IPU CET 2026 Syllabus PDF

Indraprastha University Common Entrance Test (IPU CET)

M.Tech. (Biotechnology) CET Code-148 & M.Tech (FPT)

Biochemistry and Enzymology: Organization of life; Importance of water; Structure and function of biomolecules: Amino acids, Carbohydrates, Lipids, Proteins and Nucleic acids; Protein structure, folding and function,Metabolic pathways and their regulation: glycolysis, TCA cycle (Krebs' cycle), glycolysis, electron transport chain; gluconeogenesis, glycogen and fatty acid metabolism, Enzyme classification, kinetics including its regulation and inhibition, active sites, Factors influencing enzyme activity, Enzyme assays, cofactors and coenzymes, immobilization of enzymes, enzyme engineering.

Microbiology: Size, shape and arrangement of bacterial cells, Structure of the cell and cell wall Nutritional requirements for growth, nutrients uptake by microbial cells, Culture media, Isolation of pure cultures, cultivation and preservation of cultures, Microbial growth Kinetics, Physical and chemical methods of microbial control,

Action of microbial control agents and evaluation of effectiveness of antimicrobial agents, Metabolic diversity and pathways of energy use, unique pathways of microbial fermentation and photosynthesis, Microbial diseases and their control, Mechanism of microbial pathogenicity, action of antibiotics and other antimicrobial drugs, Superbugs
and opportunistic infections, Biosecurity, Microbiome.

Cell Biology: Cell structure and organelles; Biological membranes; Transport across membranes; Signal transduction; Hormones and neurotransmitters. Prokaryotic and eukaryotic cell structure; Cell cycle, cell division and cell growth control; Cell-Cell communication, Cell signaling and signal transduction.

Molecular Biology and Genetics: Molecular structure of genes and chromosomes; Mutations and mutagenesis; Eukaryotic genome organization and Complexity; Nucleic acid replication, transcription, translation in prokaryotes and eukaryotes; RNA processing, regulation of gene expression, Mendelian inheritance; organization of genome, sex determination and sex-linked characteristics, cytoplasmic inheritance, linkage, recombination and mapping of genes in eukaryotes, population genetics. Gene interaction; Complementation; Linkage, recombination and chromosome mapping; Extra chromosomal inheritance; Microbial genetics (plasmids, transformation, transduction, conjugation); Epigenetics.

Immunology: Active and passive immunity; Innate, humoral and cell mediated immunity; Antigen; Antibody structure and function; Molecular basis of antibody diversity; Synthesis of antibody and secretion; Antigen-antibody reaction; Complement; Primary and secondary lymphoid organ; B and T cells and macrophages; Major his to compatibility complex (MHC); T cell receptor; Antigen processing and presentation; Polyclonal and monoclonal antibody; Regulation of immune response; Immune tolerance; Hypersensitivity; Autoimmunity; Graft versus host reaction. Immunological techniques: Immuno diffusion, immune electrophoresis, RIA and ELISA, Flow cytometry.

Bioinformatics: Major bioinformatic resources and search tools; Sequence and structure databases; Sequence analysis (biomolecular sequence file formats, scoring matrices, sequence alignment, phylogeny).

Recombinant DNA Technology: Restriction and modification enzymes; Vectors-plasmid, bacteriophage and other viral vectors, cosmids, Ti plasmid, yeast artificial chromosome; mammalian and plant expression vectors; cDNA and genomic DNA library; Gene isolation, cloning and expression; Transposons and gene targeting; DNA labeling; DNA fingerprinting; Southern and northern blotting; In-situ hybridization; RAPD, RFLP, AFLP, SSRs, SNPs; Gene transfer techniques; Microarray, PCR, site directed mutagenesis, DNA sequencing; molecular probes, Gene therapy.

Plant and Animal Biotechnology: Totipotency; Regeneration of plants; Tissue culture and Cell suspension culture system; Production of secondary metabolites by plant suspension cultures; transgenic plants; Plant products of industrial importance; Animal cell culture, media composition and growth conditions; Animal cell and tissue preservation; Anchorage and non-anchorage dependent cell culture; Hybridoma technology; Stem cell technology; Animal cloning; Transgenic plants and animals.

