



BABA GHULAM SHAH BADSHAH UNIVERSITY RAJOURI (J&K)

SYLLABUS & GENERAL INSTRUCTIONS REGARDING COMMON ENTRANCE TEST (CET) FOR B. TECH PROGRAMME (2010)

1) SCHEME OF EXAMINATION:

There shall be 02 papers of objective type questions. Each paper will have 75 questions. The details are as under

Paper	Subject	Subject Code	Total questions	Time duration	Reporting Time
I	(A) Physics	01	45	1½ Hours	9:25 am
	(B) Chemistry		30		
II	Mathematics	02	75	1½ Hours	1:25 pm

For Paper I

9:25 am: Reporting time

9:30 am: The invigilator shall ascertain the identity of each candidate by comparing his/her facial appearance with the photographs on the Admit card and Attendance sheet. The centre Superintendent shall also check the identity of the candidates and ensure that only the genuine candidates have been allowed to sit in the examination hall and there is no case of impersonation.

9:45 am: Candidates will be given answer sheets. They will go through instructions printed on the cover page and fill in the particulars on the answer sheet.

9:55 am: They will be given question booklets. The question booklet number is to be entered on the answer sheet.

10.00 am: They will break open the seal of the question booklet and start attempting the questions.

11.30 am: Examination in Paper I ends

The candidate will remain seated. They will hand over the answer sheets to the invigilator and leave the examination hall only when they are asked to do so.

Note:- After distribution of answer sheets, no candidate shall be allowed to go out of the examination hall under any circumstances,

For Paper II

1 :25 pm :Reporting time

1:30 pm: The invigilator shall ascertain the identity of each candidate by comparing his/her facial appearance with the photographs on the Admit card and Attendance sheet. The centre Superintendent shall also check the identity of the candidates and ensure that only the genuine candidates have been allowed to sit in the examination hall and there is no case of impersonation.

1:45 pm: Candidates will be given answer sheets. They will go through instructions printed on the cover page and fill in the particulars on the answer sheet.

1:55 pm: They will be given question booklets. The question booklet number is to be entered on the answer sheet.

2:00 pm: They will break open the seal of the question booklet and start attempting the questions.

3.30pm: Examination in Paper-II ends

The candidate will remain seated. They will hand over the answer sheets to the Invigilator and leave the examination hall only when they are asked to do so.

2) Nature of Question Papers:

1. The question papers shall be objective-type and Multiple Choice answers. The question booklet comprises of several pages stapled together in one cover. The questions are based on knowledge, understanding and application of the relevant subject. Each question carries one mark and all questions are compulsory. There is no negative marking.

2. Each question booklet is numbered. Before starting to answer the questions, please check the booklet thoroughly. In case you detect any defect like missing question/ questions, the booklet shall be replaced with the same series by the Invigilator. No complaint shall be entertained after the test is over.

3. Do not open the seal of the packet containing question booklet until you are asked to do so.

4. Write your Roll number on the cover page of the question booklet at the space provided for the purpose.

5. Candidates should not put any type of marking on the question booklet. Paper for rough work is included in the question booklet; use it, if you need.

3) Nature of OMR Answer Sheets.

1. The OMR Sheets are used in order to simplify the procedure of evaluation of answer sheets and to ensure accuracy. Each circle on the OMR sheet has an alphabetical or numerical value. Therefore, a small mistake in shading the round spot on the circle may result in a big mistake.

2. The answer sheet will be supplied to the candidates in the examination hall.

3. At the top of the answer sheet, there are few blanks which are to be filled carefully by the candidate.

4. Write question booklet number, booklet series, subject code and Roll number in numerals. Also darken the appropriate circles.
5. Write your name, date of birth (DD, MM, and YY) for date, month and year respectively.
6. Write the given certification statement in your running handwriting in English and append your signature at the space provided for the purpose on your answer sheet. The certificate is to be authenticated by the invigilator and the Superintendent of the examination centre.
7. Complete the formalities and wait for the signal to start, break open the seal, open the question booklet, begin reading and answering the questions.
8. You don't have to write your answers or mark them in the question booklet.

