PROFORMA

DETAILS OF ENTRANCE TEST – 2016

Name of the Faculty: Faculty of Engineering & Technology

Department/Centre: Applied Sciences & Humanities

Name of the Program: M.Sc. (Electronics)

About Program's Prospects: .....

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Summary of Entrance Test

S.No.	Test-Component (Strike off, if not applicable)	Test Duration (in minutes)	Max. Marks	Passing Marks	Negative Marking (Yes/No)
	Objective/Multiple Choice Questions	120	85		Yes

Any other information about the Entrance Test:

Important Instructions for Test (Pl. add/modify as required)

Permissible Material/equipment for Entrance Test (as required):

- Black/Blue Ball Pen,
- Pencil

Detailed Syllabus for the Entrance Test

Please see Annexure

M.Sc. ELECTRONICS ENTRANCE TEST: SYLLABUS

PHYSICS:

Bohr's model of hydrogen atom, Energy levels and spectra, Correspondence principle, Stark effect, Zeeman effect, Nuclear mass and nuclear size, Binding energy, Stable nuclei, Alpha, Beta and Gamma decay.

Heat & Thermodynamics: Kinetic theory of gases. Specific heat of solids, Conduction, Transmission and Radiation of heat. Basic laws of thermodynamics. Efficiency of engines. Entropy and Enthalpy. Maxwell's relations.

Optics: Basic ideas of geometrical optics and Physical optics. Interference of light, Diffraction of light, polarization of light and its applications. Particle nature of radiation: photoelectrical effect, Compton effect. Lasers: coherence of light, principle of laser, ruby laser, Helinium-neon laser, optical resonators. Fibre optics: types of optical fibres, numerical aperture, Step index & graded index fibres, modal dispersion.

Dielectrics: Polar & non-polar dielectrics, polarization, potential due to a dipole, succeptibility, Gauss's law for dielectrics, Dielectric boundary conditions. Capacitance, current density and continuity equation. Magnetostatics: Biot-Savart's law, Ampere's law, Force between current loops. Faraday's law and Lenz's law in Electromagnetic induction, Maxwell's equations and electromagnetic wave propagation.

QUANTUM MECHANICS:

Quantum Mechanics: Failure of Classical Physics, Probabilistic Interpretation of Waves, Conditions for Physical Acceptability of Wave Functions. Schrodinger Wave Equation for a Free Particle and in a Force Field (1 Dimension), Boundary and Continuity Conditions. Operators in Quantum Mechanics, Time-Independent One Dimensional Schrödinger Wave Equation, Stationary States, Eigen-Values and Eigen- Functions. Hydrogen Atom, de-Broglie waves, Heisenberg uncertainty principle.

MATHEMATICS:

Vector Differential Calculus. Vector Integral Calculus. Transformation between Line integral and Double integral Area in Cartesian and Polar Coordinates, Stokes's Theorem, Gauss Divergence Theorem.

Matrices: Introduction to Matrices, System of Linear Algebraic Equations, Eigen Values and Eigen Vectors, Diagonalization. Powers of a Matrix. Real and Complex Matrices: Real Matrices: Symmetric , Skew Symmetric , Orthogonal Quadratic Form, Complex Matrices: Hermitian, Skew Hermitian, Unitary Matrices.

Ordinary Differential Equations, Linear Differential Equations of Second Order,. Higher order homogeneous differential equations. Fourier series, Fourier Transforms, Discrete and Fast Fourier Transforms.

ELECTRONICS:

i) Semiconductor physics & Devices:

Semiconductors: Intrinsic & extrinsic semiconductors, carrier concentration at normal equilibrium, Drift and diffusion of carriers, donors, acceptors, minority carriers, dependence of Fermi level on temperature and doping concentration, relationship between mobility, carrier concentration and conductivity.

Semiconductor Diodes: p-n junctions and its basics, Zener and varactor diode, Diode breakdown. Metal-semiconductor junction, Ohmic and rectifying contacts.

Transistors : Basics of BJT, Transistor characteristics, Transistor configurations and operational modes. Field -Effect Transistors: Basics of JEFTs, MESFETS, and MOSFETS. Photo-transistors and solar cell.

ii) Analog & digital Electronics

OP-Amps: Differential amplifier, common mode gain, differential gain, CMRR, offset voltage, offset null, slew rate, input offset current, input bias current, frequency response of an op-amp. Application of op-amp: Inverting and non-inverting amplifiers, voltage followers, addition, subtraction, differentiation and integration using op-amp, comparator, Schmitt trigger. Active filters: First and second order low pass and high pass butterworth filters. Comparators, multivibrators and signal conditioning circuits.

Number systems, Logic Gates, Flip Flops: RS flip flop, D flip flop, 3 stake JK flip flop, T flip flop, Master slave flip flop, positive and negative edge flip flops. Registers and counters.

iii) Microprocessors

Introduction to 8085 – Basic/applications: 8086 Microprocessor: Internal architecture, Real mode memory addressing, Instruction Format. Addressing modes: Data-Addressing modes, Program Memory-Addressing modes, Stack Memory-Addressing modes.

Instruction Set: Programming 8086 using Data movement instructions, data transfers, miscellaneous data transfer instructions, Arithmetic and logic instructions, Program control instructions, Introduction to interrupts.

Peripheral Devices: 8255-Programmable Peripheral Interface, 8254- Programmable interval Timer, 8259- Priority Interrupt Controller, 8251- USART. Interrupts: Basic interrupt processing, Interrupt instructions, Operation of real mode interrupt, interrupt flag bits, Hardware interrupts. DMA: Introduction to Direct memory Access. Other Microprocessors: Introduction to 80486, Pentium and Pentium Pro Microprocessors. Introduction to protected mode memory addressing.

iv) Communication Electronics

Modulation & demodulation., Basics of AM modulation. Angle Modulation: Elements of frequency and phase modulation, frequency spectrum of FM waves. Pulse Modulation: Pulse modulation, pulse transmission, pulse amplitude modulation, Time division multiplexing, pulse time modulation, pulse width and pulse position modulation, digital communication, bit transmission, signaling rate, digital filtering, pulse code modulation.
