

## 2 LATERAL ENTRY ADMISSION TO THE SECOND YEAR OF UG PROGRAMME

### 2.1 ELIGIBILITY:

A candidate shall be eligible for admission in the Second year of B.E. programs subject to the following conditions:

The candidate

- i. has passed
  - a) 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 60% marks (55% for SC/ST) in aggregate or equivalent grade point.
- OR
- b) diploma, in relevant\* discipline, of minimum 2-years duration after 10+2 from Polytechnic College/Institute affiliated with State Board of Technical Education/University, or recognized by UGC/AICTE with a minimum of 60% marks (55% for SC/ST) in aggregate or equivalent grade point.
- ii. has qualified LEET-TIET with at least 20% aggregate marks (15% for SC/ST candidates).
- iii. possesses a good moral character.
- iv. is a citizen of India.

**\* The various UG programs and their relevant diploma disciplines are given as below:**

SR. No.	Name of Programme	Relevant Disciplines of Diploma#
1.	CHEMICAL ENGINEERING – CHE	Chemical Technology/ Chemical Engineering / Food Technology/Biotechnology / Mechanical
2.	CIVIL ENGINEERING - CIE	Civil Engineering/Architectural Assistantship
3.	(a) COMPUTER ENGINEERING - COE (b) COMPUTER SCIENCE & ENGINEERING (DERABASSI CAMPUS) - CSE	Computer Engineering/Computer Programming & Application/ Computer Servicing & Maintenance/Information Technology/Electronics & Communication/ Electronics & Computer Engineering
4.	ELECTRICAL ENGINEERING - ELE	Electrical Engineering, Electrical & Electronics Engineering, Electronics Engineering, Electronics & Communication
5.	(a) ELECTRONICS & COMMUNICATION ENGINEERING - ECE (b) ELECTRONICS AND COMPUTER ENGINEERING - ENC (c) ELECTRONICS (INSTRUMENTATION & CONTROL) ENGINEERING - EIC	Electronics & Communication/ Electrical and Telecommunication Engineering/Electrical and Electronics/Electronics & TV Technology/ Electronics & Microprocessors/ Electronics and Instrumentation/ Electronics & Computer/ Computer Science & Engineering/Computer Science/ Computer Engineering/ Information Technology, Electrical & Electronics Engineering, Instrumentation Technology, Instrumentation & Process Control, Instrumentation & Control.

6.	(a) MECHANICAL ENGINEERING - MEE (b) MECHATRONICS - MEC	Mechanical Engineering/Production & Industrial Engineering/ Refrigeration & Air Conditioning/ Foundry Technology/Industrial/Production Engineering/Maintenance of Plant & Machinery/ Welding Technology/Tool and Die/ Automobile/ Mechatronics/Aerospace Engineering/ Aeronautical Engineering/Marine Engineering/ Mechanical Engineering (RAC).
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**#Other than these, any other diploma discipline as per AICTE guidelines will also be considered.**

**Note: Candidates are required to fill one form for the discipline(s) mentioned at each SR. No. e.g., If a candidate is willing to apply for disciplines at SR. No. 4 and SR. No. 5, then he/she is required to fill two forms with requisite fee for each form and is also required to take the entrance test of each and If he/she is interested for applying in the two different disciplines mentioned at SR. No. 5 then he is required to fill one form and appear in single test corresponding to SR. No. 5 only.**

## 2.2 NUMBER OF SEATS

Lateral Entry admission to B.E. programme for diploma holders at the 2<sup>nd</sup> year (3<sup>rd</sup> Semester) level will be made through Lateral Entry Engineering Test (LEET) to be conducted by Thapar Institute of Engineering & Technology (**LEET-TIET**) for the following seats in various categories:

Categories →  Disciplines ↓	General	SC (15%)	ST (7.5%)	PH (3%)	Grand Total
Chemical Engineering	4	1	1	0	6
Civil Engineering	13	3	1	0	17
Computer Engineering	55	11	5	2	73
Computer Science & Engineering (Derabassi Campus)	8	2	1	1	12
Electrical Engineering	13	3	1	1	18
Electronics & Communication Engineering	15	3	2	1	21
Electronics and Computer Engineering	13	3	1	1	18
Electronics (Instrumentation & Control) Engineering	7	2	1	0	10
Mechanical Engineering	17	3	2	1	23
Mechatronics	2	1	0	0	3
<b>Total</b>	<b>147</b>	<b>32</b>	<b>15</b>	<b>7</b>	<b>201</b>

In addition to above seats, 1% over and above seats are reserved for children of employees of Thapar Institute of Engineering & Technology. The candidates seeking admission under this category are required to satisfy the eligibility as mentioned above at 2.1.