Each question is followed by four responses *i.e.* 1, 2, 3, and 4; of which only one is correct or the most appropriate response. Indicate the correct response by darkening the appropriate circle completely with black or blue ball point pen on the answer sheet.

For Example Q. 11

Chennai is the capital of the State of:

1. Karnataka
2. Tamil Nadu
3. Andhra Pradesh
4. Kerala

The *correct response* is (2). Locate the question number in the Answer Sheet and darken the circle under column (2) as shown below.

A

10	①	②	③	④
11	①	●	③	④
12	①	②	③	④
13	①	②	③	④

Correct way of answering

Note:

- a) Ensure that the circle is completely darkened. Incomplete or faintly darkened circle will be rejected. Consequently no marks will be awarded for the same.

b) If more than one circle is darkened or if the response is marked in any other manner as shown at 'B' below, it shall be treated as *wrong*.

B

10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Incorrect way of answering

4) Instructions

Candidates are required to go through the instructions given below carefully.

1. No textual material, printed/handwritten, will be allowed inside the hall. Candidates are advised not to carry any such material to the examination hall.
2. No candidate shall be allowed to enter the examination hall for appearing in the examination after the question paper has been distributed i.e. 9:55 am.
3. The candidates are not allowed to carry mobile phones/calculators/pocket transistors/electronic watches with facilities of calculator/slide rules, any form of table or any other such aid.
4. Tea, Coffee, Cold Drinks, Snacks etc. are not allowed in the examination hall during the course of examination.
5. Smoking in the examination hall is strictly prohibited.
6. The candidate must sit in the seat allotted to him/her.
7. In no case will any candidate change his/her seat.
8. No candidate will leave the hall before the expiry of full time duration prescribed for the examination and without handing over answer sheet to the Invigilator on duty.
9. No person/ persons other than those authorized by the university shall be allowed to enter the examination hall.
10. *Amanuensis* will not be allowed.
11. The candidate's misbehaviour in any form in the examination hall shall entail his/ her disqualification. Any disturbance in the examination hall shall be deemed as misbehavior and the

candidates shall forfeit the right to continue to take the examination. In this regard, the decision of the centre Superintendent shall be final.

5) PREPARATION OF MERIT LISTS

1. Merit list for each course shall be prepared on the basis of inter-se merit of candidates in the Common Entrance Test for Open as well as for each Reserved Categories, separately.
2. In case of any subsequent vacancy / vacancies caused by whatever reason in any category, the same shall be filled from amongst the candidates of that particular category strictly according to merit. In event of non-availability of eligible candidates in any Reserved Category, the vacancies shall go to the Open Merit Category.
3. In case two or more candidates obtain equal merit, the inter-se merit of such candidates shall be determined (as per preference shown by them) in the Application Form as under:

B Tech.

- i) Candidates with higher merit in Mathematics.
- ii) Candidates with higher merit in Mathematics plus Physics, if marks in Mathematics are equal.
- iii) Candidates older in age will be preferred if points as per (i) and (ii) above are equal

SYLLABUS FOR COMMON ENTRANCE TEST FOR B.TECH PROGRAMME (2010)

PART – I (A)

PHYSICS

Unit I

Units and dimensions and their applications, motion in straight line, equations of motion, speed, velocity, vectors in two dimensions, unit vector resolution of vector, scalar and vector product of vectors, motion in two dimensions, projectile motion, circular motion, bending of cyclist and banking of roads, Force and inertia, conservation of linear momentum, rocket propulsion, equilibrium of concurrent forces, laws of friction, angle and coefficient of friction, inertial and non-inertial frames of reference. Work, energy and power, collision in one and two dimensions, mass energy equivalence, conservation of energy.

Unit II

Center of mass of two particle system, center of mass of a rigid body, motion of center of mass, torque, angular momentum and its conservation, moment of inertia, parallel axis and perpendicular axis theorems, moment of inertia of a ring, rod bar, disc, sphere. Universal law of gravitation, inertial and gravitational mass, variation of acceleration due to gravity with altitude/depth, latitude and rotation of earth, gravitational potential energy, orbital and escape velocity, geostationary satellite and Kepler's laws.

