



# Information Brochure



अखिल भारतीय सलाईट  
प्रवेश परीक्षा – 2018  
**ALL INDIA SLIET  
ENTRANCE TEST - 2018**

# SET 2018

*For Admission to:*  
**M.TECH.PROGRAMMES**  
**M.Sc.PROGRAMMES**  
**M.B.A.PROGRAMMES**

संत लौंगोवाल अभियंत्रिकी एवं प्रौद्योगिकी संस्थान  
**SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY**

[www.sliet.ac.in](http://www.sliet.ac.in)

(Deemed - to - be - University - Estd. By: MHRD, Govt. of India)  
**LONGOWAL – 148 106, Distt. Sangrur (Punjab) INDIA**





**NOTE: This brochure contains information related to dates, eligibility and Syllabi for admission to PG programmes. For more details please read information brochure SET-2018 available on [www.sliet.ac.in](http://www.sliet.ac.in) & [www.sliet.net.in](http://www.sliet.net.in)**

## IMPORTANT DATES

**Last date** for receipt of complete Application Form(Online)  
(SET-IV(MBA),VI(M.Sc.) & VII(M.Tech.):  
**July 13, 2018**

**DATE OF EXAMINATION**  
July 22,2018(Sunday) 10.00-12.00 Hours

**DECLARATION OF RESULT**  
SET-IV/SET-VI/SET-VII : **July 27 , 2018**

**OFFLINE COUNSELLING AND DOCUMENT VERIFICATION**  
**July 31, 2018**

**For any Information Contact:**

**Dr. A.S.Dhaliwal, Chairman, SET-2018**

**Dr. Mandeep Singh, Vice Chairman, SET-2018**

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Email: [chairmanset2018@gmail.com](mailto:chairmanset2018@gmail.com)

Help Desk Numbers: (9.00A.M. TO 5.00P.M.on working days): **01672-253178, 253179, 280072,253136**  
(For ONLINE Application)

Institute Website/ ONLINE Application: [www.sliet.ac.in](http://www.sliet.ac.in), [www.sliet.net.in](http://www.sliet.net.in)

### No.of seats filled through SET in 2016 & 2017

M.Sc.	2016	2017	M.Tech.Programme	2016	2017
M.Sc.Chemistry	8	11	Electronics and Communication Engineering	6	9
M.Sc.Physics	9	14	Food Engineering & Technology	6	3
M.Sc.Mathematics	7	8	Instrumentation & Control Engineering	0	3
			Manufacturing System Engineering	12	5
			Welding & Fabrication	2	0
			Computer Science & Engineering	10	7
			Chemical Engineering	0	0



## IMPORTANT INFORMATION

The Institute offers modular pattern of education in emerging areas of Engineering, Technology, Sciences, Humanities and Management. Following PG Programmes are offered by the institute:

(a) M.Tech (b) M.B.A. (c) M.Sc.

### 1.1 SLIET ENTRANCE TEST (SET) -2018 Schedule

The SLIET Entrance Test to PG programmes will be conducted only in case the seats remain vacant after admission through the central agencies (CCMT/CCMN) for the respective programmes.

### 1.2 Pattern of Examination

There will be only one paper of two hours duration and of 100 marks.

The syllabi and distribution of marks for SET-IV/VI/VII is given in subsequent chapters of this information Brochure.

**Note :** There will be objective type questions with four options having single correct answer. For each incorrect response, one fourth (1/4) of the total marks allotted to the question would be deducted. However, no deduction of marks will be made if no response is indicated for an item in the OMR Answer Sheet. The candidates appearing for Examination are advised not to attempt such item in the answer sheet if they are not sure of the correct response. *More than one answer indicated against a question will be deemed as incorrect response and will be negatively marked.* All objective type questions are required to be answered on OMR Answer Sheet to be provided at the time of Examination. Answers are to be marked using ball point pen (black / blue) only.

### 1.3. Application Fee

Process of registration shall be **ONLINE** only.