Bioprocess Engineering and Process Biotechnology: Upstream production and downstream; Bioprocess design and development from lab to industrial scale; Microbial, animal and plant cell culture platforms, Chemical engineering principles applied to biological system, Principle of reactor design, mass and heat transfer; Media formulation and optimization; Kinetics of microbial growth, substrate utilization and product formation; Sterilization of air and media; Batch, fed-batch and continuous processes; Various types of microbial and enzyme reactors.

Biosafety, Bioethical and Intellectual Property Right Issues in Biotechnology: Biosafety- Concept, Concernsn and Regulations; Safety considerations in Laboratories; Ethical issues and conflicts in biotechnology; Kinds of IPR; Protection of traditional knowledge and Genetic Resources; Patents in Biotechnology.

Techniques in Biotechnology: Colorimetry and Spectroscopy, Flow cytometry, Microscopy, Centrifugation, Chromatography, Electrophoresis, X-ray crystallography, Nuclear Magnetic Resonance (NMR) spectra, Magnetic Resonance Imaging (MRI), lasers in biology and medicine, Mass spectrometry.

Environmental Biotechnology: Sewage and waste water treatment, Solid waste management, Biodegradation of xenobiotic compounds, Bioremediation and biorestoration, Natural resource recovery, Environmental biotechnology in agriculture, Biofuel, Environmental genetics.

Biostatistic: Measures of central tendency and dispersal; probability distributions (Binomial,Poisson and normal); Sampling distribution; Difference between parametric andnon-parametric statistics; Confidence Interval; Errors; Levels of significance; Regression and Correlation; t-test; Analysis of variance; Chi squared test; Basic introduction to multivariate statistics, etc.

M.Tech. (Robotics & Automation) CET Code-156

ENGINEERING MATHEMATICS

Mathematical Logic: Propositional Logic, First Order Logic. Complex Variables: Analytic functions, Cauchy's integral theorem and integral formula, Taylor's and Laurent' series. Residue theorem, solution integrals.

Differential equations: First order equation (linear and non-linear), Higher order linear differential equations with constant coefficients, Methods of variation of parameters, Cauchy's and Euler's equations. Initial and boundary value problems, Partial Differential Equations and variable separable method.

Probability and Statistics:-Sampling theorems, Conditional probability, Mean, Median, mode and standard deviation, Random variables, Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Correlation and regression analysis.

Set Theory & Algebra:- Sets: Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra.

Combinatorics: Permutations; Combinations; Counting; Summation; generating functions; recurrence relations, asymptotics.

Graph Theory: Connectivity: spanning trees; Cut vertices & edges; covering; matching; independent sets; Colouring; Planarity; Isomorphism.

Linear Algebra:- Algebra of matrices, determinants, systems of linear equations, Eigen values and Eigen vectors.

Numerical Methods:- LU decomposition for systems of linear equations; numerical solutions of non-linear algebraic equations by Secant, Bisection and Newton- Raphson Methods; Numerical integration by trapezoidal and Simpson's rules.

Calculus:- Limit, Continuity & differentiability, Mean value Theorems, Theorems of Integral calculus, evaluation of definite & improper integrals, Partial derivatives, Total derivatives, maxima & minima, Multiple integrals, Fourier series. Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

ENGINEERING SUBJECTS

Network theorems: Superposition, Thevenin and Norton's maximum power transfer. Electric Circuits and Fields: Network graph, KCL, KVL, node and mesh analysis, transient response of dc and ac networks. Programming in C, Functions.

Electrical Machines: Single phase transformer- equivalent circuit, phasor diagram , tests, regulations and efficiency, DC machines- types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors- principles, types, performances characteristics, starting and speed control; single phase induction motors; synchronous machines- performances, regulation and parallel operation of generators, motor starting, characteristics and application; servo and stepper motors.

Electronic Devices: Generation and recombination of carriers. P-n junction diode, Zener diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-I-n and available photo diode, Basics of LASERs. Device technology. Basics of Measurement Systems:- Static and dynamic characteristics of Measurement Systems. Error and uncertainty, analysis, statistical analysis of data and curve fitting. Transducers, Mechanical Measurement and Industrial Instrumentation: Resistive, Capacitive, Inductive and piezoelectric transducers and their signal conditioning. Measurement of displacement, velocity and acceleration (translational and rotational), force, torque, vibration and shock. Measurement of pressure, flow, temperature and liquid level. Measurement of pH, conductivity, viscosity and humidity.