Unit III

Elastic properties, Hook's law, co-efficient of elasticity, Poisson's ratio, elastic energy, viscosity, Stokes law and terminal velocity, Stream line flow, Reynold's number, equation of continuity. Bernoulli's equation, velocity of efflux, surface tension, surface energy, excess of pressure capillarity.

Unit IV

Kinetic theory of gases, pressure exerted by Ideal gas, kinetic interpretation of temperature, gas laws, first law of thermodynamics, C_p and C_v of ideal gas, thermodynamic process (reversible, irreversible, isothermal and adiabatic), Second law of thermodynamics, Carnots engine and efficiency of heat engine, Black body radiation, Stefan's law, Wein's law, thermal conductivity.

Unit V

Periodic motion, simple harmonic motion and its equation of motion, oscillations due to spring, Kinetic energy and potential energy in S.H.M., examples of simple harmonic motion, forced oscillation and damped oscillations, wave motion, speed of a wave, principle of super position, reflection of waves, harmonic waves, standing waves in strings and pipes, laws of string, resonance tube, beats, Doppler effect.

Unit VI

Coulomb's law, electric field and potential due to a point charge and charged sphere, Dipole - its fields along the axis and perpendicular to the axis, concept of dielectric and dielectric constant, Gauss's law - its applications to find the field due to line charges, infinite sheet of charge and charged sphere, forces and torque experienced by a dipole in an electric field, energy of dipole in an electric field. capacitance, parallel plate capacitor, series, parallel combination of capacitor, energy of charged capacitor.

Unit VII

Electric current, drift velocity, Ohm's law, resistibility, resistance in series and parallel, Kirchoff's law and its applications, electric power, heating effects of current Joule's law, EMF and terminal voltage of a cell, internal resistance of a cell, grouping of cells, thermoelectricity, Seebeck effect, Peltier effect.

Unit VIII

Ampere's laws, Bio-savart's law, magnetic field due to solenoid, current loop and straight conductor. Force on moving charge in uniform magnetic field, force between two parallel current carrying conductors, moving coil galvanometer and its conversion into ammeter and voltmeter. Terrestrial magnetism, magnetic elements at a place, para, dia, ferromagnetism.

Unit IX

Induced EMF, Faraday's law, Lenz's law, electromagnetic induction, self and mutual inductance, alternating current, impedance and reactance, power in AC circuits with L, C and R in series, transformers, AC generators and choke, energy of current carrying inductor.

Unit X

Electromagnetic oscillation, electromagnetic waves, spectrum (elementary facts about their uses) and wave fronts and Huygen principle, interference, Young's double slit experiment, diffraction due to single slit, polarization of light and Brewster's law, refraction of light, lateral displacement, and dispersion of light due to prism, dispersive power, Raleigh's, scattering law, total internal reflection, rainbow, types of spectra.

Unit XI

Thomson's experiment for e/m of electron, charge of electron by Milkan's oil drop experiment, particle nature of light, Einstein's photoelectric equation, photo cells. Size of nucleus, Bohr's model of atom, energy quantization, hydrogen, hydrogen spectrum, composition of nucleus, nuclear forces, laws of radioactive decay, half life, decay constant, mass-energy relation, binding energy and mass defect, nuclear fission, nuclear reactor, nuclear fusion.

Unit XII

Crystalline structure of solids, energy bands in solids, conductors, insulators and semiconductors, PN junction, Junction transistors, diode as a rectifier, transistor as an amplifier and oscillator, logic gates and combination of gates NAND and NOR.

Note:

- 1. 20% of the questions shall be of numerical type.*
- 2. Each numerical shall be of the type, it can be solved in about 1½ minutes time.*

PART-I (B)

CHEMISTRY

Unit-1 Chemical Arithmetic, Atomic structure and Nuclear Chemistry.

