KLE Technological University
Creating Value
Leveraging Knowledge
B. V. Bhoomaraddi Engineering & Technology College Campus, Hubballi - India

RESEARCH ENTRANCE TEST -2022(RET-2022)

2nd Call

Syllabus

For Admission to PhD Programmes

KLE TECH.

KLE TECHNOLOGICAL UNIVERSITY, HUBBALLI

SCHEME OF RESEARCH ENTRANCE TEST (RET)
For Admission to Ph.D Programme in

1. Civil Engineering
2. Computer Science & Engineering
3. Electronics and Communication Engineering
4. Mechanical Engineering
5. Management Studies & Research
6. Automation & Robotics
7. Biotechnology
8. Electrical and Electronics Engineering
9. Humanities & Social Science
10. Physics
11. Chemistry
12. Mathematics
13. Center for Engineering Education and Research

Question Paper Pattern: Faculty of Engineering and Mathematics

Part I- Quantitative Aptitude	
Mathematics Section (Maths-1) Includes Objective type questions with multiple options covering entire syllabus. Questions carrying one mark	30 Questions
Part II- Discipline Oriented Section	
Includes Objective type questions with multiple options preferably numerical problems covering entire syllabus. Questions carrying one mark.	50 Questions
Part III- General Aptitude	
Common to Engineering and Science Reading Comprehension, Data Sufficiency & Data Interpretation, Logical Reasoning, computer awareness. Questions carrying one mark	20 Questions
Total	**100 Marks**

Question Paper Pattern: Faculty of Advanced Sciences: Physics, Chemistry

Part I- Quantitative Aptitude	
Mathematics Section (Maths-1) Include Objective type question with multiple options covering full syllabus. Questions carrying one mark	30 Questions
Part II- Discipline Oriented Section	
Include Objective type question with multiple options preferably numerical covering full syllabus	50 Questions
Part III- General Aptitude	
Common to Engineering and Science Reading Comprehension Data Sufficiency & Data Interpretation, Logical Reasoning computer awareness. Questions carrying one mark	20 Questions
Total	**100 Marks**

Question Paper Pattern : Faculty of Management Studies

Part I- Quantitative Aptitude	
Verbal Ability, Numerical Analysis Quantitative ability Questions carrying one mark	30 Questions
Part II- Discipline Oriented Section	
Include Objective type question with multiple options preferably numerical covering full syllabus	50 Questions
Part III- General Aptitude	
Reading Comprehension Data Sufficiency & Data Interpretation, Logical Reasoning computer awareness. Questions carrying one mark	20 Questions
Total	**100 Marks**

Question Paper Pattern: Faculty of Humanities

Part I- Quantitative Aptitude	
Verbal Ability, Numerical Analysis Quantitative ability Questions carrying one mark	30 Questions
Part II- Discipline Oriented Section	
Include Objective type question with multiple options preferably numerical covering full syllabus	50 Questions
Part III- General Aptitude	
Reading Comprehension Data Sufficiency & Data Interpretation, Logical Reasoning computer awareness. Questions carrying one mark	20 Questions
Total	**100 Marks**

Part I- Syllabus for Faculty of engineering, Advanced science and Mathematics Mathematics section (Maths-1)

Note: Includes Objective type questions with multiple options covering full syllabus. Each question carries one mark. *Total: 50 questions.*

Chapter Number	Content
1	**Matrices:** Definition, Rank of matrix Systems of m linear equations with n unknown, Eigen value and Eigen vectors of a square matrix.
2	Differential Calculus : Limits and Continuity , Differentiation and its applications, Partial Derivatives.(Basic) Integral Calculus : Reduction formulae, Definite Integrals, Properties and Multiple Integrals,
3	**Vector Algebra;** Complex numbers; Definitions, Vector products, Properties; Amplitude & Modules of a complex number, De Moivere's theorem and examples.
4	Applied Mathematics - Laplace Transforms (Elementary transformation), Fourier series, (Basics definition and examples.) half range Fourier series and harmonic analysis
5	Numerical Solutions of Algebraic and transcendental equations, Finite differences, Interpolation (For equal and unequal intervals) Numerical solutions of first order differential equations, Numerical Integration
6	**Statistics and Probability** Measures of central tendency and dispersion curve fitting by least square methods. Correlation and regression. analysis Probability : Axioms, conditional probability, probability distribution-Binomial poison and normal distribution