#### Online Application Fee(Non-Refundable)

-	General & Other Categories (Boys)	:	₹1200/*-
-	General & Other Categories (Girls)	:	₹ 800/*-
-	SC / ST (Boys and Girls)	:	₹ 600/*-

*\*Bank Charges Extra*

#### Mode of payment

Netbanking, Debit and Credit Card

### 1.4 Centres of SET-2018 :

The examination centre will be at SLIET, Longowal only

### 1.5. Admit Cards

The admit card can be downloaded from [www.sliet.net.in](http://www.sliet.net.in) after the closing date and on or before the date of examination.

### 1.6. Merit List

- All admissions will be made on merit determined for admission. In case of tie among two or more candidates, candidate elder in age as per the relevant entry in the matriculation certificate shall be placed higher in merit. Again, if there is tie in age (date of birth), candidate having higher marks in qualifying examination shall be placed higher in merit. Wrong filling of Date of Birth in Application Form will lead to disqualification of candidature.

- A candidate has to obtain a minimum marks in Entrance Test for inclusion in the merit list. Candidates, who fail to appear in Entrance test (SET) 2018, will not be included in the merit list.

#### • FOR ADMISSION TO M.TECH. PROGRAMMES

- (i) 1<sup>ST</sup> Preference will be given to GATE qualified candidates and a separate merit list will be prepared on the basis of valid GATE score.
- (ii) If seats remain vacant after the above process at (i), the SET-VII qualified candidates will be considered for admission as per merit.



• **FOR ADMISSION TO MBA PROGRAMMES**

- Merit list will be prepared on the basis of marks obtained in CAT in the corresponding year or CMAT-2018 or GATE qualified or SET-IV followed by group discussions and interview.
- First preference will be given to the candidates having valid CAT score / percentile (However, these candidates have to appear in Group Discussion and Interview). Then CMAT-18, GATE valid score will be considered in respective order.
- If seats still remain vacant after above process, the admission shall be made as per merit of SET-IV followed by GD/Interview
- For preparing the merit list, the marks obtained in the CAT in the corresponding year or CMAT-2018 or GATE or SET-IV shall be converted out of 400. Marks for GD and interview will be awarded out of 25 each.
- Final merit list will be made on basis of marks scored in all three components out of 450.
- Institute shall decide the minimum cut off marks wherever qualifying marks in the test is not mentioned in result card.

• **FOR ADMISSION TO M.SC. PROGRAMMES**

Admission to M.Sc. programmes the candidates will also be considered based on JAM/PU-CET (PG)-2018 Panjab University, Chandigarh, CUCET or SET-VI examination. There shall be a minimum cut off marks for admission to M.Sc. Programmes. Candidate will be admitted in the same discipline in which he/she has applied and appeared and not in any other discipline.

Preference will be given to JAM qualified then PUCET/CUCET and then SET-VI in their respective order.

**1.7. Counselling and Document Verification**

There will be **OFFLINE COUNSELLING** for M.Sc./M.Tech./MBA on 31.07.2018. No separate letters will be sent.

**1.8 FEE STRUCTURE FOR ACADEMIC YEAR 2018-19**

		PG (M. Tech., MBA)	PG (M.Sc.)
<b>A. REFUNDABLE CAUTION MONEY: (WITHOUT ANY INTEREST) To be paid at the time of admission</b>	Caution Money Institute/Hostel	5000	5000
	Caution Money Hostel (Mess)*	10000	10000
	<b>Total (A)</b>	<b>15000</b>	<b>15000</b>
<b>B. NON REFUNDABLE FEES (To be paid at the time of admission)</b>	Admission Related Fee	1700	1700
	Students Activity Related Fee	5600	5600
	Library Related Fee	1700	1700
	<b>Total (B)</b>	<b>9000</b>	<b>9000</b>
<b>C. OTHER FEE PER SEMESTER (Non-Refundable)</b>	Development Fee	2200	2200
	Tuition Fee	13500	8800
	Other Charges	1600	2800
	Hostel Fee	2700	2700
	<b>Total (C)</b>	<b>20000</b>	<b>16500</b>
<b>Grand Total (A+B+C) (in ₹)</b>		<b>44000</b>	<b>40500</b>

\* Applicable to those students only who opt to reside in hostels.