- a) Laws of chemical combination, mole concept (numericals) calculations using chemical equations. Equivalent weight of oxidizing and reducing agents.
- b) Atomic structure, Bohr's model of hydrogen atom, Quantum numbers, Pauli exclusion principle, Hund's rule and Aufbau principle. Heisenberg's uncertainty principle, de-Broglie equation and their significance.
- c) Nuclear chemistry: Properties of alpha, beta and gamma radiations, Group displacement law, half-life period and average life period. Different types of nuclear reactions using alpha particles, neutrons, protons and deuterons as projectiles, carbon-14 dating. Calculation of numbers of alpha and beta particles.

Unit II Chemical Equilibrium

- a) Law of mass action, Le-Chatelier's principle. and its application to physical and chemical equilibria. Ionisation of weak electrolytes (Ostwald's dilution law)
- b) Acids and bases: Acid base equilibria. Bronsted-Lowry and Lewis concept, of acids and bases. Ionic product of water. pH and pOH scales, pK_a & pK_b values, solubility product, buffer solution, common ion effect, hydrolysis of salts.

Unit III Chemical Kinetics

Effect of concentration and temperature on rate of chemical reactions, (Arrhenius Equation (Temp, Co-efficient Concept of activation energy, First and second order reactions, half-life period, Units of rate constant for zero, first and second order reactions.

Unit IV Solutions

Different ways of expressing the concentration of solutions (molarity, molality, mole fraction, ppm and normality), vapour pressure, Raoult's law, ideal and non-ideal solutions, colligative properties, determination of molecular masses of non-volatile solutes involving various colligative properties, abnormal molecular masses and Van't Hoff Factor.

Unit V Energetic and Chemical Thermodynamics

Energy changes during chemical reactions, internal Energy and enthalpy change, Enthalpy of combustion solution and neutralization, Hess's Law (Numerical problems) First, second & third law of thermodynamics, concept of entropy and Free energy, spontaneity of a chemical reaction and Thermodynamic equilibrium.

Unit VI Redox Reactions and electrochemistry

Determination of oxidation numbers, oxidation and reduction in terms of electron transfer, dependence of electrode and cell potential on concentration (Nernst Equation), electrode potential as a criteria for product formation in electrolysis. E.M.F. of Galvanic cell, relationship between free energy change and F.M.P. F. of a cell, definition and units' of equivalent, molar and specific conductivity.

Unit VII States of Matter

Dalton's law of partial pressure, Graham's law of diffusion of gases, causes of deviation from ideal behaviour, ideal gas equation and nature of 'R', Vander Vaal's equation, surface tension and viscosity of liquids, crystalline and amorphous solids, crystal lattice, crystal types, radius ratio and structure of NaCl, CaCl and ZnS, co-ordination number, stoichiometric defects (Schottky Frenkel and interstitial defects.)

Unit VIII Surface chemistry

Freundlich absorption isotherm, preparation of colloidal solutions by physical and chemical methods, electrical properties (cataphoresis, elector-osmosis, coagulation and protective colloids), homogeneous and heterogeneous catalysis.

Unit IX Periodic Properties

Classification of elements into s, p, d, and f blocks, variation of ionization energy, electron affinity, electronegativity, atomic and ionic radii along the period and down the group.

Unit X Chemical Bonding and Molecular structure

Types of chemical bonds, quantum theory of covalent bond, pi and sigma bonds, hybridization involving s, p and d-orbitals, dipole moments and hydrogen bond. VSEPR-theory and shapes of simple molecules like H₂O, NH₃, SO₂, CO₂, PCl₃, PCl₅, ClF₃, BF₃, SF₄, XeF₂, XeF₄. Molecular orbital theory, bond order and its significance, electronic configuration of H₂⁺, H₂⁻, He₂⁺, O₂, O₂⁻, O₂⁺, O₂²⁻, F₂.

Unit XI Chemistry of Representative Elements

(S and P Block Elements)

Electronic configuration, oxidation states and trends in various properties like ionization energy, electron affinity, atomic radii, electronegativity and diagonal relationship of s and p block elements.