Part II- Syllabus for Discipline Oriented Section
School Civil Engineering

1. *Note: Includes Objective type questions with multiple options covering full syllabus. Each question carries one mark.* *Total: 50 questions.*

Chapter Number	Content
1	**Structural Analysis** - Structural Systems, Methods of Joints and Sections and Truss Analysis, Strain Energy, Arches and Cables. Plane Stresses and Plane Strain, Principal Stresses and Principal Strains
2	**Fluid Mechanics**- Open Channel Flow, Water Hammer, Dimensional Analysis, Impact of Jets on Vanes, Turbines, Centrifugal Pumps.
3	**Concrete Technology** - Fresh Concrete and Hardened Concrete, Mix Design, Special Concretes, Non-destructive Testing of Concrete.
4	**Design of Concrete Structures** - Principles of Limit State Design, Serviceability Limits, Effective Lengths, Design Loads, Anchorage of Bars, Lateral Stability of Beams
5	**Geotech** - Index Properties of Soil, Classification of Soils, Soil Structures, Compaction of Soil, Consolidation of Soils, Shear Strength of Soil
6	**Transportation** - Highway Planning and Alignment, Design Principles, Pavement Materials and Construction, Wind Analysis and Site Selection for Airports.
7	**Irrigation Engineering** - Water Requirements of Crops, Canals, Diversion Works, Gravity and Earthen Dams.
8	**Steel Structures** - Steel Structural Fasteners, Tension – Compression – Flexure Members Connections.
9	**Environmental Engineering -** Demand and conveyance of water, Quality of Water, Water Treatment, Miscellaneous Treatment and Distribution of Water, Sewerage systems and characteristics

2. *Note: Each module will have approximately 5 questions.*

Part II- Syllabus for Discipline Oriented Section

School of Computer Sciences & Engineering

(CSE/ISE/MCA)

Note: Includes Objective type question with multiple options covering full syllabus. Each question carries one mark. Total : 50 questions.

1. Discrete Mathematical Structures.
2. Computer Organization.
3. Data Structures using C.
4. Operating systems.
5. OOP with C++
6. DBMS
7. Design and Analysis of Algorithms
8. Object oriented Analysis and design
9. Software Engg
10. Computer Networks

Part II- Syllabus for Discipline Oriented Section
School of: Electronics and Communication Engineering

Note: Includes Objective type questions with multiple options covering full syllabus. Each question carries one mark. *Total: 50 questions.*

Chapter Number	Content
1	Fundamentals of DC, AC Circuits and Network Theorems.
3	Simplification of Boolean Expressions: Karnaugh maps combinational logic Design. Sequential logic circuits: Flip flops and counters, shift Registers
5	Electronic circuits and Applications. Response of control systems: Nyquist and Bode plots, phase and gain margins.
6	Field Theory: Electric and magnetic fields, Maxwells equations. Fundamentals Communication Techniques
8	Fundamentals of Signal processing
9	Microprocessors: Architecture, operation, programming and interfacing

Part II-Syllabus for Discipline Oriented Section

School of Mechanical Engineering

(IP/IEM/Auto/ME/ & Other Allied branches)

Note: Objective type question with multiple options covering full syllabus. Each question carries one mark. All questions are to be answered *Total : 50 questions.*

Design Stream	**Weightage 40%**
Engineering Materials: Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.	2 Questions
Mechanics of Materials: Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.	6 Questions
Theory of Machines: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope.	5 Questions
Machine Design: Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints; shafts, gears, rolling and sliding contact bearings, brakes and clutches, springs.	5 Questions
Vibrations: Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.	2 Questions
Thermal Stream	**Weightage 30%**
Fluid Mechanics: Fluid properties; fluid statics, manometry, buoyancy, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings.	5 Questions
Thermodynamics: Thermodynamic systems and processes; properties of pure substances, behaviour of ideal and real gases; zeroth and first laws of thermodynamics, calculation of work and heat in various processes; second law of thermodynamics; thermodynamic property charts and tables, availability and irreversibility; thermodynamic relations.	6 Questions

Heat-Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, Heisler's charts; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat exchanger performance, LMTD and NTU methods; radiative heat transfer, Stefan Boltzmann law, Wien's displacement law, black and grey surfaces, view factors, radiation network analysis.	4 Questions
Manufacturing Stream	**Weightage 30%**
Casting, Forming and Joining Processes: Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk and sheet metal forming processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding.	6 Questions
Machining and Machine Tool Operations: Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, design of jigs and fixtures.	5 Questions
Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.	3 Questions
Computer Integrated Manufacturing: Basic concepts of CAD/CAM and their integration tools.	1 Question

