SYLLABUS FOR ELECTRONICS AND COMMUNICATION ENGINEERING

MATHEMATICS (50 Marks)

Unit-I: Matrices
Matrices of 3rd order: Types of matrices-Algebra of matrices-Transpose of a matrix-Symmetric, skew symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Properties-Laplace's expansion-singular and non singular matrices-Adjoint and multiplicative inverse of a square matrix-System of linear equations in 3 variables-Solutions by Crammer's rule, Matrix inversion method,-Gauss-Jordan methods.
Partial Fractions: Resolving a given rational function into partial fractions.

Unit–II: Trigonometry
Properties of Trigonometric functions – Ratios of Compound angles, multiple angles, sub multiple angles – Transformations of Products into sum or difference and vice versa – Simple trigonometric equations – Properties of triangles – Inverse Trigonometric functions.
Complex Numbers: Properties of Modulus, amplitude and conjugate of complex numbers, arithmetic operations on complex number—Modulus-Amplitude form (Polar form)-Euler form (exponential form)-Properties- De Movire's Theorem and its applications.

Unit–III: Analytical Geometry
Straight Lines – different forms of Straight Lines, distance of a point from a line, acute angle between two lines, intersection of two non- parallel lines and distance between two parallel lines. Circles-Equation of circle given center and radius, given ends of diameter-General equation-finding center and radius. Standard forms of equations of Parabola, Ellipse and Hyperbola – simple properties.

Unit–IV: Differentiation and its Applications
Functions and limits – Standard limits – Differentiation from the First Principles – Differentiation of sum, product, quotient of functions, function of function, trigonometric, inverse trigonometric, exponential, logarithmic, Hyperbolic functions, implicit, explicit and parametric functions – Derivative of a function with respect to another function-Second order derivatives – Geometrical applications of the derivative (angle between curves, tangent and normal) – Increasing and decreasing functions – Maxima and Minima (single variable functions) using second order derivative only – Derivative as rate measure -Errors and approximations - Partial Differentiation – Partial derivatives up to second order – Euler's theorem.

Unit–V: Integration and its Applications
Indefinite Integral – Standard forms – Integration by decomposition of the integrand of trigonometric, algebraic, exponential, logarithmic and Hyperbolic functions – Integration by substitution – Integration of reducible and irreducible quadratic factors – Integration by parts – Definite Integrals and properties, Definite Integral as the limit of a sum – Application of Integration to find areas under plane curves and volumes of Solids of revolution – Mean and RMS value.

Unit–VI: Differential Equations
Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solution of differential equation of the type first order, first degree, variable-separable, homogeneous equations, exact, linear differential equation of the form $dy/dx + Py = Q$, Bernoulli's equation, nth order linear differential equation with constant coefficients both homogeneous and non homogeneous and finding the Particular Integrals for

the functions e^{ax}, x^m, sin ax, cos ax.

Unit–VII: Laplace Transforms and Fourier series
Laplace Transforms and Inverse Laplace Transforms of Elementary functions. Shifting Theorems of LTs and ILTs.
Define Fourier series, Euler's Formulae Over the interval (C, C+2π).Even and odd functions and their Fourier series

Unit–VIII: Probability and Statistics
Define Probability, addition Theorem, conditional Probability, Mean, Median, Mode, Mean deviation and standard deviation.

PHYSICS (25 Marks)

Unit-I: Units and dimensions: Physical quantity-fundamental and derived physical quantities-units-fundamental and derived units-SI units-multiples and sub-multiples in SI units-advantages of SI units-dimensions and dimensional formulae-dimensionless quantities- applications and limitations of dimensional analysis-problems.

Unit-II: Elements of vectors:
Scalar and vector quantities-examples-types of vectors- addition and subtraction of vectors-triangle law-parallelogram law and its cases-polygon law- resolution of a vector-unit vectors (i, j, k)-dot product and cross product of two vectors- characteristics of dot and cross products-examples-problems.

