APPLIED MATHS – I

Section A

Function of several variables, limits and continuity, partial derivatives, higher order partial derivatives, Euler's theorem, Jacobians, maxima of functions of two variables. Lagrange's method of multipliers, double and triple integrals, change of variables, applications of double and triple integrals.

Section B

Linear differential equations of second order with constant coefficients: complementary functions, particular integrals, Euler homogeneous form, and variation of parameters.
Taylor's theorem with remainder, power series expansion of functions,

Section C

Matrices: review of properties of determinants. Elementary operations on matrices. Homogeneous and non homogeneous system of linear equations and their properties, bilinear, quadratic, hermitian and skew-hermeitian forms. Eigen values of hermitian, skew-hermitian and unitary matrices.

Section D

Complex analytic functions: brief review of complex numbers, complex variable, derivatives of analytical function, cauchy-Riemann equations, harmonic function, complex series, some elementary functions, logarithm.

BOOKS:

1. Kryszig, Thomas-Finny, Advanced Engineering Mathematics.

2. S.S. Shastri, "Engineering Mathematics (2nd edition) Vol-I and Vol-II.

3. B.S. Grewal, Higher Engineering Mathematics.

4. Piskunov, Differential and Integral Calculus.

5. R.K.Jain and S.R. K. Iyengar, Advanced Engineering, Mathematics.

APPLIED PHYSICS

Section A

Physical Optics: Interference-division of wavefront-fresnel's biprism, division of multitude, interference by Newton's rings, Michelson's interferometer and its applications.

Diffraction- Difference between fraunhofer and fresnel diffraction through slit, plane transmission grating, its dispersal and resolving powers Polarization- polarized and unpolarised light, double refraction, nicol prism, quarter and half wave plates, simple concepts of photoelasticity.

Section B

Wave and oscillations: Simple harmonic oscillations, simple concept of harmonic oscillator, resonance, quality factor, E.M wave theory, Review of basic ideas, Maxwell's equations and their experimental basis. Simple plane wave equations. **Dielelectrics:** Molecular Theory, polarization, displacement susceptibility, dielectric coefficient, permitivity and various relations between these Gauss's law in the presence of dielectric, energy stored in an electric field. Behavior of dielectric in field –simple concepts, dielectric losses.

Section C

Quantum Physics: Difficulities with classical physics, Introduction to quantum mechanics-simple concepts, discovery of Planck's constant. De Broglie Waves, Phase and Group Velocities, Particle diffraction, Uncertainty Principle, the wave equation, Postulates of quantum mechanics, Time dependent and independent Schrodinger equation,, Tunnel Effect, Harmonic

Section D

Nuclear Physics: Neutron cross-section, nuclear fission, moderators, nuclear reactors, reactor criticality, interaction of radiation with matter-basic concepts, Radiation Detectors-ionization chamber, cloud Chamber & bubble chamber.

Books:

1. Arthur Beiser, Concepts of Modern Physics, 5th International edition Tata McGraw Hill

2. Wehr, Richards & Adair, Physics of the Atom.

3. A.S.Vasudeva, Modern Engg. Physics.

INTRODUCTION TO COMPUTER FUNDAMENTAL AND PROGRAMMING IN C

Section A

Programming Fundamentals: Introduction to Computer, Block Diagram & Organization of Computer Number System, Hardware, Software, Types of programming Languages- Machine Language, ALL, HLL Translators- compiler, interpreter, assembler, linker and loader

Section B

Programming Techniques: - Steps in Program Development, Algorithm, Flow Charts, Pseudo code and Classification of Programming Language.

Section C

C as Structured Programming Language:- C character set, Literals, Keywords, Identifiers, Data Types and size , Variables, Expressions, Labels, Statements, Type of Operators ,Constants

Section D

C functions ,Library Function, Parameter Passing, Recursion, Arrays- declaration, initialization, Iteration

C Files, function and File handling, 'C' pre-processor and command line arguments, macro and conditional compiler directives

(The programming language C is to be taught along with the course in detail.)

Books:

1. Kanitkar, "Let us C", BPB Publications

2. Richie and Kerningham, "C Programming"

3. V Rajaraman "Fundamentals of computers"

4. D.Dromey, "How to solve it by computers" (Prentice Hall)

5. E. Balaguruswamy, "Programming in C", Tata McGraw Hill.

Applied Physics Lab

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments

Note: (Two experiments to be done from each section, total number of experiments required to be performed 10 to be decided by the teacher concerned and availability of equipment.)