Part II-Syllabus for Discipline Oriented Section

School of Management Studies & Research

Note: Objective type question with multiple options covering full syllabus. Each question carries one mark. *Total : 50 questions*

Module 1 :

Management: Definition, nature, purpose and functions, Principles of management,

Planning, Organizing, Staffing, Directing, controlling

MBO, Motivation, Leadership, Communication

Module 2

Organization behavior: nature, Learning

Personality:definition-traits-determinants

Perception: Meaning, factors influencing perception, perception and decision making

Human Resource Management: definition, nature, scope-managerial and operative functions of HRM. Objections of HRM

Module 3

Marketing Management: Meaning-importance

Marketing management process: Marketing mix. Sales and Distribution, Advertizing and Media Planning, CRM

Module 4

Financial Management: Definition, scope, functions, objectives, Time value of money,International Finance

Module 5:

Operations: Site selection, Plant layout, Aggregate Planning, Scheduling, SCM, Linear Programming, Queuing models and Latest Management concepts in all the above modules

Part II- Syllabus for Discipline Oriented Section

Department of Automation and Robotics

Note: Objective type questions with multiple options covering full syllabus. Each question carries one mark. All questions are to be answered. Total: 50 questions

Section I: Electronics Fundamentals **20 Questions**

1. **Fundamentals of Circuits Theory and Network Theorems**
2. **Operational Amplifiers and their Applications**
3. **Digital Electronic Circuits**: Boolean algebra, Fundamentals of Combinational logic and Sequential logic circuits
4. **Control systems**: Time domain and Frequency domain parameters, Transfer function models
5. **Power Electronics devices and their applications as Converters**
6. **Microprocessors & Microcontrollers Architecture and programming**
7. **Measurement and Data Acquisition Systems**: Sensors and Transducers, Measurement Bridges
8. **Embedded System Design**: Architectural features, Scope and Challenges

Section II: Mechanical Fundamentals: **20 Questions**

1. **Mechanics of Materials**: Stress & Strain, Mechanical Properties of Materials, Axial Deformation, Torsion, Equilibrium of Beams, Bending, Shear Stress in Beams and Beam Deflections
2. **Machine Design**: The Design Process, Engineering Materials, Their Properties and Material Selection, Kinematics of Gears and Gear Design, Keys, Couplings, Seals and Shaft Designs, Linear Motion Elements, Springs, Fasteners, Clutches And Brakes, Bearings: Rolling Contact & Surface Contact
3. **Kinematics of Machinery**: Introduction to Kinematics, Position Analysis, Velocity & Acceleration Analysis, Cams Design and Kinematic Analysis, Gears Kinematic Analysis and Selection, Belts and Chain Drives, Screw Mechanisms and Static Force Analysis
4. **Manufacturing Technology**: Turning , Shaping and Planning Machines, Milling Machines, Drilling & Grinding Machines, CNC Machine Tools, Non-traditional Machining, Metrology and Inspection, Comparators and Angular Measurement Devices and Advanced Metrology.
5. **Hydraulics & Pneumatics**: Introduction to Hydraulic Power and Hydraulic Pumps, Hydraulic Actuators: Cylinders and Motors, Hydraulic Valves, Hydraulic Circuit Design and

Analysis, Pneumatic Systems, Pneumatic Circuit Design, Hydraulic Control Systems and Electro Pneumatics

Section III: Computer Science Fundamentals **10 Questions**

1. Computer Organization
2. Data Structures using C
3. Operating systems
4. OOP with C++
5. DBMS

Part II- Syllabus for Discipline Oriented Section
Department of: Electrical & Electronics Engineering

Note: Includes Objective type questions with multiple options covering full syllabus. Each question carries one mark. Total: 50 questions.