Unit-III: Kinematics and Friction
Equations of motion-acceleration due to gravity-equations of motion under gravity- expressions for maximum height, time of ascent, time of descent, time of flight, velocity on reaching the point of projection in vertical motion--motion of a body projected from the top of a tower-projectile motion-examples-horizontal and oblique projections-expressions for maximum height, time of ascent, time of flight, horizontal range, problems. Friction- causes and types of friction-normal reaction-laws of friction-coefficients of friction- angle of friction-methods of reducing friction-advantages and disadvantages of friction- motion of a body over a rough horizontal surface, a smooth inclined plane and a rough inclined plane–problems.

Unit–IV: Work, Power and Energy
Work, power and energy-definitions and units-potential and kinetic energies-examples and expressions-work-energy theorem-law of conservation of energy-problems.

Unit-V: Simple harmonic motion and Sound
Definition-conditions of SHM-examples of SHM-expressions for displacement, velocity, acceleration, time period, frequency and phase of SHM-time period of a simple pendulum-seconds pendulum-problems. Sound-musical sound and noise-noise pollution-Effects and methods of control of Noise Pollution-Beats and echo's-problems-Doppler effect – Explanation, and Applications - Acoustics of buildings-Reverberation-Sabine's formula- characteristics of a good building-problems.

Unit-VI: Heat and Thermodynamics
Expansion of gases-Boyle's law-Absolute scale of temperature-Charles laws-Ideal gas equation-Universal gas constant and its value-SI Units-problems-external work done by a gas-isothermal process-adiabatic process-first law of thermodynamics and its applications to

isothermal process and adiabatic process-two specific heats of a gas-relation between Cp and Cv-problems-second law of thermodynamics and its applications.

Unit-VII: Modern physics
Photoelectric effect – explanation and its laws-applications of photoelectric effect (photocell)-Einstein's photoelectric equation – critical angle and total internal reflection – optical fibers - principle, working , types and applications-concept of super conductivity – its properties and applications.

CHEMISTRY (25 Marks)

Unit – I: Fundamentals of chemistry:
Atomic structure: Introduction-Fundamental particles – Bohr's theory – Quantum numbers – Aufbau principle – Hund's rule – Pauli's exclusion principle- Electronic configurations of elements up to atomic number 20, shapes of **s**, **p**, **d** orbital's.
Chemical Bonding: Introduction – types of chemical bonds – Ionic bond taking example of NaCl and MgO –characteristics of ionic compounds and covalent bond taking example H_2, O_2, N_2, HCl, characteristics of covalent compounds-Coordinate covalent bond- Metallic bond .
Oxidation-Reductions:concepts of Oxidation-Reduction ,Oxidation number and its calculations, differences between oxidation number and Valency

Unit-II: Solutions:
Introduction solution classification of solutions, solute, solvent, concentration, mole concept,–Molarity,–Normality, equivalent weight using acids, bases and salts, numerical problems on Molarity and Normality.

Unit-III: Acids and Bases:
Introduction – theories of acids and bases – Arrhenius, Bronsted – Lowry theory – Lewis acid base theory – Ionic product of water - p^H and related numerical problems – buffers solutions – Applications.

Unit – IV: Principles of Metallurgy:
Characteristics of metals and distinction between metals and non- metals. Definitions of metallurgy , ore, gangue, flux, slag –concentration of ore-hand picking, levigation, froth floatation – extraction of crude metal – roasting calcination, smelting – alloys – composition and uses of brass, German silver and nichrome.

Unit-V: Electrochemistry:
Conductors, insulators, electrolytes - Arrhenius theory of electrolytic dissociation – electrolysis – Faraday's laws of electrolysis- numerical problems – Galvanic cell – standard electrode potential – electro chemical series –emf and numerical problems on emf of a cell.

Unit –VI: Corrosion:
Introduction - factors influencing corrosion - electrochemical theory of corrosion- composition cell, stress cell and concentration cells– rusting of iron and its mechanism – prevention of corrosion by (a) coating methods, (b) cathodic protection (sacrificial and impressive voltage methods).