- Vacant seats of first year of B.E. 2018 batch shall also be filled through lateral entry candidates in session 2019-20.

### 2.3 TUITION FEE & OTHER DUES

The candidates admitted through LEET-TIET (2019) are required to deposit the same tuition fee and other dues as applicable to the candidates admitted in B.E. through JEE (Main)-2019 in the session 2019-20.

**2.4 APPLICATION FEE** : **Rs. 1500/-**

### 2.5 IMPORTANT DATES

**Last date for receipt of completed application forms** : **June 15, 2019**

**OFFLINE Tests to be conducted by TIET** : **June 23, 2019**

CHE & COE, CSE	:	09:00 am – 11.00 am
CIE & ENC, ECE	:	12:00 noon – 02:00 pm
ELE & MEE, MEC	:	03:00 pm – 05:00 pm

**Display of Result of Entrance Test** : **July 3, 2019**

**Venue of Offline Entrance Test** : **Patiala/New Delhi**

#### LEET In-person Counselling

Counselling including deposit of fee : July 19, 2019

Last round of counselling for vacant seats, if any : August 1, 2019

### 2.6 IMPORTANT NOTE

1 If the candidate is applying in two different groups (as mentioned at 2.1 above) for admission to LEET programmes then he/she has to select additional group with requisite fee for each group. However, if the candidate is applying for only one group then he needs to fill only one application form along with the requisite fee.

2 **If Application Fee is paid Online:** The candidates are not required to send the printout of application form but they must produce it at the time of interview.

**If Application Fee is paid through DD:** Please send one of the printouts by attaching DD of required amount as mentioned in filled online Application Form/Prospectus (in favour of **Thapar Institute of Engineering & Technology** and payable at Patiala) to "**In-charge Admission Cell**' **Thapar Institute of Engineering & Technology, Patiala (Punjab)-147 004.**

3 If any seat in the reserve categories remained unfilled, such vacant seats shall be filled by General category candidates in the final round of counselling on the basis of merit. In case a SC seat remains vacant, it will be first offered to ST candidate or a vice versa before converting into General Category.

4 Candidates having any pending backlog in the qualifying degree (diploma) shall not be considered for admission.

5 In case of a tie among candidates securing equal marks in the merit list, the same will be broken in accordance with the following criteria:

- a. Candidate senior in age shall rank higher in order of merit.
  - b. In the case of a tie in age also, a candidate getting higher percentage of marks in the qualifying examination shall be ranked higher in order of merit.
  - c. In the case of a tie in percentage of marks in the qualifying examination also, a candidate securing higher percentage of marks in matriculation/secondary or equivalent examination shall rank higher in order of merit.
- 6 Candidates appearing in the final exam of the qualifying degree are also eligible to apply. Such candidates have to furnish following undertaking at the time of counselling.  
*"I am applying on my own risk and responsibility as my final result of the Qualifying Exam has not been declared.  
I do hereby declare that I do not have any backlog paper in any of the previous semesters (Years) of study of the qualifying exam and also, I do not expect any backlog in my final exam.  
I assure you that I will produce the proof of passing of my Qualifying Examination with the minimum percentage of marks required on or before December 31, 2019, failing which my admission shall stand cancelled and I shall not claim any right on any count whatsoever."*

## **2.7 INSTRUCTIONS FOR OFFLINE ENTRANCE TEST**

- 1 Entrance Test for B.E. (Lateral Entry) shall be conducted OFFLINE.
- 2 The Admit Cards for offline entrance test shall be sent to registered email IDs (as mentioned in online application form) of the candidates provided their DD along with print out of application form reaches Thapar Institute of Engineering & Technology within the stipulated time, in case application fee paid through DD.

**Note: The Admit Card shall be issued provisionally to the candidate subject to his/her satisfying the eligibility condition.**

- 3 The candidate shall take out two printouts of 'Admit Card', paste latest photograph on each and then come to the Entrance Test Centre. Along with admit cards, the candidate will also carry any one of the identity proof (Original) with him/her like Aadhar Card/Passport/Voter Identity Card/ PAN Card/ Driving License. One copy of the admit card shall be retained by the entrance test centre. The candidate shall keep the other copy (duly acknowledged by the examiner at test centre) to be shown at the time of document checking during counselling.
- 4 Electronic gadgets such as Calculators, Mobile Phones, Pagers, etc. are not permitted in the Examination Centre.
- 5 The Entrance Test shall contain 100 objective type questions. Duration of the Entrance Test will be 120 minutes.