- Alkaline metals: Hydration of ions, action with ammonia, flame colouration, solubility of hydroxides, carbonates and sulphates.
- Alkaline earth metals: Solubility of carbonates, hydroxides and sulphates.
- Boron family: Structure of halides, relative acid strength of trihalides of boron.
- Carbon family: Hydrides and oxides.

(e) Nitrogenfamily: Oxides of nitrogen and phosphorous, reducing nature, basic strength and boilingpoints of their halides.

(f) Oxygenfamily: Volatility, thermal stability, andacid character, reducing character and bond angles of their hydrides. Oxyacids of sulphur.

(g) Halogen family: Bond energy, colour and oxidizing power, boiling point, acid strength and dipole moment, thermal stability, reducing power of hydracids, relative acidity and oxidizing power of oxyacids of halogens.

Unit XII Transition metal including lanthanides

Electronic configuration, oxidation states, colour and magnetic properties of transition metal oxides of V, Cr and Mn, alloys of copper, silver and iron, oxidation states of lanthanides.

Unit XII Co-ordination chemistry and Organometallics

Werner's theory, nomenclature, isomerism in co-ordination compounds (ionization. linkage, hydrage. co-ordination, geometrical and optical), bonding in co-ordination compounds on the basis of V.B. theory, stability of co-ordination compounds in solution, Ferrocene and Zeise's salt.

UnitXIV Chemistry of Metals

General aspects of metallurgy, metallurgy of iron, copper and silver and their properties, preparation, properties and uses of copper sulphate and silver nitrate, various forms of iron.

Unit XV Nomenclature and basic concepts inorganic chemistry

Nomenclature of organic compounds (monofunctional and polyfunctional groups), priority rule, inductive, electrometric, resonance and hypercojugation effects, reaction intermediates, carbocations, carbanions and free radicals with their general stability order, types of organic reactions (addition, substitution, elimination and redox reaction), aromaticity on the basis of Huckel rule. Ortho, meta and para directing groups.

Unit XVI Hydrocarbons

Structural isomerism. in alkanes, alkenes, alkynes and arenas, stereoisomerism:. "geometrical and optical isomerism, chirality, origin of chirality, specific rotation, racemisation and resolution, conformations in ethane and cyclohexane, relative configuration (D,L-Nomenclature), absolute (R and S system of nomenclature)". Reactions of hydrocarbons: addition, substitution and oxidation reactions, electrophiles and nucleophiles, acidic character of alkynes.

Unit XVII Organic Chemistry Based on Functional Group-I

(Haloalkanes, haloarenes, alcohols and phenols)

General methods of preparation and properties of haloalkanes, haloarenes, alcohols, phenols, chloroform, iodoform and glycerol.

Unit XVIII Organic Chemistry based on functional Group-II

(Ethers, aldehydes ketones, monocarboxylic acids).

General methods of preparation and properties of ethers, aldehydes, ketones and monocarboxylic acids, derivatives of monocarboxylic acids like acid halides, acid anhydrides, acid amides and esters, relative strength of carboxylic acids.

Unit XIX Organic Chemistry based on functional Group-III

(Cyanides, isocyanides, nitrocompounds and amines)

General methods of preparation and properties of cyanides, Isocyanides, nitro compounds and amines, relative basic character of amines.

Unit XX Molecules of Life

Carbohydrates: definition, classification, mutarotation, Structure of amino-acids, peptides and proteins (Molish and ninhydrin tests). Classification and uses of vitamins.

Note: *Numericals shall not exceed 15%.*

Paper II

MATHEMATICS

Unit I Algebra

1) Sets, Relations and Functions:

Sets and their representation, finite and infinite set, subsets, empty set, universal set, complement of a set, union and intersection of sets and their algebraic properties including De-Morgan's Laws. Difference of sets and symmetric difference of sets. Cartesian product of sets, Relations, Equivalence relations. Function (Mapping). Domain and range of function. Into, onto, one-one and many one function. Composites function.