Unit-VII: Water Technology:
Introduction –soft and hard water – causes of hardness – types of hardness –disadvantages of hard water – degree of hardness, units and Numerical problems– softening methods – permutit process – ion exchange process – qualities of drinking water – municipal treatment of water for drinking purpose.- Osmosis and reverse Osmosis, advantages of reverse Osmosis.

Unit-VIII: Polymers:
Introduction – polymerization – types of polymerization – addition , condensation polymerization with examples – plastics – types of plastics – advantages of plastics over traditional materials – Disadvantages of using plastics ,thermo plastics and thermo setting plastics– differences between thermo plastics and thermo stetting plastics- preparation and

uses of the following plastics: 1. Polythene, 2. PVC, 3. Teflon, 4. Polystyrene, 5.Urea formaldehyde – Rubber – natural rubber – processing from latex –Vulcanization – Elastomers – Butyle rubber Buna-s, Neoprene rubber and their uses.

Unit-IX: Fuels: Definition and classification of fuels based on physical state and occurrence – characteristics of good fuel - composition and uses of gaseous fuels. (a) Water gas, (b) producer gas, (c) natural gas, (d) coal gas, (e) bio gas, (f) acetylene.

Unit-X: Environmental Chemistry: Introduction – environment –understand the terms lithosphere, hydrosphere, atmosphere bio sphere, biotic component, energy component pollutant, receptor, sink, particulate, DO, BOD, Threshold limit value, COD- Air pollution - causes-Effects-Forest resources ,uses and over exploitation ,deforestation acid rain, green house effect –ozone depletion – control of Air pollution – Water pollution – causes – effects – control measures. Renewable and Non Renewable energy sources – concept of ecosystem –producers, consumers and decomposers – Biodiversity ,threats to Biodiversity .

ELECTRONICS AND COMMUNICATION ENGINEERING (100 Marks)

1. ELECTRONIC DEVICES AND CIRCUITS: Semiconductor diodes – varactor diode – zener diode – Clippers and clampers-Transistors– FETs – UJT (characteristics only) – Power supplies – Rectifiers and Filters – HW, FW and Bridge type – RC , LC and CLC filters – Series and Shunt regulators, IC regulators – Transistor amplifiers – CE, CC and CB configurations – Biasing techniques-RC coupled – Transformer coupled amplifiers Differential amplifiers – Feedback, Power and Tuned amplifiers, Darlington pair amplifier – Operational amplifiers – characteristics and applications – RC, LC and Crystal oscillators – Astable , Bistable and Monostable Multivibrators using Transistors and 555 timers- Schmitt Trigger – Sweep circuits – Miller and Bootstrap circuits, VCO, PLL- Fabrication of ICs.

2. CIRCUIT THEORY: Mesh current and Node voltage analysis – Crammer's Rule – Network theorems – Thevenin's, Norton's, Maximum Power transfer, Superposition and Reciprocity theorems– Series and Parallel Resonance – Q- factor – Selectivity – Bandwidth- Coupled circuits, Transient analysis-RC and RL, Linear wave shaping circuits. Transmission Lines – Characteristic Impedance –Reflection Coefficient – SWR – Transmission Line losses and Impedance matching.

3. ELECTRONIC MEASURING INSTRUMENTS:
Analog Instruments – Extension of range of Ammeter, Voltmeter and Ohmmeter – FET voltmeter – Differential voltmeter- Bridges-Wheatstone, Maxwell, schering – Digital instruments – successive approximation – digital frequency meter-digital LCR meter- CRO – CRT – time base generator – deflection sensitivity – triggered sweep circuits – CRO applications, AF Oscillator – RF Signal generator – AF Power meters – Q meter – Distortion Factor Meter – Digital IC tester, logic analyser, spectrum analyser-XY plotters.

4. Programming in 'C' : Data types – arithmetic operations – operators & expressions – control statements – functions – parameter passing – Arrays – pointers – structures.