## **2.8 GENERAL INFORMATION REGARDING LEET-TIET OFFLINE ENTRANCE TEST INCLUDING ENTRANCE TEST SYLLABUS**

There will be two papers as per details given below:

- Paper-I General
- Paper-II Professional

Duration of Test: 120 minutes (100 Questions)

The question paper will contain multiple choice objective type questions of one mark each.

**Paper-I** shall contain 40 questions in all with 10 questions in each of **Physics, Chemistry, Mathematics and English**. **Paper-II** shall contain 60 questions in the **relevant engineering discipline** each carrying one mark.

**Negative Marking:  $1/4^{\text{th}}$  marks shall be deducted for each wrong answer.**

## **PAPER-I GENERAL**

### **MATHEMATICS**

**Algebra:** Quadratic equation, equations reducible to quadratic form, relation between roots and coefficients. Arithmetic progression, Geometric progression, series of natural numbers, partial fractions, Binomial Theorem and its applications.

**Trigonometry:** Trigonometric ratios and their relations, Ratios of some standard angles, solution of trigonometric equations, sum and difference formulae, product formulas. Multiple and sub-multiple angles, solution of triangles.

**Co-ordinate Geometry:** Cartesian Co-ordinates, Equations of straight lines in various forms, Intersection of two straight lines, angles between two lines, Distance formulae, Equation of a circle in various forms, Tangent and normal to a circle.

**Differential Calculus:** Concept of a function, limit, standard limits, Continuity, Differentiation, their geometrical and physical meanings, Differentiation from first principles, Differentiation of sum, product, quotient of functions, function of a function, Differentiation of implicit functions, trigonometric functions and logarithmic differentiation.

**Integral Calculus:** Definite and Indefinite integrals, method of integration by substitution, by parts and partial fractions, Integration of rational and irrational functions.

### **PHYSICS**

**Heat:** Heat as a form of energy, Mechanical equivalent of heat (Joule's experiment), Specific heat of a gas, Measurement of temperature, Platinum resistance and thermoelectric thermometers, Temperature scales, kinetic interpretation of temperature. Thermal expansion. Modes of heat transfer, Searle's method and Lee's method for thermal conductivity, Black body radiations, Stefan's law. Wien's law.

**Acoustics:** Wave motion, velocity of sound, Newton's formula and Laplace's correction, Beats, Doppler Effect, Intensity of sound waves, Reverberation, Acoustics of buildings, Production and detection of ultrasonic waves.

**Optics:** Refraction through a compound plate, total internal reflection, Optical fiber, image formation by spherical mirrors/lenses, Lens maker's formula, Chromatic aberration and its removal, Optical instruments- simple and compound microscopes, Astronomical telescope, Magnifying power & resolving power, Huygens principle & its applications, Young's double slit experiment, Diffraction through a single slit, Polarisation of light.

**Electricity and Magnetism:** Electric field and electric potential, Electric dipole and its field, Gauss's law and applications, Energy stored in a capacitor, Dielectrics, Current Electricity, Kirchoffs laws and applications, Slide wire bridge, Potentiometer, Ammeter, Voltmeter, Thermal and chemical effects of current.

**Electromagnetism:** Magnetic effects of current, Biot-Savart law and applications, Lorentz force, moving coil galvanometers, Laws of electromagnetic induction, Mutual and self-inductance, AC generator, Alternating currents, LR, CR, LCR, circuits.

**Modern Physics:** Determination of  $e/m$  and  $e$  of electron, Bohr's model and hydrogen spectra, Spectral series, Photoelectric effect, Matter waves.

## CHEMISTRY

**Structure and bonding:** Fundamental particles, Heisenberg's uncertainty principle, Quantum numbers, Pauli's exclusion principle, Aufbau rule, Hund's rule, ionic and Covalent bond, orbital concept of covalency, Hybridisation ( $sp$ ,  $sp^2$  and  $sp^3$ ), Chemical Equilibria.

**Electrochemistry and Redox Chemistry:** Balancing Chemical equations, Oxidation and Reduction reactions, electronic Concept, balancing redox reactions by oxidation number method. Faraday's laws of Electrolysis and its application in Electroplating, Electrometallurgy and Electrorefining, Degree of ionisation, Equilibria in aqueous solutions, solubility product and common ion effect, Modern concepts of acid & base, their strength and ionization constant, pH value, acid base titrations, choice of indicators and Buffer solutions.

**Colloids and Water:** Particle size and colloidal state, Preparation of colloids by dispersion and condensation, Stability and properties of colloids, Tyndell effect, Brownian movement, coagulation. Hard and soft water, degree of hardness and its determination, Disadvantage of hard water in industrial use and boilers.