2) Complex number in the form $a+ib$, representation of complex numbers by points in a plane. Argand diagram algebra of complex numbers. Real and imaginary parts of complex numbers. Modulus and argument (amplitude) of a complex number. Complex conjugate. Square root of a complex number-cube roots of unity. Triangle, inequality.

3) Theory of Quadratic Equations Solution of quadratic equation in complex number system $aX^2 + bx + c = 0$; $a \neq 0$, $a, b, c, \in \mathbb{R}$.

Relation between roots and coefficients, nature of roots of a quadratic equation. Formation of quadratic equation with given roots. Symmetric functions of roots viz, $S^2, S^2 + 1/S^2$ & $S^3 + 1/S^3, 1/S + 1/S^2$

4) Sequences and progressions

Arithmetic progression and geometric progression, First term, common difference, nth term, sum of n terms of an A.P Arithmetic mean, insertion of Arithmetic means between any two given numbers, First term, common ratio, nth term sum to n terms and infinite number of terms of a G.P. Insertion of G.M.'s between any two given numbers. Recurring decimal numbers and G.P. Sum to n terms of special cases viz. (n, n^2, n^3)

5) Binomial Theorem: Expansion of binomial with positive integral index, general and particular terms. Finding middle terms and term independent of x Expansion of binomial with any index.

Unit II Two dimensional Geometry

1) Point- Distance formula, area of a triangle. Condition of collinearity of three points and section formula. Centroid and in center of triangle. Locus and its equation. Slope of line. Intercept of a line on coordinate axes.

2) Straight line; various forms of equations of a line, intersection of lines. Angle between two lines. Lines parallel and perpendicular to a given line. Condition for concurrency of three lines. Distance of a point from a line and distance between two parallel lines. Coordinates of orthocentre and circumcentre of a triangle.

3) Pair of straight lines: Homogeneous equation of second degree in x and y, represents a pair of straight lines passing through origin. Angle between pair of lines through origin and condition of

parallelism and perpendicularity. Joint equation of angle bisectors. Condition for general second degree equation to represent a pair of lines.

4) Circle: Standard equation of a circle, general form of the equation of a circle, its center and radius. Equation of circle whose end points of diameter are given. Point of intersection of a line and a circle with center at origin and condition for a line to be tangent to a circle. Length of tangent Equation of tangent to a circle at a given point Equation of family of circles through the intersection of two circles.

5) Conic section: Equations of parabola, ellipse and hyperbola in standard forms. Condition for a line $y = mx + c$ to be tangent to parabola, ellipse and hyperbola.

Unit III Trigonometry

1) Circular functions and their properties

2) Application of circular functions of difference and sum of two angles. Application of sum and product of sines and of cosines of angles.

3) Application of sine and cosine rule.

4) Trigonometric equations.

5) Inverse trigonometric functions - Principle values, properties of inverse trigonometric functions within the principle values viz

$$\sin^{-1}(\sin x) = x$$

$$\sin^{-1}(1/x) = \operatorname{Cosec}^{-1} x, \sin^{-1} x + \cos^{-1} x = \pi/2$$

$$\sin^{-1} x + \cos^{-1} x = \sin^{-1} [x \sqrt{1-y^2} + y \sqrt{1-x^2}]$$

Unit IV Determinants and Matrices

1) Determinants: their expansion, minors and cofactor, zero relations and properties of determinants.

2) Application of determinants in solution of equation up to three variables (Cramer rule), Area of triangle.

3) Matrices, definition with examples, types of matrices, equality of matrices. Addition and scalar multiplication of matrices and their properties.

4) Transpose of a matrix, symmetric and skew symmetric matrices, matrix multiplication.

5) Adjoint and inverse of matrices. Solution of simultaneous linear equations up to three variables by matrix inversion method.

Note: *In the treatment up to 3x3 determinants and matrices shall be considered.*

Unit V Vectors

1) Vectors as directed, line segment, magnitude and direction of a vector, equal vectors, unit vector, zero vector, position vector of a point, localized and free vectors, parallel and collinear vectors, components of a vector in two and three dimensions.

