



**DEPARTMENT OF ELECTRONICS AND  
COMMUNICATION ENGINEERING**  
**GUIDE TO LATERAL ENTRY ENTRANCE EXAMINATION**  
**(LEET)**  
**LATERAL ENTRY ADMISSION TO THE SECOND YEAR OF**  
**UG PROGRAMME**

### 1.1 ELIGIBILITY:

A candidate shall be eligible for admission in the B-Tech Programme of Electronics and Communication Engineering subject to the following conditions:

The candidate has passed diploma, in relevant discipline, of minimum 3 years duration after Matriculation from Polytechnic College/Institute affiliated with State Board of Technical Education/University, or recognized by UGC/AICTE with a minimum of 50% Marks.

### 1.2 GENERAL INFORMATION REGARDING LEET

There will be two papers as per details given below:

- A. **PAPER A- GENERAL:** This shall be a common paper for all streams. This shall consist of objective type questions from Physics & Mathematics taught at the 1<sup>st</sup> & 2<sup>nd</sup> semester level of B-Tech. at Islamic University Of science & Technology.
- B. **PAPER B- E & C ENGINEERING:** This shall consist of objective type questions from the core branches of Electronics and Communication Engineering.

### 1.3. INSTRUCTIONS REGARDING PAPER A:

- (i) The question paper will contain multiple choice objective type questions.
- (ii) Four options A, B, C and D are provided for each question. Out of the four given options, only one option is the correct answer. The candidate will be required to write his/her answer indicating one option out of the four options in the box provided for that question in the answer sheet.
- (iii) There is a separate sheet for writing answers. Use only CAPITAL letters for writing the answers in the space provided on the answer sheet.
- (iv) If a candidate does not wish to attempt a specific question, the space (box) provided on the answer sheet corresponding to that question should be marked 'X'. A box left blank will be considered as wrong answer.
- (v) Space for doing rough work has been provided at the end of the question paper. Use only that space for the purpose.
- (vi) Question paper is to be returned at the end of the examination.
- (vii) There will be negative marking for wrong answers, *i.e.*, marks will be deducted for wrong answers. For each correct answer, one mark shall be awarded. For each wrong answer (or box left blank in the answer sheet), ¼ mark shall be deducted.
- viii) Don't write your roll number anywhere except in the space provided.

## 1.4. SYLLABUS

### i) PAPER A

The syllabus for General paper i.e. Physics & Mathematics shall be the same as in the First year of engineering taught at the 1<sup>st</sup> & 2<sup>nd</sup> semester level of B-Tech. at Islamic University Of science & Technology.

### ii) PAPER B

The syllabus for paper B is from the fundamentals courses of Electronics and Communication taught at diploma level.

## SYLLABUS

### i) PAPER A

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### ii) PAPER B

The syllabus for paper B is from the fundamentals courses of Electronics and Communication taught at diploma level.

## Paper A

### Physics

**Vector Analysis:** Rotation of coordinate axis and transformation of vectors, Gradient of scalar field, divergence and curl of vector field in Cartesian, spherical polar and cylindrical coordinate systems, Gauss's divergence theorem, Stokes's theorem.

**Collision of particles:** Conservative and non-conservative forces, elastic and inelastic scattering, frames of references, laboratory and center of mass system, kinematics of elastic scattering in laboratory system, application of conservation theorem in solving collision and scattering problems.

**Vibration and Acoustics:** Differential equation of simple harmonic motion, energy of simple harmonic oscillator, damped harmonic motion, energy dissipation, forced oscillations, amplitude and velocity resonance, sharpness of resonance, energy consideration in forced oscillations

**Electromagnetic Theory:** Coulombs law and Gauss's theorem, calculation of electric field and potential, Biot -Savart's law, Ampere's theorem, divergence and curl of magnetic field, Faraday's law

**Maxwell's equation:** electromagnetic wave equation in free space, its solution in one dimension and discussion, energy and momentum in electromagnetic wave, Introduction to plasma: Debye shielding, plasma parameter, plasma frequency

**Quantum Mechanics:** De-Broglie Hypothesis, Davison Germer experiment, wave function and its properties, expectation value, quantum mechanical operator, Wave Packet, Normalisation factor, Uncertainty principle. Schrödinger Equation for free Particle, Schrödinger wave Equation; Time Dependent and Time Independent, Tunnelling effect and its example (Tunnel diode or alpha decay).

**Elementary Solid State Physics:** Crystal lattice, Crystal structure, Unit cells, Miller Indices, Bravais lattice, Photographic crystal X-ray diffraction techniques.

**Classification of solids:** Formation of energy bands in metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, Fermi energy.

**Diffraction:** Optical diffraction techniques- Fresnel and Fraunhofer diffraction. X-ray diffraction techniques: (Single crystal and Polycrystalline materials)- Laue's method, Powder method, Oscillation and Rotation method.