**Organic Chemistry:** Nomenclature of organic compounds, IUPAC system. Saturated and unsaturated Hydrocarbons, Ethane, Ethylene and Acetylene. Substitution and addition reactions (preliminary ideas). Isomerisation (Chain position, functional, cis-trans and optical), Aldehydes and Ketones, preparation, properties and qualitative tests. Polymerisation, addition and condensation polymerisation, degree of polymerisation, Linear and cross linked polymers.

## ENGLISH

Idioms and phrases and their usage, Correction of sentences, sentence structure, sequence of tenses, Parts of speech, Words often confused in the form of pair of words, Common synonyms and antonyms, Active and Passive voice, Direct and indirect speech, Punctuation.

## PAPER-II PROFESSIONAL

### A. For candidates seeking admission to the disciplines of MECHANICAL ENGINEERING/ MECHANICAL ENGINEERING (PRODUCTION)/MECHATRONICS

**Manufacturing Process:** Dry sand and green sand casting; Casting defects: Die casting, Continuous casting and Centrifugal casting, Welding Process: Gas welding, Arc welding, Resistance welding; Thermit welding: Soldering and Brazing: Welding defects and precautions, Elements of metal cutting; Cutting tools tool geometry, cutting fluids; Lathe

and Milling operations: Grinding process, grinding wheel: Introduction to Broaching and gear generation processes; Electric discharge machinery. Water Jet machining and ultrasonic machining. Forming processes: Hot and Cold working: Rolling: Punching, blanking, shearing, spinning.

**Thermal Engineering:** Basic concept of Thermodynamics : Energy, Thermo-dynamics systems, types (open and closed) Heat and work, specific heat, Enthalpy, laws of thermodynamics: Zeroth, First and Second Laws Reversible and irreversible process, Entropy.

Description of various types of Boilers, boiler mountings and accessories. Basic concepts of thermal conduction, convection and radiation. Basic equations of different cases of Conduction. Convection (natural and forced) and radiation. Concept of Black, white and opaque bodies, Stefan Boltzmanns laws.

**Mechanics of Solids:** Concepts of bending moment and shear force. Bending moment and shear force diagrams for cantilevers, simply supported beams, overhanging beams subjected to concentrated and U.D. Ls. Concepts of torsion. Derivation of torsion equation for circular shafts. Close coiled helical spring subjected to axial load and twisting moment, stiffness of a spring. Its angle of twist, strain energy and proof resilience.

**Metrology:** Necessity and importance of Metrology in Engineering field, standards of measurements, line and wave length: Limits, fits and tolerances. Concept of interchangeability. Angle and Taper Measurements: Slip gages and dial indicator in taper measurement. Screw Thread Measurements: Measurements of Major diameter. Minor diameter, effective diameter, pitch. Angle and Form of threads for external and internal threads. Comparator: Types of Comparators (Mechanical, optical, electrical, electronic and pneumatic). Limit gauges: Go and No-go gauges. Alignment tests on lathe. Drilling machine. Milling machine and grinding machine.

**Materials and Metallurgy:** Introduction to Engineering materials, ferrous and nonferrous materials: Pig iron grey and white cast iron, alloying elements in steel and their effect. High speed steel, heat resistant steel and spring steel. Aluminum and its alloys. Bearing metals. Plastic materials, refractory materials, tempering, hardening and surface hardening processes, selection of materials for different components.

**Industrial Engineering and Management:** Work study, uses of work study: Objectives and basic procedure of Method study and work measurements. Types of inspection, inspection at various stages. Quality control: its advantages: Statistical quality control. Control charts and sampling plans. Types of production: Materials requirements planning, Plant location and layout, types of layouts and their comparison. Importance and advantages of standardization. Cost reduction through standardization. Management of men, materials and machines. Types of industrial organizations: Wages and incentives, trade unions: Role of technician in industry.

**Refrigeration and Air Conditioning:** Basic concepts and principles of refrigeration: Refrigeration methods. Air refrigeration cycle, vapour compression cycle, simple vapour absorption cycle, their applications and limitations. Refrigerants: Important properties of refrigerants, properties and applications of commonly used refrigerants such as R11, R12, R22, NH<sub>3</sub> etc. Air conditioning, its concepts. Human comfort, application of air conditioning, Description of room air conditioning, packages air conditioner, central air conditioning system.