5. INDUSTRIAL ELECTRONICS: Thyristor family – SCR, TRIAC, Power BJT –IGBT (characteristics, working principle and applications) – Converters – Inverters and Cycloconverters – Series and Parallel Inverters– PWM inverters,– Speed control of AC / DC motors using converters and choppers. – Off Line and On Line UPS – Opto electronic devices – LDR (characteristics and applications) – Transducers – LVDT – Strain Gauge, Thermocouple - Ultrasonics - Pulse echo flaw detector.

6. COMMUNICATION SYSTEMS: Analog – Need for modulation – Types of modulation – AM, FM , PM – Modulation Index – Bandwidth – Power requirements – Transmitters – Low level and High level types – Receivers – Super heterodyne – AM and FM receivers – characteristics – Sensitivity , Selectivity , Fidelity – IMRR and choice of IF – Wave Propagation – Ground, Sky and Space waves – Properties. Digital – Pulse modulation – PCM, Delta modulation – Data codes – Synchronous and Asynchronous transmission – error detection and correction - digital modulation – ASK, FSK, PSK and QAM – generation and detection – Multiplexing – TDM , FDM – Multiple Access – TDMA, FDMA –PSTN, ISDN - Internet Telephony.

7. ADVANCED COMMUNICATION SYSTEMS: Antennas– radiation resistance – beam width – polarization – directivity – efficiency – bandwidth – gain – front to back ratio – folded dipole – arrays – broadside – end fire – Yagi, Log periodic, Turnstile antennas – Parabolic reflectors – beam width, gain and applications. Wave Guides – Rectangular – Dominant mode – Phase and Group velocity – Cut off wavelength - working principle and applications of Magnetron, Klystron, TWT – Radar – range equation – Pulsed radars – indicators – duplexers – CW radars and MTI radars–ILS – Satellite communication – UP link and DOWN link frequencies – types of satellites – satellite on board – earth station systems – satellite applications– GPS – Fiber Optic communication – types of fibers – couplers, splices, connectors, optical emitters and detectors – optical repeaters and amplifiers – Wave length Division multiplexing –DWDM – Mobile Communication – cellular concept – AMPS, GSM, CDMA, DECT and EDGE systems.

8. DIGITAL ELECTRONICS: Number systems – Logic gates – Boolean algebra – Adders and Subtractors, Multiplexers, Demultiplexers-Encoders-decoders, Comparators – Flip-flops– Registers and Counters – Memories – RAM, ROM, Flash ROM, NVROM, Cache Memory, Virtual Memory, Associative Memory – D/A converters – binary weighted – R-2R Ladder, A/D Converter - Counter and Successive approximation types.

9. MICROPROCESSORS & MICROCONTROLLERS: Features of microprocessors – block diagram 8085 – pin diagram of 8085 – functions of various registers – instruction set – timing diagram – latest processors used in desktop / Laptop - 8051 Architecture – Instruction Set – subroutines – use of input and output machine related statements – time delay programme – assembler directives -   peripheral ICs – 8255 use of ADC 0808/ADC0809 and DAC0808/DAC0809 – Interfacing of RTC**.**

10. ADVANCED MICRO CONTROLLER & DSP : PIC Microcontroller architecture – I/O ports – Interrupts – Addressing modes & Instructor set of PIC16F877 – MCS – 196 microcontroller features – addressing modes & Instruction set of MCS – 196-ARM micro controller features, architecture – addressing modes & instruction set – DSP – FIR & IIR filter – applications of DSP – Difference between micro processor & DSP-IC no. of DSP – Embedded systems block diagram – Applications – Multiprocessing & Tasking – comparison of normal OS & RTOS.

11. CONSUMER ELECTRONICS : Recording and Reproduction of Sound using Magnetic and Optical methods – Television Picture elements – scanning and synchronization – blanking and interlacing – composite video signal, flicker, CCIR standards – Color TV – Additive and subtractive mixing – types of color TV systems – NTSC, PAL and SECAM – PAL system processing – DTH system – Cable TV – HDTV.