Chapter Number	Content
1.	Electronic devices, circuits and Applications, Simplification of Boolean Expressions: Karnaugh maps combinational logic Design, Sequential logic circuits: Flip flops and counters, shift Registers
2.	**Power Systems**: Power generation concepts, ac and dc transmission concepts, Models and performance of transmission lines and cables, Series and shunt compensation, Electric field distribution and insulators, Distribution systems, Per-unit quantities, Bus admittance matrix, Gauss Seidel and Newton-Raphson load flow methods, Voltage and Frequency control, Power factor correction, Symmetrical components, Symmetrical and unsymmetrical fault analysis, Principles of over-current, differential and distance protection; Circuit breakers, System stability concepts, Equal area criterion.
3.	**Electric Circuits** Network graph, KCL, KVL, Node and Mesh analysis, Transient response of dc and ac networks, Sinusoidal steady-state analysis, Resonance, Passive filters, Ideal current and voltage sources, Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem, Two-port networks, Three phase circuits, Power and power factor in ac circuits.
4.	**Electrical Machines** Single phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency; Three phase transformers: connections, parallel operation; Auto-transformer, Electromechanical energy conversion principles, DC machines: separately excited, series and shunt, motoring and generating mode of operation and their characteristics, starting and speed control of dc motors; Three phase induction motors: principle of operation, types, performance, torque-speed characteristics, no-load and blocked rotor tests, equivalent circuit, starting and speed control; Operating principle of single phase induction motors; Synchronous machines: cylindrical and salient pole machines, performance, regulation and parallel operation of generators, starting of synchronous motor, characteristics; Types of losses and efficiency calculations of electric machines.
5.	**Control Systems** Mathematical modeling and representation of systems, Feedback principle, transfer function, Block diagrams and Signal flow graphs, Transient and Steady-state analysis of linear time invariant systems, Routh-Hurwitz and Nyquist criteria, Bode plots, Root loci, Stability analysis, Lag, Lead and Lead-Lag compensators; P, PI and PID controllers; State space model, State transition matrix.

6. **Power Electronics** Characteristics of semiconductor power devices: Diode, Thyristor, Triac, GTO, MOSFET, IGBT; DC to DC conversion: Buck, Boost and Buck-Boost converters; Single and three phase configuration of uncontrolled rectifiers, Line commutated thyristor based converters, Bidirectional ac to dc voltage source converters, Issues of line current harmonics, Power factor, Distortion factor of ac to dc converters, Single phase and three phase inverters, Sinusoidal pulse width modulation.

Part II-Syllabus for Discipline Oriented Section

Department of Biotechnology

Note: Objective type question with multiple options covering full syllabus. Each question carries one mark. *Total : 50 questions*

Module 1: Cell and Molecular Biology	Weightage
Prokaryotic and eukaryotic cell structure and function, cell division, plant and animal cells, cell organells, structure of DNA and RNA, types of DNA and RNA, protein sysnthesis, transcription and translation, gene expression, gene regulation, steps involved in DNA cloning, enzymes and vectors, screening and characterization of transformants, recombinant protein production, prokartyoic and eukaryotic expression systems, transgemic organisms.	10 Questions

Module 2: Microbiology and Immunology	Weightage
History and scope of microbiology, structure and functions of prokaryotic and eukaryotic microorganisms, pure culture techniques, enumeration technicques, characterization techniques, staining techniques, microscopy, control of microorganisms by physical and chemical agents, applications of microbes. Immune system, humoral and cell mediated immunity, immune regulation, immune disorders, transplantation immunology and immune diagnosis.	10 Questions

Module 3: Biochemistry and Bioanalytical Techniques	Weightage
Concept of mole and molecule, normality, molarity, molality, pH, buffer prepration and standardization. Structure and functions of biomolecules, enzymes and their classification, enzyme kinetics and applications, metabolism (catabolism and anabolism), metabolic disorders. Qualitative and quantitative analysis, bioanalytical techniques, colorimetry, spectrophotometry, chromatographic techniques, HPLC, GC, Mass spectrometry, MALDI-TOF and amino acid sequencing.	10 Questions

Module 4: Bioinformatics and Computational Biology	Weightage
Biological Databases, nucleotide and amino acid sequence analysis, sequence alignment and database searches, aspects of BLAST and multiple sequence alignment, phylogenetic analysis, predictive methods for detecting functional sites in the DNA, in-silico PCR, primer design and restriction mapping of plasmids, predictive methods for secondary, tertiary protein structures,	10 Questions

Genome sequencing and analysis, Basics of Genomics and Proteomics, in-silico drug design.	
Module 5: Fermentation Technology and Bioprocess Engineering	**Weightage**
Unit operations involved in bioprocesses, thermodynamic principles, basics of bioprocess calculations, general material balance, energy balance, reaction stochiometry, basic concepts of bioprocess control, process flow and process control, fundamentals of fermentation technology, industrial production of enzymes and metabolites, media and media optimization, media sterilization, upstream and downstream process technology, bioprocess optimization, bioprocess automation, types of bioreactors and their applications, product economics.	10 Questions
Total Questions	**50 Questions**

Part II-Syllabus for Discipline Oriented Section

Department of Chemistry

Note: Objective type question with multiple options covering full syllabus. Each question carries one mark. (Topics Studied up to the Bachelor Degree Level should be considered for setting the comprehensive questions in the subject)

Total: 50 questions.