**Theory of Machines:** Simple mechanisms: Flywheels, Co-efficient of friction, Motion of a body along horizontal and inclined planes. Friction in screw jack, friction between nut and screw square and V-threads. Concept of power transmission, various power

transmission systems with their merits and demerits. Flat and V-belts drives, ratio of tensions. Horse power transmitted, centrifugal tension, condition for maximum power transmission, and function of governors. Definitions of sensitivity, stability, synchronism and hunting of governors, description and simple problems on watt, porter and Hartnell governor.

**B. For candidates seeking admission to the disciplines of ELECTRONICS & COMMUNICATION ENGINEERING, ELECTRONICS & COMPUTER ENGINEERING and ELECTRONICS (INSTRUMENTATION & CONTROL) ENGINEERING**

**Network Analysis:** Circuit laws and their applications in solving problems, Network theorems, all types of network, one port, two port, symmetrical, unsymmetrical balanced, T. Ladder, lattice, bridge, their characteristic impedance. Attenuators, filters. Concept of different types of filters, Impedance matching of filters. Transmission lines, concept and applications, characteristic impedance, different methods of loading, concepts of reflection and standing waves.

**Analog Electronics:** PN junction diode, V-I characteristics, Diode as half wave, full wave and bridge rectifier, Zener diodes, Concepts of bipolar transistors and common base common emitter, common collector configuration and parameters. Different types of amplifiers, working principles and expression of voltage gain, current gain, input impedance, output impedance, etc. Working principles of Multi-vibrators, time base, operational amplifier, timer and regulated power supply.

**Digital Electronics** Binary and hexadecimal number system, Binary addition, subtraction, multiplication and division, Logic Gates, De Morgan's Theorems, K-Map, TTL and MOS families, BCD, excess-3 and Gray code, Arithmetic circuits, Decoders, Multiplexers and De-Multiplexers, flip flops, Counters, Types of RAM/ROM, A/D and D/A conversion.

**Computer Architecture and Microprocessors:** Design of basic computer, Introduction to RISC, CISC architecture, Control Unit – Hard wired and Micro programmed, Pipeline processing, Memory Hierarchy, associative memory, cache memory, virtual memory, I/O organization. CPU, Microprocessor, structure of 8085. Instruction set, addressing modes, Instruction Cycle, Register Organization, Simple programming in assembly language. Input/output operations, concept of interrupts structure, Microprocessor applications.

**Programming Language C:** Constants, variables and data types, Operators and Expressions, Control Structures, Functions, Arrays, Pointers, Strings, Structure and Unions, File Handling.

**Operating System (OS):** System Software: Compiler, Assembler, Loader, Definition, types and importance of Operating Systems, Memory organization, Process Management Functions, Job Scheduler, Process Scheduler, Process synchronization, Memory Management Function, Segmentation, Swapping, Simple Paging System, Virtual Memory, I/O Management Functions, Dedicated Devices.

**Communication Theory and Systems:** Communication systems types, types of modulation, amplitude modulation, frequency modulation, AM modulators. Demodulation of AM waves, FM waves, transmitters and radio receivers. Antenna and wave propagation. Types and areas of applications. Conducting materials, low and high resistivity materials, super conductivity. Development of modern insulating materials. Magnetic materials, permeability, Hysteresis loop, soft and hard magnetic materials. Components, Capacitor, polyster, Metallised, polyster gap ceramic, paper and electrolytic types. Resistors of different types. Transformers, Inductors and RF Coils, Printed circuit boards.



**C. For candidates seeking admission to the disciplines of COMPUTER ENGINEERING and COMPUTER SCIENCE & ENGINEERING (DERABASSI CAMPUS)**

**Analog & Digital Electronics:** PN junction diode, V-I characteristics, Diode as half wave, full wave and bridge rectifier, Zener diodes, CB, CE, CC configuration of the transistor, Binary and hexadecimal number system, Binary addition, subtraction, multiplication and division, Logic Gates, DE Morgan's Theorems, K-Map, TTL and MOS families, BCD, excess-3 and Gray code, Arithmetic circuits, Decoders, Multiplexers and De-Multiplexers, flip flops, Counters, Types of RAM/ROM, A/D and D/A conversion.

**Programming Language C:** Constants, variables and data types, Operators and Expressions, Control Structures, Functions, Arrays, Pointers, Strings, Structure and Unions, File Handling.

**System Analysis and Design:** Systems Development Life Cycle, Feasibility Study, cost and benefit analysis, Requirement Specifications and Analysis.

**Introduction to Databases:** Architecture and structure of Database Management System, data independence, ER Diagrams, Introduction to network, hierarchical and relational model, Domain, Attributes, Tuples and Relations, Entity and referential integrity, keys, Normalization, First, Second and Third normal forms, Boyce/Codd normal form, Structured Query Language: DDL and DML statements.