For Industry Institute Sponsored Candidates in M.Tech./ MBA/ M.Sc. the tuition fee will be ₹ 27500/- per semester.

**The fee structure may be revised from time to time with the approval of competent authority.**

**NOTE : Amount for Group Insurance Scheme (GIS) is to be paid annually by each student as decided by the Institute applicable on the date of admission.**





## M.TECH. PROGRAMME

The objective of M. Tech. programme is a continuation of technical expertise acquired in qualifying Degree Programmes. This will offer an opportunity to the candidate to acquire skill to work on R&D projects and to promote industry institute interaction.

**a) Eligibility :**

- 1) B.Tech. / B.E. / B.Sc. (Engg.) Degree of recognized University/Institute in the appropriate branch.

OR

has passed Section 'B' of the Institution of Engineers (India) in appropriate branch or Grade IETE and has three years of professional experience in reputed organization. The candidates must have secured at least 60% marks (55% in case of candidates belonging to reserved categories) in aggregate in qualifying degree.

- 2) For Industry-Institute sponsored category seats, appropriate branches for admission in various M.Tech. courses are as under :

- i) M. Tech. (Manufacturing Systems Engineering): Candidate should have B.E./ B.Tech. Degree in Mechanical Engineering/ Manufacturing Engineering / Production Engineering / Industrial Engineering or equivalent\*
- ii) M. Tech. (Welding and Fabrication): Candidate should have B.E./ B.Tech. Degree in Mechanical Engineering / Manufacturing Engineering /Welding Technology / Production Engineering / Industrial Engineering or equivalent\*
- iii) M. Tech. (Food Engineering & Technology): Candidate should have B.E./B.Tech. or equivalent in Food Technology / Food Engineering / Agricultural & Food Engineering/Food Processing & Preservation/Food Processing Engineering/Food Processing Technology or equivalent\*.
- iv) M. Tech. (Instrumentation & Control Engineering): Candidate should have B.E./ B.Tech. Degree in Electrical Engineering or Instrumentation & Control or Electrical and Electronics Engineering or Instrumentation Engineering or Electronics Engineering or Computer Engineering or Electronics & Instrumentation Engineering or Electronics & Communication Engineering or equivalent\*
- v) M. Tech. (Chemical Engineering): Candidate should have B.E. / B.Tech. or equivalent in Chemical Engineering/ Chemical Technology/Chemical Engineering (Plastic and Polymer)/Chemical and Polymer Engineering/ Chemical & Alcohol Technology/ Chemical and Bio-Engineering or equivalent\*
- vi) M. Tech. (Electronics & Communication Engineering): Candidate should have B.E./ B.Tech. Degree in Electronics & Communication Engineering or Electrical and Electronics Engineering or Electronics & Instrumentation Engineering or Computer Engineering or equivalent\*
- vii) M. Tech. (Computer Science & Engineering): Candidate should have B.E./ B.Tech. or equivalent Degree in Computer Engineering/ Computer Science & Engineering/ Computer Technology/Computer Science/Information Technology/Computer Science and Information Technology/ Computer Science and System Engineering/ Computer Engineering & Applications.

*NOTE: In addition to above appropriate branches for courses at SLIET, Longowal as mentioned at the CCMT-2018 website are also valid. Eligibility conditions laid down in CCMT-2018 shall also be applicable.*

**(\*The decision of Admission Committee regarding equivalency shall be final and binding upon the candidate).**

- b) Duration:** The duration of M.Tech. programme is 2 years.

- c) Reservation of seats will be as per Govt. of India rules (Refer section 2.9) but the same will not apply to Industry-Institute sponsored seats mentioned below:**

- (e) Fee Structure for M.Tech. Programmes** (Detailed fee structure is in Section 2.11) :

- **Note 1 :** The fee structure may be revised from time to time with the approval of competent authority.

