DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

LATERAL ENTRY ADMISSION TO THE SECOND YEAR OF B TECH.

PROGRAMME

1.1 **GENERAL INFORMATION REGARDING LATERAL ENTRY ENTRANCE EXAMINATION**

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 Ist & 2nd semester level of B.Tech. at Islamic University Of science & Technology.

B. **PAPER B- COMPUTER SCIENCE & ENGINEERING:** This shall consist of Objective type questions from the core branches of Computer science & Engineering.

1.2**. 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 CAPTIAL 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.

1.3 **INSTRUCTIONS REGARDING PAPER B**:

i) The question paper shall comprise of 60 objective type questions from the core subjects (Syllabus attached) of Computer Science & Engineering

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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 Ist & 2nd semester level of B.Tech. at Islamic University Of science & Technology.

ii) **PAPER B**…..

COMPUTER SCIENCE & ENGINEERING

COMPUTER FUNDAMENTALS:

Hardware: The CPU & storage, description of processor, Computer memory, memory organization, ROM and RAM, types of memory, Logic Circuits & Computer Architecture, logical operations AND, OR, NOT , Bus architecture.

Data Representation: Representation of characters, Integers, fractions. Hexadecimal, Octal, Binary representation of numbers, Number base conversion.

Binary Arithmetic, Binary addition, subtraction, two's complement representation of numbers, addition/ subtraction of numbers in two's complement, binary multiplication and division.

The Internet, Internet and the world- wide- web (WWW), Communication protocols, Classifications of networks.

C PROGRAMMING & DATA STRUCTURE:

Control structures like if else, switch case, loops.

Arrays, Matrices, Functions, Recursion, Introduction to pointers.

Concept of Stack & Queue, Singly & Doubly – Linked Lists, Circular Linked List, their Implementation & Comparison, Array Based & Linked List Based Implementation of Stack & Queue & their Applications.

Searching: Sequential & Binary Search on Array-based Ordered Lists, Binary Trees, their Implementation & Traversal, Binary Search Trees: Searching, Insertion & Deletion of Nodes.

DIGITAL ELECTRONICS:

Boolean algebra: Postulates and theorems, logic functions, minimization of Boolean functions using algebraic, Karnaugh map.

Introduction to combinational circuit: Realization of basic combinational functions like Adder / Subtractor, Encoder / decoder, Multiplexer /DE multiplexer.

Sequential Circuits: Flip-Flops - SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits - their design, State minimization, state assignment, Circuit implementation, Registers-Shift registers, Ripple counters, Synchronous counters, Timing signal.

OPERATING SYSTEMS:

Introduction: Definition and types of operating systems.

Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling .

Process Synchronization and Deadlocks: The Critical-Section problem, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock.

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation ,Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Disk structure, Disk scheduling methods, Disk management.

Physics

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

Collision of particles, Conservative and non-conservative forces, elastics 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 Fraunhoffer 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^{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 , langrage 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. Caley- Hamilton theorem, Quadratic Form.

SCHEME OF EXAMINATION:

PAPER	A		B
SUBJECT	PHYSICS	MATHEMATICS	COMPUTER SCIENCE & ENGINEERING
MARKS/NATURE OF PAPER	20 OBJECTIVE	20 OBJECTIVE	60 OBJECTIVE