Section A

1.   To find the wavelength of sodium light by Newton's rings experiment.

2.   To find the wavelength of sodium light by Fresnel's Biprism experiment.

3.   To find the wavelength of sodium light by using the phenomenon of diffraction of light at a straight edge.

4.   To find the wavelength of various colors of white light with the help of a plane transmission diffraction grating.

5.   To find the wavelength of sodium light by Michelson interferometer.

Section B

1.   To find the refractive index and Cauchy's constant of a prism by using spectrometer.

2.   To find the resolving power of a telescope.

3.   To study the beam parameters of a helium-neon laser.

4.   To find the specific rotation of sugar solution by using a polarimeter.

5.   To find the velocity of Ultrasonic Waves in a given liquid.

6.   To find the specific rotation of sugar using polarimeter

Electricity and Magnetism

Section C

1. To compare the capacitances of two capacitors by De'sauty Bridge.

2. To find the flashing & quenching potentials of argon & also to find the capacitance of unknown capacitor.

3. To find the temperature coefficient of resistance by using platinum resistance thermometer and Callender

& Griffith bridge.

Section D

1. To find the frequency of AC mains by using sonometer.

2. To find the low resistance by carrey – Foster's bridge.

3. To find the resistance of a galvanometer by Thomson's constant deflection method using a post office box.

4. To find the value of high resistance by Substitution method.

5. To find the value of high resistance by Leakage method.

6. To convert a galvanometer into an ammeter of a given range.

7. To study the variation of magnetic field with distance and to find the radius of coil by Stewart

   and Gee's apparatus.

8. To find the reduction factor of two turn coil of tangent galvanometer by using a copper voltammeter.

Modern Physics:

Section E

1. To find the value of e/m for electrons by Helical method.

2. To determine the charge of an electron by Millikan's oil drop method.

3. To find the ionization potential of Argon. Mercury using a thyratron tube.

4. To find the value of Planck's constant by using a photoelectric cell.

Section F

1. To study the various crystal structures using Beed Model.

2. To calculate the hysteresis loss by tracing a B-H curve for a given sample.

3. To determine the band gap of an intrinsic semiconductor by four probe method.

4. To determine the resisitivity of a semi-conductor by four probe method at different temperatures.

5. To determine the Hall co-efficient.

6. To study the photovoltaic cell & hence to verify the inverse square law.

Books:

1. Practical Physics-S.L.Gupta & V.Kumar.

2. Advanced Practical Physics Vol. I & II – S.P. Singh

3. Practical Physics for B.Sc I, II and III - C.L.Arora.

Workshop Practice-I

Instructions for paper setter / candidates

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 (i) Performing a practical exercises assigned by the examiner (25 marks).

 (ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments: -

Fitting Shop: -

Introduction to the tools used in Fitting Shop and various processes in Fitting shop.

 1. To make a square piece of mild steel.

 2. To make V-matching joint of mild steel.

 3. To make a V-notch.

Machine Shop: -

Introduction to various machine tools and machine parts, such as Lathes, drilling machine, grinders etc. Cutting tools and operations.

 1. Facing and turning on mild steel rod on Lathe Machine.

 2. To make a groove on lathe machine.

 3. Taper turning operation on Lathe Machine.

Carpentry and Pattern making Shop: -

Carpentry and Pattern Making Various types of timber and practice boards, defects in timber, seasoning of wood, tools, operations and joints. Introduction to the tools used in carpentry shop.

 1. To make the 'T' lap joint.

 2. To make 'T' Dove-tail joint.

 3. To make Mortise & Tennon joint.

Welding Shop: -

Introduction to different welding methods, welding equipment, electrodes, welding joints, awareness of welding defects.

(I)To make a lap joint.

(II)To make a T joint.

(III)To make a V-butt joint.

Smithy and Forging: -

Introduction to forging tools, equipments and operations, Forgability of metals.

1.	To make a ring of mild steel by cold forging process.

2.	To make S-hook by hot forging process.

3.	To make chisel by hot forging process.

Foundry Shop: -

Introduction to moulding materials, moulds, use of cores, melting furnaces, tools and equipment used in Foundry.

1.	Make a single piece pattern mould.

2.	To make spilt pattern mould.

3.	To make mould and core and assemble it.

Electrical and Electronics Shop: -

1.	Introduction to electric wiring.

2.	Exercises preparation of PCBs, involving soldering of electrical & electronic application.

Books: -

1.	Workshop Technology by Chapman.

2.	Manufacturing Processes by Begman.

3.	Manufacturing Materials and processes by JS Campbell.

Computer Programming Lab.