- **Note 2 :** Admission on the basis of GATE does not guarantee the GATE Scholarship. However, Scholarship shall be offered as sanctioned by AICTE, New Delhi.

-**Note 3 :** The scholarship to the admitted students (with GATE) shall be disbursed by AICTE, New Delhi through DBT scheme as per policy of Govt. of India.

**Important Note:**

- *The candidates with valid GATE score are exempted from SET-VII*
  - *Number of Vacant seat will be uploaded separately.*
  - *In case the no vacant seat will be available in any stream then no test will be conducted*
  - *There shall be no reservation or quota etc. on territorial basis for admission to M. Tech./P.G. Programmes.*
- \* Minimum number of students to run above programmes shall be as per senate decision.*

**SYLLABUS OF SLIET ENTRANCE TEST (SET-VII)**  
**For admission to M.Tech. Programme-2018(Vacant Seats)**  
**Pattern of SET-VII**

SLIET Entrance Test (SET-VII) for admission to M.Tech. Programme will consist of one paper of two hours duration. This paper will have 100 objective type questions of 100 marks.

**Note:** *Answers of the objective type questions are to be filled in the OMR answer sheet given separately during the examination. There will be 25% negative marking for wrong answers.*

**Marks: 100 (100 Questions)**

**Time : 2 Hours**

Common for all M.Tech.

Engineering Mathematics

**Marks: 17 (17 Questions)**

**Linear Algebra:** Matrix Algebra, Systems of linear equations, Eigen values and eigen vectors.

**Calculus:** Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, Multiple integrals, Fourier series. Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

**Differential equations:** First order equation (linear only), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's and Legendre's equations, Initial and boundary value problems, Partial Differential Equations, linear and non-linear equations of first order only.

**Complex variables:** Analytic functions, Cauchy's integral theorem and integral formula, Taylor's and Laurent' series, Residue theorem, evaluation of real integrals.

**Probability and Statistics:** Mean, median, mode and standard deviation, Probability(simple problems) Random variables, Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Correlation and regression analysis.

**Numerical Methods:** Solutions of non-linear algebraic equations, single and multi-step methods for differential equations.

**Transform Theory:** Fourier transform, Laplace transform, Z-transform.

MENTAL APTITUDE

**Marks: 16 (16 Questions)**

- a) Language and Communication Skills
- b) Arithmetic and Quantitative Skills
- c) Critical Reasoning & General Intelligence
- d) General Awareness



## MANUFACTURING SYSTEMS ENGINEERING / MECHANICAL ENGINEERING (WELDING AND FABRICATION)

**Marks:67(67 Questions)**

**Engineering Mathematics:** Laplace transformation & Fourier series, partial differential equations, vector calculus, curve fitting, regression analysis & linear correlation.

**Engineering Mechanics:** Statics Laws of equilibrium, centroids & centre of gravity, friction, moment of inertia, virtual work. Dynamics: Kinematics of particle, Newton's second Law of motion, work & energy, impulse & momentum, force & acceleration.

**TOM & SOM:** Simple mechanisms, velocity & acceleration in mechanisms, cams, balancing & vibrations, stress and strains, Mohr's circle, complex stresses, bending & deflection of beams, curved beams, shear centre, unsymmetrical bending, Castigliano's Theorem, pressures vessel, rotating rings.

**Fluid Mechanics & Machines:** Introduction, static pressure, gauges, flow of liquids through orifices & pipes, working principles of hydraulic machines & pumps.

**Material Science:** Bonding in solids & crystals, structure of material, imperfection in solids, heat treatment, magnetic materials, dielectric and other materials.

**Thermal Science:** Basics I.C. Engines, steam nozzles, steam turbines, compressors & gas turbines, different modes of heat transfer.