1. **Periodic Properties:** Atomic radii – Ionization energy in groups and periods – Electron affinity - Chemical Bonding.
2. **Organic Chemistry:** Classification and nomenclature of organic compounds.
   Electronic effects and reactive intermediates –Principles of purification of organic compounds – Halogens – Cycloalkanes – Aromatic hydrocarbons – Elimination Reaction – Organo-metallic compounds – Alcohols – Phenols – Carboxyl compounds – Carboxylic acid – Hydroxy acids – Amines – Diazonium Compounds. Active methyl compounds – Carbohydrates – Stereo- chemistry – Amino acids – Peptides – proteins. Oils and Fats – Waxes – Dyes – Terpenes. Drugs - Hormones – Vitamins.
3. **Inorganic Chemistry:** Molecular orbital theory – General characteristics of s – block and p-block elements - Gravimetry – Statistical analysis of results of quantitative measurements (errors – accuracy – precession etc.). Nobel Gases – Non-aqueous solvents - Ion exchange - Metallurgy – Gaseous fuels.
4. **Physical Chemistry:** Liquid mixtures - Properties of liquid Mixtures – Colligative Properties - Chemical Kinetics – Colloids – Emulsions – Crystallography-Electrochemistry- Hydrolysis of salts – Ionic equilibria. Distribution law.
5. **Nuclear chemistry:** Fundamental properties of nucleons – isotopes – nuclear stability – binding energy – nuclear models – fission and fusion – nuclear transmutation – radioactivity – nuclear reactors – accelerators. Applications of nuclear chemistry.
6. **Thermodynamics:** Gas laws - Thermodynamic processes – State function – Laws of Thermodynamics - Heat engine - Free energy – Entropy – Phase equilibria.

7. **Co-ordination Chemistry:** Basic concepts – Valence bond theory – Crystal field theory – Bio-inorganic chemistry – Enzymes – Occurrence – properties and structure of enzymes.
8. **Radiation Chemistry:** Primary and secondary states in radiochemical reactions. Ionic yield – energy yield – comparison with photochemistry – Radiolysis – Units of Measurement of radiation.
9. **Molecular Chemistry:** Types of spectra – Rotational energy – Calculation of bond length – Vibrational energy - Selection rules and transitions.
10. **Polymer Chemistry:** Polymers – classifications - polymerization - addition and condensation polymerization. Commercial polymers - Plexi glass and Polyurethane. Elastomers-advantages of synthetic rubber over natural rubber, neoprene and butyl rubbers. Adhesives – Epoxy resin - Polymer Composites - Carbon fiber and Kevlar – structure, properties and applications.

Part II-Syllabus for Discipline Oriented Section

Department of Physics

Note: Objective type question with multiple options covering full syllabus. Each question carries one mark. (Topics Studied up to the Bachelor Degree Level should be considered for setting the comprehensive questions in the subject)

Total : 50 questions.

1. **Mechanics and Properties of Matter:** Frames of Reference – Rigid body dynamics – Moment of Inertia – Laws of Conservation. Elasticity – Viscosity – Surface Tension.
2. **Heat and Thermodynamics :** Kinetic Theory – Laws of Radiation – Thermodynamics – Liquification of Gases – Entropy – Heat engines and Refrigeration. Thermal Conductivity.
3. **Waves Acoustics :** Progressive waves – Superposition – Doppler effect – Acoustics of Buildings – Fourier transforms – Ultrasonics.
4. **Optics :** Theories of Light – Interference – Diffraction – Polarisation – Optical Instruments
    a. Resolving Power. Laser – Production, Properties and Applications.