**Data Structure:** Basics, Arrays, Operations on arrays with Algorithms (searching, traversing, inserting, deleting), Traversing a linked list, searching linked list, Insertion and deletion into linked list, Application of linked lists, doubly linked lists, Stacks, Queues, Binary Trees, Search algorithm (Linear and Binary), Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort) and their comparisons.

**Computer Architecture:** Instruction Code, Instruction Cycle, Instruction types, Design of basic computer, Register Organization, Addressing modes, Introduction to RISC, CISC architecture, Control Unit – Hard wired and Micro programmed, Pipeline processing, Memory Hierarchy, associative memory, cache memory, virtual memory, I/O organization.

**Data Communication and Computer Networks:** LAN, MAN and WAN, OSI Model, Topologies, Basic access protocols: CSMA/CD, Token Passing, Ethernet, Error Detection, Network connectivity Devices, NICs, Hubs, Repeaters, Multiplexers, Modems, Routers and Protocols, Firewall, ATM, Different classes of IP addressing, Protocol Suites.

**Object Oriented Programming Using C++:** Procedure oriented programming Vs. Object oriented programming (OOP), Classes, Objects, reusability, encapsulation, dynamic binding, message passing, Constructor and Destructor, Member Functions, Overloading Member Functions, Inheritance, Protected, private and public data, types of inheritance, single inheritance, hierarchical inheritance, multiple inheritance, Polymorphism and Virtual Functions.

**Operating System (OS):** System Software: Compiler, Assembler, Loader, Definition, types and importance of Operating Systems, Memory organization, Process Management Functions, Job Scheduler, Process Scheduler, Process synchronization, Memory Management Function, Segmentation, Swapping, Simple Paging System, Virtual Memory, I/O Management Functions, Dedicated Devices.

#### **D. For candidates seeking admission to the discipline of ELECTRICAL ENGINEERING**

**Introduction:** Comparison of copper and aluminum as electrical conducting material. Development of modern insulating materials. Development of dynamo grade and transformer grade silicon sheet steel materials. Circuit laws and their applications in solving problems. Concept of permeability, reluctance, mmf, coreless. Concept of phase difference, phase representation of alternating quantities.

**Poly Phase System:** Production of rotating magnetic field in electrical machines. Characteristics of D.C. machines. Shunt series and compound types, speed control of D.C. motors. Transformer-single phase, three phase, phasor diagrams, equivalent circuits, testing, regulation, losses, efficiency, parallel operation, maintenance.

**Three Phase Induction Motor:** Slip, torque & their various relations. Torque-slip characteristics, equivalent circuit, starting, testing, speed control, maintenance.

**Single Phase Induction Motor:** Torque/Speed characteristics, methods of producing starting torque, capacitor, shaded pole and reluctance motors.

**AC Series Motor, Universal Motor:** Synchronous machines: Speed/frequency relation, EMF equation, winding coefficients, synchronous impedance concept, phasor diagram, Regulation. Parallel operation, V curves, starting.

**Measuring Instruments:** Indicating, integrating and recording instruments: deflecting, controlling and damping torques; moving coil and moving iron instruments, sources of errors extension range Watt-meters, Dynamometer type, maximum demand indicators, Energy-meters-single phase and three phase, Megger, Earth tester, Multi-meter, power factor meter.

**Electronic Instruments:** VTVM, CRO, Electronic multi-meter, analog multi-meter, digital meters. Measurement of inductance and capacitance and capacitance, power measurements in 3 ph. Circuits.

**Transmission System:** Selection of voltage, comparison of A.C. and D.C. systems, comparison of 3 ph. & 1ph. Systems. Electrical features of transmission line: Calculation of resistance, inductance and capacitance in a.c. transmission lines. Problems on efficiency and regulation, corona. Distribution system: Layout of H.T. and L.T. distribution system. Comparison of overhead and underground distribution system. Estimation, Generation. Conventional and Non-conventional sources of energy. Different types of power stations. Comparison, Load estimation – concept, types of power stations, comparison, Load estimation, concept of regional and national grid. Switch gear system: - Circuit breakers, Types, ratings, Comparison, Protection: - Fuses, relays, types & characteristics, comparison. Protection schemes of generators, transformers, bus bars, feeders.

