication
2. RNA : Structure, and type and Function
3. Structure of gene, old and new concept.

UNIT-II 1. Genetic code : Properties, codon assignment, Secondary genetic code,
2. Protein synthesis.
3. Mitochondrial genome.
4. Chloroplast genome

UNIT-III 1. Gene Therapy
2. Transposable elements.
3. DNA damage and repair
4. Tissue engineering : General Concept

UNIT-IV 1. Law of Thermodynamics.
2. Beer lambert's law
3. Radioisotopes techniques.
4. Autoradiography

UNIT-V 1. Biophysics Introduction, scope and application
2. Principle, structure, functions of the following
   a. Spectroscopy b. Electrophoresis
   c. Centrifugation d. Colorimeter
   e. Chromatography f. ELISA

List of Books :

1. C.B. Power-Cell Biology, First Edition (2005), Himalaya Publishing House.
2. Gerald Karp - Cell and Molecular biology, 4th Edition (2005).
3. Lewis J.Klein Smith and Valerie M.Kish-Principles of cell and molecular biology-Third Edition (2002)
4. P.K. Gupta- Cell and molecular biology, Second Edition (2003), Rastogi publications.
5. Tortora, Funke and Case-Microbiology : An introduction 6th Edition (1998), Binjamin/ Cummings Publishing Co.
6. Richard M-Twyaman-Advanced Molecular Biology, First South Asian Edition (1998), Viva Books Pvt. Ltd.
7. K. Wilson and J.Walker :Principle and Techniques of Biotechnology and Molecular Biotechnology.
8. Upadhya and Upadhya : Biophysical Chemistry.
9. David, I. Nelson and Michael M.Cox : Lehniger : Principal of Biochemistry 4th Edition. W.H. Freeman and Company, New York.

PAPER - II

RECOMBINANT DNA TECHNOLOGY

M.M. 50

UNIT-I 1. Scope and aim of the Biotechnology.

2. Recombinant DNA Technology : General concept and Application. Strategies of recombinant DNA technology in Prokaryotes.

3. Restriction Enzymes : End O nublease (type, Nomenclature, Restriction, Sequence, and Cleavage Pattern).

   a. Modification of cut ends.

   b. Steps in gene cloning

   d. Isolation of the desired gene.

4. cDNA Library, Genomic Library.

UNIT-II 1. Vectors (Animal and Plant vectors)

2. Bacteriophage Vectors

3. Introduction of vectors into apropriate host.

UNIT-III 1. PCR:- Procedure (denaturation, Annealing, extension)

2. Types of PCR

3. Applications Advantages and Limitation of PCR.

UNIT-IV 1. Monoclonal Antibodies : Structure, Production, Application.

2. In vitro fertilization and embryo transfer.

3. Genome map and Genome Project.

5. Apoptosis.

UNIT-V 1. Stem cell technology

2. Targeted Gene Transfer

3. DNA fingerprinting

4. Transgenic animals and Plants.

List or Books :

1. B.D. Singh (2004) Biotechynology, Expanding Horizons. First Edition. Kalyani Publishers, Ludhiana.
2. P.K. Gupta (2005) Biotechnology and Genomics, Rastogi Publication, Meerut.
3. Stan bury and Whittaker - Principles of Sterilization techniques, First Indian reprint Edition (1997). Aditya Book (P) Ltd. New Delhi.
4. L.E. Casida- Industrial Microbiology Edition (1994).
5. A.H. Patel - Industrial Microbiology 4th Edition (2003)
6. K.S. Bilgrami and A.K. Pandey - Introduction to Biotechnology Edition 2nd (1998)
7. U Satyanarayan Biotechnology, First Edition (2005) Books and Allied (P) Ltd. Kolkata.
8. Atul kumar and Vandana A.Kumar (2004) Plant Biotechnology and tissue culture, Principle and Perspectives, International Books Distributing Co. Luchnow.

PRACTICAL LIST :

1. Isolation of DNA.
2. Isolation RNA.
3. Estimation of DNA from Plant Cells.
4. Laminar Flow, Autoclave, Oven Incubator water bath Quebec colony counter, Centrifuge, Spectrophotodmeter, Electrophoresis, Camera Lucida.
5. Experiments (at least - two) on the basis of electrophoresis.

SCHEME FOR PRACTICAL EXAMINATION

Time : 4 hrs. M.M. : 50

1.	DNA Isolation	10 marks
2.	RNA Isolation	10 marks
3.	Practical based on Biophysics	10 marks
4.	Spotting based on paper I and II (5 spots) at least two from each paper	10 marks
5.	Viva - Voce	05 marks
6.	Record / Sessional	05 marks

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