**Operation Research:-** Linear programming, network models, queuing theory, PERT,CPM

**Metal Cutting & Forming:** Tool nomenclature, orthogonal & oblique cutting, chip formation and types of chips, force system in turning, milling, tool wear, tool life and machinability. Fundamentals of dynamometry, temperature measurement in machining, types & application of different cutting fluids, plasticity, theories of failure, rolling, forging, extrusion and drawing processes.

**Measurement & Quality Control:** Standards of measurements, measurement of displacement, speed, stress strain, force, torque, spur gears etc., introduction of quality control, control charts, OC curve, acceptance sampling, TQM, reliability.

**Work Study & Ergonomic:** Productivity, methods study, time study, work sampling, ergonomics.

**Manufacturing Processes:** Metal casting & fabrication; types of molding sand, solidification of metals, design of Risers, various molding & casting processes. Arc welding process, TIG,MIG,CO<sub>2</sub>,Plasma, resistance welding, welding defects, powder metallurgy.

**Non-Conventional Machining Processes:** EDM, ECM, CHM, USM, AJM, WJM, EBM, IBM, LBM and PAM.

**Industrial Automation:** Introduction, pneumatics, pneumatic actuators & valves, basic pneumatic circuits, fluidics & fluid logic, pneumatic sensors, programmable logic controllers, encoders.

**CAD/CAM:** Fundamentals of CAD,NC Machine tools, group technology, components of CIM, computer aided part programming, adaptive control system.

## FOOD ENGINEERING & TECHNOLOGY

**Marks:67(67 Questions)**

**Technology of Fruit and Vegetable Processing:** Extraction and preservation of fruit juices, jam, jelly and marmalades, Intermediate moisture products, Canning of fruits and vegetables, Drying and Dehydration of fruits & vegetables, Freezing, Chutney, Pickles and tomato products, Utilization of byproducts.

**Dairy Engineering:** Cleaning and sanitation in dairy industries, Homogenization, Pasteurization, Sterilization, Evaporation and Drying of milk, Utilization of byproducts.

**Food Chemistry:** Physico-chemical characteristics of food constituents, Changes in food constituents during processing and their determination methods, Enzymes and their applications in food processing.

**Heat and Mass Transfer in Food Processing:** Modes of heat transfer-Principles and practices in food engineering, Heat exchangers and their application in food processing, Mass transfer-Fick's law of diffusion of mass transfer, natural and forced convective mass transfer.

**Food Packaging and Storage Engineering:** Properties of packaging materials, Packaging equipment and machinery,





Food packaging systems, Packaging standards and Role of packing in environmental pollution, Storage requirements and structures, Handling equipments, Management Practices.

**Biotechnology:** Principles of biochemistry, Microbial products, Techniques of genetic engineering, Enzyme technology, Tissue culture technology, Environmental biotechnology.

**Animal Products Technology:** Meat processing and preservation, Sausage, Meat Plant sanitation and safety, Fish processing and preservation, Fish products, Utilization of by-products.

**Food Biochemistry:** Cell biochemistry, Metabolism of carbohydrates, lipids and proteins.

**Food Analysis and Quality Control:** Quality attributes and measurements, Consistency and viscosity, Modern techniques of food analysis, Measurements of various properties, sensory quality and analysis, Food laws and regulations.

**Technology of Cereals and Pulses:** Structure and composition, Wheat milling technology, Rice Milling, Milling of pulses, Cereal based extruded products, Utilization of by-products.

**Industrial Microbiology :** Techniques of strain development, Microbial growth, Food spoilage, Microbial products.

**Biochemical Engineering:** Media sterilization, Air Sterilization, Enzyme Kinetics, Bioreactor fermenter, Aeration and Agitation.

**Food Processing Plant Layout and Design:** Network analysis of processes, Evaluation of layouts, Plant Buildings, Cost analysis, Plant layout of different industries.

**Beverage Technology:** Non-alcoholic beverages, Alcoholic beverages, Instrumentation and process control in beverage industry.

**Food Engineering:** Material and energy balance, Flow of fluids, Thermal processing, Freezing, Fluidization, Refrigeration and air conditioning, Leaching & Extraction.