#### **E. For candidates seeking admission to the discipline of CIVIL ENGINEERING**

**Structural Engineering:** Simple stresses and strains, Elasticity, Hooke's Law, Moduli of Elasticity and Rigidity. Stresses and strains of homogeneous materials and composite sections. Types of beams and supports and loads, concept of bending moment and shear force. Bending moment and shear force diagrams for simple cases. Deflection in beams. Moment area theorem, Bending and shear stresses in circular, rectangular, T and L sections, Comparison of strength of the above sections, Design of singly and doubly Reinforced beams, Design of Columns-Types of Columns. Short and long column, load

carrying capacity, effective length of column, lateral and helical ties. I.S. Specifications for reinforcement detailing. Design of slabs types of slabs, one-way slab, two-way slab, I.S. specifications for Reinforcement detailing method of design as per I.S. code. Design of foundations-isolated footing rectangular footing, square footings, circular footings. Design of tension members in structural steel, gross area, net area, tension splice, design of tension member. Design of compression members, column splice, load carrying capacities. Design of beams in structural steel.

**Surveying:** Linear measurements with tape, corrections, chain surveying, offsets, perpendicular offset, oblique offset, measurement of offsets, limiting length of offset, Field book, Instructions for booking field notes, Instruments for setting out right angles, Compass surveying, Prismatic compass. Surveyor's compass, comparison between prismatic and surveyor's compass, meridians & bearings, calculation of included angles from bearings, calculation of bearing from including angles, local attraction, magnetic declination levelling, types of levels. Principles of levelling, Classification of levelling. Rise & Fall method, Height of Instrument method, various corrections in levelling. Theodolite surveying, measurement of angle by theodolite.

**Transportation Engineering:** Introduction of Transportation Engineering, Traffic Engineering, Road materials, Geometric design, Design of flexible and rigid pavements, Road maintenance, Railway Engg. Rails, Sleepers, ballast, points and crossing, Track laying and track maintenance, typical sections of tunnel, method of construction of tunnels in soft rock.

**Soil and Construction Engineering:** Foundations-types, construction details, walls, load bearing and non-load bearing walls, brick masonry, bonds in masonry, stone masonry, type of a stone masonry, partition walls, doors. Floors-types of floors, construction procedure, maintenance of buildings, properties of bricks and stones, cement, aggregates, workability of concrete, Batching, mixing, compaction, placing, curing of concrete. Properties of hardened concrete. Introduction to soil mechanics, Soil classification. Index properties of soil, Shear strength concept.

**Fluid Mechanics, Irrigation and Water Supply Engineering:** Specific weight, density, specific gravity, viscosity, vapour pressure, cohesion, adhesion, surface tension, capilarity and compressibility. Pressure, intensity of pressure, pressure head, and pascal's Law and its applications. Total pressure, resultant pressure and center of pressure on rectangular, triangular, trapezoidal, circular and curved surfaces. Atmospheric, gauge and absolute pressure, simple differential manometers. Steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow. Discharge and continuity equation, Bernoulli's theorem, statement and description, venturimeter, orifices, time of emptying tanks of uniform cross section by a single orifice. Laminar and turbulent flow explained through. Reynolds experiments. Reynolds number and critical velocity and velocity distribution, losses in pipes, hydraulic gradient line, and total energy line flow from one reservoir to another through a long pipe of uniform and composite section. Water hammer, uniform and non-uniform flow, discharge through channels using chezy's formula and Manning's formula. Most economical sections, rectangular, trapezoidal and circular. Measurement of discharge by notches and weirs, measurement of velocity by Pitot tube and current meter. Introduction to irrigation Engg. Flow irrigation, head works and river training works, water logging, water supply, sources of water, Water treatment. Types of pipes, laying of pipes. Quality of sewage, laying of sewers, Building drainage and rural sanitation.

## F. For candidates seeking admission to the discipline of CHEMICAL ENGINEERING

**Basic Chemical Engineering:** Units & conversions, Dimensional analysis, Gas Law, Material Balance consisting key components, simultaneous Equation by pass and recycle. Energy Balance. The first law type of heat effects, heat capacities, thermochemistry.

**Fluid Flow and Mechanical Operation:** Flow of incompressible Fluids, Laminar and Turbulent Flow in Pipes, Frictional Losses in pipes.

**Flow Measurement:** Pitot tube orifice meter, venturimeter, Rotameter, Weir & Notches, (their construction and derivation with formula).

**Transportation of Fluids:** Classification of Pumps, construction and operation of reciprocating, rotary, centrifugal and gear Pumps. Different type of valves, fans, blowers and compressors, Description of various size reduction equipments and laws for power requirement. Separations, Screening, filtration thickeners, classifiers, Centrifuges and cyclone separator.