12. DATA COMMUNICATIONS AND COMPUTER NETWORKS: Transmission Media – twisted pair – UTP –STP –Coaxial cable – Optical fiber – comparison – Shannon Capacity theorem – Network Topologies – BUS, STAR, RING – switching – Packet and Circuit switching – OSI 7-layer model and functions – CSMA and token ring – properties and operations – Wireless LAN – Blue tooth technology – WAN architecture – Packet transmission – ARPA Net – ISP and ISDN

architectures – WAN Protocols – TCP / IP features and comparison –Ports and Sockets – Domain Name System – Email – File transfer protocol – Proxy server and Web server architecture – Web Browser Architecture.

13.   DIGITAL CIRCUIT DESIGN THROUGH VERILOG HDL : MOS transistor fabrications – merits of CMOS technology – Stick diagram of VLSI design – Use of Verilog VHDL in VLSI simulation – compare VHDL & Verilog HDL – concepts of Gate Level design – Data Flow & Behavior modeling – User Defined Primitives (UDP) – Simple logic circuits like adder, substractor using behavioral data – Design of combinational circuits – multiplexer, decoder, encoder , comparator, Flip –Flops, Counter divide by 3, registers, RAM & ROM – test bench model – Mealy & Moore types of states machines.

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MATHEMATICS

1. If $\begin{bmatrix} x & 1 & 1 \\ 2 & 3 & 4 \\ 1 & 1 & 1 \end{bmatrix}$ is a singular matrix, then the value of x is.

   1) -4   2) -3   3) -2   4)1

2. The number of solutions of the equation $\tan^2\theta = \frac{1}{3}$ are

   1) 2   2) 3   3) 4   4) None

3. The focus of the parabola $y^2 - x - 2y + 2 = 0$ is

   1) $(\frac{1}{4}, 0)$ 2) $(1, 2)$ 3) $(\frac{3}{4}, 1)$ 4) $(\frac{5}{4}, 1)$

4. $\int_0^{\frac{\pi}{2}} \log \tan x \, dx =$

   1) 1   2) 0   3) 2log2   4) none

PHYSICS

1. Dimensional formula for Energy is

   1) MLT^{-2} 2) ML^2T^{-2} 3) ML^2T^2 4) MLT^2

2. A body is thrownup vertically with a velocity of 19.6m/s .The maximum height reached by the body is(g=9.8m/s^2)

   1) 19.6m   2) 19.6m/s   3) 19.8m   4) 19.8m/s.

3. Gases obeys Boyle's law

   1) at high temperature and low pressures only

   2) at low temperature and high pressures only

   3) at high temperature and high pressures only

   4) at all temperatures and all pressures

4. A workdone by a man in carrying a load of 30kg over his head when he travels a distance 5m in horizontal direction is (g=9.8m/s^2)

   1) 1470J   2) 0 J   3) 1470m   4) 150 J

CHEMISTRY

1. Which of the following orbital has less energy

   1) 3P   2) 3d   3) 4d   4) 4f

2. Which of the following element has stable electronic configuration?

   1) H   2) He   3) Li   4) Be

3. The pH of 0.001M NaOH is

   1) 1   2) 3   3) 11   4) 14

4. Brass is an alloy of

   1) Cu +Sn   2) Cu +Zn   3) Cu +Zn +Ni   4) Fe +Cr + Ni

ELECTRONICS AND COMMUNICATION ENGINEERING

1. An example of square law device is
   1) Diode   2) Resistor   3) JFET   4) SCR

2. TWT uses a helix
   1) To reduce the axial velocity of RF field   2) To ensure broadband operation
   3) To increase the efficiency   4) To reduce noise

3. Quality factor of a tuned circuit is
   1) Product of BW and $f_{resonant}$ 2) $BW/f_{resonant}$
   3) $f_{resonant}/BW$ 4) $2 f_{resonant}$

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