5. **Electricity and Magnetism :** Electrostatics – Galvanometers - Measuring Instruments) Alternating and Direct current – Generation and Analysis – Thermoelectricity – Electromagnetism .
6. **Atomic and Molecular Physics :** The electron – Atomic Models – Atomic spectra – Molecular spectra – Related measurements. Zeeman effect. X – rays – Crystallography.
7. **Nuclear Physics :** The nucleus – Nuclear models - Mass spectrographs – Radioactivity – Accelerators – Nuclear detectors – Nuclear reactions - Cosmic ray - Mossbauer effect – Magnetic Resonance – Applications – Elementary Particles.
8. **Solid State Physics :** Relativity - Special and General Theories of relativity – Statistical Physics Specific Heats of Solids – Band Theory of solids – Classification of solids – Electrical Conductivity in solids – Dielectric and Magnetic Properties – Specific Heats of Solids –

Semiconductors – Applications – Semiconductor devices – Transistors - Amplifiers – Oscillators - Digital electronics – Superconductivity.

9. **Quantum Physics :** Failure of Classical Physics – Duality – Wave function – Schrodinger wave equations. Solutions – Eigen values.
10. **Recent Trends in Physics :** Liquid Crystals – Optical Fibers – Smart Materials –Nano-Materials.

Part II- Syllabus for Discipline Oriented Section
School /Department of Mathematics

Note: Includes Objective type questions with multiple options covering full syllabus. Each question carries one mark. *Total: 50 questions.*

Chapter Number	Content
1	a) DIFFERENTIAL CALCULUS: nth derivative of standard functions, polar curves, angle between polar curves. Partial differentiation, maximum and minimum for function of single and two variables. Curvature and radius of curvature, mean value theorems, Taylor's and Maclaurin's expansion for a function of single variable. Indeterminate forms. b) INTEGRAL CALCULUS: Tracing of standard curves. Beta and gamma functions. Length, Area, Volume using multiple integrals.
2	**VECTOR CALCULUS:** Vector fields, Gradient and directional derivatives. Line and Surface integrals. Independence of path and potential functions. Green's theorem, Divergence of vector field, Divergence theorem, Curl of vector field. Stokes theorem
3	**DIFFERENTIAL EQUATIONS:** Solutions of first order and first degree differential equations and higher order differential equations.
4	**INFINITTE SERIES:** Convergence and divergence of series of positive terms. Standard tests for convergence. Alternating series, Leibnitz test.
5	**LINEAR ALGEBRA:** Matrices and determinants, Inverse of a matrix, rank of a matrix, consistency of a system of linear equations. Eigen values and eigen vectors

6 STATISTICS AND PROBABILITY: Correlation and regression, analysis of variance. Probability: Axiams , Including Bayes theorem, conditional probability, probability distribution-Binomial Poisson, normal, geometric and exponential distribution.

a) Laplace Transforms, Fourier Series & Fourier Transforms

b) NUMERICAL METHODS : Solutions of algebraic and transcendental equations, finite differences and related problems, numerical differentiation and numerical integration , Numerical solution of ordinary and partial differential equations, application to Engineering problems.

Part III- Aptitude Section
Syllabus for Faculty of Engineering, Advanced Sciences and Mathematics

Note: Includes Objective type question with multiple options covering complete syllabus.

Each question carries one mark. Total : 20 questions.

Common to:

1. School of Civil Engineering.
2. School of Computer Science & Engineering.
3. School of Electronics & Communication Engineering.
4. School of Mechanical Engineering.
5. School of Management Studies.
6. School of Architecture.
7. Dept. of Automation and Robotics.
8. Dept. of Biotechnology.
9. Dept. of Electrical &Electronics Engineering.
10. Dept. of Physics, Chemistry and Mathematics.
11. Dept. of Humanities.
12. Centre for Engineering Education Research.

Syllabus:

Reading Comprehension, data Sufficiency & Data Interpretation, Logical Reasoning & Computer awareness.

Part III- General Aptitude Section
Syllabus for Faculty of Management Studies and Humanities

Note: Includes Objective type question with multiple options covering complete syllabus.

Each question carries one mark. Total : 20 questions.

Syllabus:

Verbal Ability, Numerical Analysis Quantitative ability

Part III- General Aptitude Section
Syllabus for Faculty of Architecture

Note: Includes Objective type question with multiple options covering complete syllabus.

Each question carries one mark. Total : 20 questions.

Syllabus:

Verbal Ability, Numerical Analysis, Quantitative Ability Basics of architectural research, General mental ability, Non-verbal reasoning.