### INSTRUMENTATION AND CONTROL ENGINEERING

**Marks:67(67 Questions)**

**Electrical Technology and Networks:** Introduction to electrical systems, DC and AC circuits, basic electrical components, electromagnetism alternating quantities, AC power, single phase series and parallel circuits, resonance circuit, nodal and mesh analysis, network theorems, superposition. Thevenin, Norton, reciprocity, Millman's, Tellegen's theorems, star-delta transformation, steady state sinusoidal analysis using phasors, Fourier series, linear constant coefficient differential and difference equations; time domain analysis and frequency domain analysis of RLC series and parallel circuits, convolution, 2-port network parameters, driving point and transfer functions, state equation for networks, attenuators (lattice, T-type, P-type, L-type, ladder type, balanced), conventional filters, passive network synthesis (positive real functions, LC network, synthesis of dissipative network, two terminal R-L and R-C network).

**Electronics Principles:** Characteristics and equivalent circuits (large and small signal) of diodes (pn junction, zener, schottky, varactor), BJT, JFETs, thyristor, UJT, and MOSFET; clipping, clamping, rectifier; biasing and bias stability of transistor and FET amplifiers, single and multistage coupling, differential, operational, feedback and power. Analysis of amplifiers, frequency response of amplifiers. op-amp circuits, filters, sinusoidal oscillators, criterion of oscillation, function generators and circuits, power supplies, display units.

**Digital electronics and microprocessors :** Number systems and arithmetic (binary, Gray , BCD , Excess-3). Boolean algebra, minimization of Boolean functions, logic gates, IC families, combinational and sequential circuits, sample and hold circuits, ADCs and DACs, semiconductor memories, ALU design, microprocessor (8085), architecture, programming, memory and I/O interfacing chips (8155, 8255, 8253, 8251, 8257, 8279, 8259), introduction to microprocessor 8086 and microcontroller 8051.

**Transducers and Instrumentation:** Measurement of voltage, current, power, energy and power factor for Bridges and potentiometers, PMMC moving iron, dynamometer and induction type instruments, instrument transformer, digital voltmeters and multi-meters, phase, time and frequency measurement, Q-meter, oscilloscope, potentiometric recorders, error analysis, transducers-elastic, resistive, inductive, capacitive, thermo-electric, piezo-electric, photo-electric, electro-mechanical, electro-chemical and ultrasonic measurement of displacement, velocity, acceleration, shock, vibration, force, torque, power, strain, stress, pressure, flow, temperature, humidity,



viscosity and density.

**Control Theory** :Basic control system components, block diagram description, signal flow graphs, reduction of block diagrams, input test signals, properties of systems, linearity, time-invariance, stability, open loop and closed loop (feedback) systems, properties of linear time-invariant (LTI) systems, transient and steady state analysis of LTI system and frequency response. LTI control system analysis, root loci, Routh Hurwitz criterion, polar plots, Bode and Nyquist plots, elements of lead and lag compensations, state space representation of systems, state equations, decomposition, direct, cascade and parallel, solution of state equations, Laplace method, Cayley-Hamilton method, diagonalization method and Sylvester method.

**Programming concepts:** Algorithms, programming in C and C++, data types, console/file input and output, arrays, structures, pointers, functions, command line arguments, passing of parameters from one function to other, concept of OOPs.

### Chemical Engineering

**Marks:67(67 Questions)**

#### **Section 1: Process Calculations and Thermodynamics**

Steady and unsteady state mass and energy balances including multiphase, multi-component, reacting and non-reacting systems. Use of tie components; recycle, bypass and purge calculations; Gibb's phase rule and degree of freedom analysis. First and Second laws of thermodynamics. Applications of first law to close and open systems. Second law and Entropy. Thermodynamic properties of pure substances: Equation of State and residual properties.