### **Heat Transfer & Mass Transfer**

**Heat Transfer:** Conduction, Fourier's law, Heat Flow through composite walls, Cylinders and spheres, insulations.

**Convection:** Natural & Forced convection, LMTD, Significance of Reynold number, Prandit's number and Grashof Number.

**Radiation:** Kirchoff's Law, Emissive power, wein's displacement law, Stefan Boltzman law, Emissivity, Absorptivity, Black Body and Green Body radiations. Boiling, Condensation and evaporation, Heat Exchanger: Double Pipe Shell & Tube.

**Mass Transfer:** Principles and Description of various unit operations involving mass transfer such as Distillation, Absorption, Extraction, crystallization & Drying.

**Unit Processes & Process Technology:** Principles of some unit Processes such as Nitration. Sulphonation, Halozenation, Oxidation, Reduction, and Products based on them. Basic Processes for the manufacture of products such as sugar, Fertilizer. Dyestuffs and paints.

**Process Instrumentation & Control:** Principle and Application of following Instruments device. Pressure and Vacuum Gauge. Thermometer and Pyrometer, Liquid Level meter: Visual indicators. Float actuated level meter.

**Analyzers:** PH meter, oxygen analyzer colorimetric analyzers. Infra-red & near Infix analyzer.

**Transmission:** Pneumatic and Inductance transmission. Concept and advantage of automatic Process Control.

**Controllers:** Pneumatic, Electronics, hydraulic, FD, TI, ID Controllers.

**Engineering Material:** Types of Different materials, such as metals, alloys and polymer their structure. Composition and application of these materials for various situations in Chemical Industry.



## PAPER – II (PROFESSIONAL)

### COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING (DERABASSI CAMPUS)

1. The structure of the Colpitts oscillator is related to the
  - (A) Hartley oscillator
  - (B) Wein Bridge oscillator
  - (C) Phase shift oscillator
  - (D) Square wave oscillator
2. Microprogramming refers to
  - (A) Developing software for a small computer, like a palmtop.
  - (B) Programming in any situations where the memory available is very low
  - (C) Control programs for controlling gates within a CPU.
  - (D) Writing programs in assembly language.

### CIVIL ENGINEERING

1. A combined footing is generally used when
  - (A) Number of columns is more than two and they are spaced far apart.
  - (B) Number of columns is two and they are spaced far close to each other.
  - (C) Number of columns is two and they are spaced far apart.
  - (D) There is only one column.
2. In slow sand filters, the rate of filtration of water is in the range of
  - (A) 175-250 lits/sqm/hr
  - (B) 500-1000 lits/sqm/hr
  - (C) 1000-5000 lits/sqm/kr
  - (D) 6000-10,000 lits/sqm/hr

### MECHANICAL ENGINEERING/MECHANICAL ENGINEERING (PRODUCTION) /MECHATRONICS

1. When fluid flows in a pipe, the Nusselt number can be calculated from the relation
  - (A)  $V.D.\rho/\mu$
  - (B)  $\mu.C_p/K$
  - (C)  $h.D/K$
  - (D)  $K.D/C_p$
2. Angle of torsion refers to the
  - (A) Maximum angle by which the shaft bends during power transmission.
  - (B) Angle through which one end of a shaft will twist relative to the other end.
  - (C) Angular velocity of the shaft in radians.
  - (D) Angular moment at the cross section.

### CHEMICAL ENGINEERING

1. Stainless steel 316 contains
  - (A) 18% chromium and 11% nickel
  - (B) 16% chromium and 13% nickel
  - (C) 11% chromium and 18% nickel
  - (D) No chromium and 8% nickel.
2. The viscosity of a liquid
  - (A) Is directly proportional to temperature.
  - (B) Is inversely proportional to temperature.
  - (C) Is directly proportional to the square root of temperature.
  - (D) Is inversely proportional to the square root of temperature.

**ELECTRONICS & COMMUNICATION ENGINEERING/ELECTRONICS (INSTRUMENTATION & CONTROL) ENGINEERING/ELECTRONICS & COMPUTER ENGINEERING**

1. A direct coupled amplifier has a gain of 1000 and 3 dB frequency of 1000KHz. What is its unity gain frequency?  
(A) 100 KHz      (B) 1000 KHz      (C)  $10^8$  Hz      (D) 10 KHz

**ELECTRICAL ENGINEERING**

1. For parallel operation of two alternators, which of the following factor(s) should be identical for both?  
(A) Voltage only      (B) Frequency  
(C) Phase sequence      (D) All of the above.
2. Mark the correct answer below as the load on an induction motor is increased upto full load:
- |     | PF        | Slip      | Efficiency |
|-----|-----------|-----------|------------|
| (A) | increases | increases | increases  |
| (B) | decreases | increases | increases  |
| (C) | decreases | decreases | decreases  |
| (D) | increases | decreases | decreases  |