Control System:- Principles of feedback, transfer function; block diagrams; steady- state errors, Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems.

Applied Mechanics:- Free body diagrams and equilibrium, trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion, including impulse and momentum (linear and angular) and energy formulations, impact, strength of materials- stress, strain and their relationship, Mohr's circle, deflection of beams, bending and shear stress, Euler's theory of columns.

Theory of Machines: Acceleration of a point on a link, Acceleration diagram, Coroilis component of acceleration, Crank and slotted lever mechanism, Klien's construction for Slider Crank mechanism and Four Bar mechanism, Analytical method for slider crank mechanism, Mechanisms with Lower Pairs Pantograph, Exact straight line motion mechanisms- Peaucellier's Hart and Scott Russell mechanism, Approximate straight line motion mechanisms- Peaucellier's, Hart and Scott Rusell mechanism. Approximate straight line motion mechanism- GrassHopper, Watt and Tchebicheff mechanism, Analysis of Hooke's joint, Davis and Ackermann steering gear mechanisms

Code 600 Syllabus for Bachelor of Design (B.DES.) for all three specializations namely: [a. Industrial Design; b. Interaction Design; c. Interior Design]

The syllabus for the CET-2023 broadly covers topics to test the aptitude and sensitivity towards Design through a set of questions from varied subjects like understanding of.

- Analytical and logical reasoning ability- This section looks into the knowledge of Series and Sequences of numbers, shapes, patterns, figures, and words; Identifying missing numbers, words, or figures; Blood relations; Direction and Distance; Alphabet test; Cause and effect; Clocks and Calendars; Coding and Decoding of Analogy Series; Matrix Completion; Incomplete Pattern; Spotting embedded figures; Classification Rules Detection; Identical figure groupings; Forming figures and analysis.
- Visual aptitude- This section would look into the knowledge of Presentation techniques; Diagrammatic Reasoning; Object and Image recognition; Venn figurative Verbal reasoning; Understanding of spatial correlation of 2D shapes and 3D objects; Cutting cubes and dice; Scale and perspective and vanishing point; Water and Mirror images. Projection of Solids, isometric drawing.
- General awareness- Design aspirants must have knowledge designed Arts, Artifact, Sculptures, and Literature. of social and cultural connection with the history of the design, environmentally sustainable design response, and socially responsible; implications on the design of products, images, environmental and infrastructure.

Code 613 Syllabus for LATERAL ENTRY EXAMINATION TEST [LEET] to Bachelor of Design (B.DES.)

- **Analytical and logical reasoning -This section looks into the knowledge of Series and Sequences of numbers, shapes, patterns, figures, and words; Identifying missing numbers, words, or figures; Analytical and Logical ability; Blood relations. Coding and Decoding of Analogy Series. Matrix Completion Incomplete Pattern Spotting embedded figures Classification Rules Detection. Identical figure groupings Forming figures and analysis Construction of Squares and Triangles Series Analytical Reasoning.**
- **Visual aptitude-- This section would look into the knowledge of Presentation techniques; Understanding of spatial correlation of 2D shapes and 3D objects; Cutting cubes and dice; Scale and perspective and vanishing point; Water and Mirror images. Projection of Solids, isometric drawing.**
- **General awareness-- Design aspirants must have knowledge of designed Arts, Artifact, Sculptures, and Literature of social and cultural connection with the history of the design, environmentally sustainable and socially responsible design; implications on the design of products, images, environmental and infrastructure.**

- **Visual Perception-- Principles of visual perception (Gestalt). Laws of grouping (Prägnanz), Discussion and demonstration of the way humans make a greater sense out of combination of simple or complex curves and shapes.Basic dimensions, how three dimensions build up volumes, representation of three axes in 2D,principles of isometric and perspective drawing, simple isometric and perspective drawing in one, andtwopoint perspective.**
- **Colors-- Introduction to colours, pigment and light, additive and subtractive models. Shades of greys. Understanding warm and cold greys, Colour terminologies – hue, value, tint, shade, intensity, chroma, etc.,**