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

    (i)   Performing a practical exercises assigned by the examiner (25 marks).

    (ii)   Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

COMMUNICATION SKILLS

INTERODUCTION: Meaning and important of communication in business, the process of communication, models of communication, types of information-order, advise, suggestion, motivation, persuasion, warning and education. Channels of communication, their effectiveness, limitations. Media of communication, barriers of communication, approaches to effective communication, tools of communication, Dictation, sentence, paragraph, punctuation and report writing. Group communication through committees, conference and other formal communication with public at large, interviews, seminar, symposia and conferences.

Specific business communication: essentials of effective business communication structure of business correspondence: inquires and replies, orders and their executions, complaints and adjustment, credit and status inquires, agency letters and sales letters. Process for drafting Effective Business Message

Letter writing: Good news, Bad news, Informative news, Persuasive news, Memorandum drafting E-mail writing Report writing – Short & Long Formal Reports Strategies to improve - reading skills, speaking skills, listening skills Guidelines to effective public speaking ,Developing job application – Covering letter, Resume, Interviewing: Negotiating the job offer

Recommended Text Books

1 Lesikar, Petit & Lesikar's Basic Business Tata McGraw

2 Flately Communication Hill

Reference Books:

1 Poe & Fruchling Basic Communication AITBS

2 Taylor English Conversion Practice Tata McGraw

3 Diwan & Aggarwal Business Communication Excel

4 Baugh, Frayer & Thomas

APPLIED CHEMISTRY

PART A

Thermodynamics- Second Low, Concept Of Entropy, Entropy Change For An Ideal Gas, Free Energy And Work Functions, Free Energy Change, Chemical Potential, Gibb's Helmholtz Equation, Clausious- Clapeyron Equation, Related Numerical Problem With Above Topics

Chemical Bonding: Ionic Bond, Energy Changes, Lattice Energy, Born Haper Cycle, Covalent Bond Energy Changes, Characteristics Of Covalent Compound, Effective Atomic Numbers, Co-Ordinate Bond-Werner's Theory, Isomerism In Co-Ordinate Compounds, Vander Wall Forces, Hybridization And Resonance, Valance Shell Electron Repulsion Theory, Discussion Of Structures Of H_2O, NH_3, Sif_4. Molecular Orbital Theory, Linear Combination Of Atomic Orbital Methods. Structure Of Simple Homonuclear Dia Atomic Molecule Like H_2, N_2, O_2, F_2.

Reaction Kinetics: Significance Of Rate Law And Rate Equation , Order And Molecularity, Determination Of Order Of Simple Reaction- Experimental Method , Equilibrium Constant And Reaction Rates-Lindemann Theory, Collision And Activated Complex Theories, Complex Reaction Of First Order Characteristics Of Consecutive , Reversible And Parallel reactions- Steady State And Non Steady State Approach.

Corrosion and its prevention –galvanic and concentration cell, dry and wet corrosion, electro chemical theory of corrosion, galvanic corrosion pitting corrosion, water-line corrosion, differential aeration corrosion, stress corrosion, factors affecting corrosion, Preventive measures(proper design, Cathodics protection, protective coatings).

PART B

Polymers and polymerization: Introduction and classification of polymers mechanism of polymerization(addition, condensation and coordination) effect of structure on properties of polymers, bio polymerization, bio degradable polymerization, preparation properties and technical applications of thermo-plastics(PVC, PVA, Teflon) and natural elastomers and synthetic rubber .Silicones.

Instrumental Methods of Analysis: Principle and application thermal methods of analysis, basic concepts of spectroscopy, Lambert`s and Beer`s law, absorption and emission spectroscopy, different spectroscopic techniques (UV, Visible , IR, Raman) elementary discussion on Flame photometry.

Phase Rule and Catalysis: Terminology, derivation of Gibb`s Phase Rule, One component system (H_20 system), Two component systems, Eutectic system (Pb-Ag), system with congruent m.pt (Zn-Mg), systems with incongruent m.pt (Na-K), Applications of above systems.

Lubrication and lubricants-Friction, mechanism of lubrication, classification and properties of lubricants, Additives for lubricants, synthetic lubricants, Greases-Preparation and properties (consistency, drop point) and uses.