- 2) Addition of vectors, multiplication of a vector by a scalar position vector of a point dividing a line segment in a given ratio.
- 3) Scalar (or dot) product of two vectors, projection of a vector. Vector (or cross) product of two vectors and its application in finding the area of triangle and parallelogram.
- 4) Scalar triple product in finding the volume of a parallelepiped. Coplanarity of three vectors or four points using scalar triple products. Vector triple product.

Unit VI Three Dimensional Geometry

- 1) Coordinate axes and planes in three-dimensional space, coordinates of a point in space. Distance between two points, section formula. direction cosines and direction ratios of a line joining two points, angle between two lines whose direction ratios are given.
- 2) Vector equation of line through a point and parallel to a given vector, vector equation of a line through two points. Collinearity of three points. Conditions for parallelism and perpendicularity of two lines.
- 3) Perpendicular distance from a given point to a given line. Distance between two parallel lines. Shortest distance between two skew lines.
- 4) General equation of a plane, normal and intercept forms of equation of a plane, equation of plane passing through a given point and perpendicular to a given vector. Angle between two planes and conditions for parallelism and perpendicularity.
- 5) Angle between a line and a plane and conditions for parallel and perpendicularity equation of a plane parallel to a given plane. Equation of a plane passing through intersection of two given plane. Distance between two parallel planes.

Note: *Vector and its Cartesian equivalent will be dealt side by side.*

Unit VII Cubic equation, limit and continuity of a function.

- 1) Statement of factor, theorem, synthetic division, relation between roots and coefficients of a given cubic equation. 2) Solution of cubic whose roots are connected with a given relation and solution of cubic whose roots are in A.P, G.P, H.P
- 3) Evaluation of symmetric functions of the roots of the cubic equation of the form $(x^3 + px^2 + qx + r) = 0$
- 4) Concept of $\lim_{x \rightarrow a} f(x)$, $\lim_{x \rightarrow a} f(x)$, $\lim_{x \rightarrow a} f(x)$

Fundamental theorems on limits. Evaluation of limits using the following standard results

$$\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}, \quad \lim_{x \rightarrow 0} \sin x = 0, \quad \lim_{x \rightarrow 0} \cos x = 1, \quad \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$\lim_{x \rightarrow 0} \log(1+x)/x = 1, \quad \lim_{x \rightarrow 0} e^x - 1/x = 1$$

5) Continuity of a function at a point, sum, product and quotient of continuous functions. continuity or polynomials, exponential, logarithmic and inverse, trigonometric functions.

Unit VIII

- 1) Derivative of sum, difference, product and quotient of two or more functions.
- 2) Derivative of a composite, algebraic and trigonometric functions.
- 3) Derivative of inverse trigonometric functions, logarithmic functions and exponential functions.
- 4) Applications of derivatives:- increasing and decreasing functions, equations of tangents and normal to a given curve at a given point, maxima and minima (absolute, local) (simple problems only).
- 5) Rolle's Theorem, Lagranges Mean Value Theorem with simple applications.

Unit IX

- 1) Integration as the inverse process of differentiation, Integration by substitution and by parts.
- 2) Evaluation of definite integrals
- 3) Properties of definite integrals
- 4) Application of integrals in finding the area bounded by a curve between two ordinates and x-axis (simple problems). order and degree of differential equation.
- 5) Solution of differential equations by method of variable separable. solution of linear differential equation of first order of type $dy/dx + py = q$ where p and q are constants or functions of x alone.

Unit X Mathematical Statistics

- 1) Random experiment and its associated sample space. events as subsets of a sample space, probability of an event. Probability of union, intersection of two events which are mutually exclusive/not mutually exclusive (simple problems)
- 2) Definition of random variable, discrete and random variables with example. Probability density function of one random variable x with examples.
- 3) Mode and median of distribution of one random variable.
- 4) Distribution function and its properties examples of distribution function.
- 5) Mathematical expectation, mean, variance, standard deviation and m.g.f. of a random variable x. (simple problems)