**Special theory of Relativity:** Frames of reference, Michelson-Morley experiment, Basic postulates of special theory of relativity, Length contraction, time dilatation, Time-energy relation.

**Superconductivity:** Meissner Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), applications of superconductors.

**Lasers:** Introduction, Principle of laser, Stimulated and spontaneous emission, Population inversion, Einstein coefficients, optical pumping, Resonant Cavity and its modes, He-Ne Laser, Ruby Laser, Semiconductor Lasers, Applications of Lasers.

## **Mathematics**

**Introduction to differential calculus:** Leibnitz's Theorem for  $n^{\text{th}}$  derivative, Taylor's theorem, Tangent and Normal, Partial Differentiation, Euler's theorem, Double points, asymptotes, curvature and tracing of curves.

**Limit, continuity and differentiability:** of functions of several variables, Chain rule, Jacobi theorem. Taylor's theorem of one and two variables, extrema of functions, two or more variables using method of Lagrange's multipliers.

**Ordinary differential equations:** Exact ordinary differential Equations and Ordinary differential equations reducible to exact differential equations. Linear differential equations and equations reducible to linear form. Linear Differential equations of second and higher order with constant and variable coefficients.

**Non-linear differential equation:** of first order, Simultaneous differential equation, Simultaneous differential equation of the form  $dx/P = dy/Q = dz/R$ , Applications of ordinary differential equations,

**Algebraic Equation:** Elements of the theory of polynomial equations. Fundamental theorem of Algebra, Relation between the roots and the coefficients of an equation, Solution of cubic & bi-quadratic equations

**Differential Equation:** Partial differential equations of first order, Lagrange linear equation, Standard form, Charpit's Method to solve non-linear partial differential equation. Partial differential equations of second and higher, Homogeneous Partial Differential equations with constant coefficients, vibration of stretched flexible string, heat flow equation. Wave equation, solutions by the method of separation of variables. Series solutions of ordinary differential equations

**Fourier Series:** Fourier Series, Integral Calculus: Differential under the sign of integration. Double and triple integrals, change of variables, Beta and Gamma functions

**Matrices:** Review of algebra of matrices, partitioning of Matrices, Hermitian and skew-Hermitian Matrices. Orthogonal and unitary matrices, Triangular matrices, Rank of a matrix. Equivalent matrices, elementary transformations, Normal form, Inverse of matrix (Different Methods) and solution of simultaneous equation by elementary operation. Normal form, Eigen values, and Eigen vectors of a matrix. Cayley-Hamilton theorem, Quadratic Form.

## Paper B

### Basic Electrical Engineering

**Basic circuit analysis techniques:** Fundamental circuit elements(R, L & C), Ohm's law, KVL, KCL, Series & Parallel combinations of R, L & C, Nodal & Mesh Analysis.

**Sources:** Voltage and Current Sources-Ideal & Practical Sources, Dependant Sources, Transformation of sources.

**Theorems:** Thevenin's, Norton, Superposition & Maximum Power Transfer Theorems

### Basics of Electronics

**Introduction to Semiconductors:** Electrical properties of p and n types, transport mechanism of charge carriers, Hall effect etc.

**Junction Diode:** Currents in p-n junction, VI-characteristics and their piecewise linear approximation, temperature dependence, diode resistance, diode capacitance, basic operation of Zener diode, Tunnel diode, Schottky diode, LED, Photodiode-Operation and their applications.

**Power Electronics Devices:** TRIAC, DIAC, SCR, UJT-Operations and Characteristics.

### Electronic Devices and Circuits

**Diode Circuits:** Half and Full wave rectifier circuits, clippers and clamper circuits.

**BJT:** Operation and Characteristics, Configurations, models, biasing, applications as amplifiers.

**MOSFET:** Operation and Characteristics, biasing and its applications

### Digital Electronics and Logic Design

**Number systems:** Binary, Octal, hexadecimal and decimal number systems, binary arithmetic's, 1's and 2's complement's, Boolean algebra, De-Morgan's laws.

**Combinational circuits:** Basic gates and their use to implement logic functions, simplifications of logic functions, K-Map, adders, Encoders/decoder, Multiplexer/Demultiplexer.

### Communication System

**Amplitude Modulation:** AM modulation, Types of AM-DSB, SSB, VSB, generation of AM.

**Frequency Modulation:** FM modulation, Types of FM, Bandwidth-Carson's rule.

**SCHEME OF EXAMINATION**

<b>Paper</b>	<b>A</b>	<b>A</b>	<b>B</b>
<b>SUBJECT</b>	<b>PHYSICS</b>	<b>MATHEMATICS</b>	<b>ELEC TRON ICS</b>
<b>MARKS/NATURE OF PAPER</b>	<b>20 OBJECTIVE</b>	<b>20 OBJECTIVE</b>	<b>60 OBJECTIVE</b>