#### **Section 2: Fluid Mechanics and Mechanical Operations**

Fluid statics, Newtonian and non-Newtonian fluids, shell-balances including differential form of Bernoulli equation and energy balance, Macroscopic friction factors, dimensional analysis and similitude, flow through pipeline systems, flowmeters, pumps and compressors, elementary boundary layer theory, flow past immersed bodies including packed and fluidized beds. Particle size and shape, particle size distribution, size reduction and classification of solid particles; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, agitation and mixing; conveying of solids.

#### **Section 3: Heat Transfer**

Steady and unsteady heat conduction, convection and radiation, thermal boundary layer and heat transfer coefficients, boiling, condensation and evaporation; types of heat exchangers and evaporators and their process calculations. Design of double pipe, shell and tube heat exchangers, and single and multiple effect evaporators.

#### **Section 4: Mass Transfer**

Fick's laws, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies; stage-wise and continuous contacting and stage efficiencies; HTU & NTU concepts; design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, drying, humidification, dehumidification and adsorption.

#### **Section 5: Chemical Reaction Engineering**

Theories of reaction rates; kinetics of homogeneous reactions, interpretation of kinetic data, single and multiple reactions in ideal reactors.

#### **Section 6: Instrumentation and Process Control**

Measurement of process variables; sensors, transducers and their dynamics, process modeling and linearization, transfer functions and dynamic responses of various systems, systems with inverse response, process reaction curve, controller modes (P,PI, and PID); control valves; analysis of closed loop systems including stability, frequency response, controller tuning, cascade and feed forward control.

#### **Section7: Plant Design and Economics**

Principles of process economics and cost estimation including depreciation and total annualized cost, cost indices, rate of return, payback period, discounted cash flow, optimization in process design and sizing of chemical engineering equipments such as compressors, heat exchangers.

#### **Section 8: Chemical Technology**

Inorganic chemical industries (sulfuric acid, phosphoric acid, chlor-alkali industry), fertilizers (Ammonia, Urea, SSP and TSP); natural products industries (Pulp and Paper, Sugar, Oil, and Fats); petroleum refining and petrochemicals; polymerization industries (polyethylene, polypropylene, PVC and polyester synthetic fibers).

**ELECTRONICS & COMMUNICATION ENGINEERING****Marks:67(67 Questions)**

**Networks:** A.C. and D.C. fundamentals, nodal and mesh analysis. Network theorems: superposition, Thevenin and Norton's maximum power transfer, Wye-Delta transformation. Steady state sinusoidal analysis using phasors. Linear constant coefficient differential equations; time domain analysis of simple RLC circuits, Solution of network equations using Laplace transform: frequency domain analysis of RLC circuits. 2-port network parameters: driving point and transfer functions. State equations for networks.

**Electronic Devices:** Semiconductor physics, diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. p-n junction diode, Zener diode, tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-i-n and avalanche photo diode, Basics of LASERS. Device technology: integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography.

**Analog Circuits:** Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and analog CMOS. Simple diode circuits, clipping, clamping, rectifier. Biasing and bias stability of transistor and FET amplifiers. Amplifiers: single and multi-stage, differential and operational, feedback, and power. Frequency response of amplifiers. Simple op-amp circuits. Filters. Sinusoidal oscillators; criterion for oscillation; single-transistor and op-amp configurations. Function generators and wave-shaping circuits, 555 Timers. Power supplies.

**Digital Circuits:** Boolean algebra, minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift-registers. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor (8085): architecture, programming, memory and I/O interfacing.

**Signals and Systems:** Definitions and properties of Laplace transform, continuous-time and discrete-time Fourier series, continuous-time and discrete-time Fourier Transform, DFT and FET, z-transform. Sampling theorem. Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems.

**Control Systems:** Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems; transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators: elements of lead and lag compensation, elements of Proportional-Integral-Derivative (PID) control. State variable representation and solution of state equation of LTI control systems.

**Communications:** Random signals and noise: probability, random variables, probability density function, Auto-correlation, power spectral density. Analog communication systems: amplitude and angle modulation and demodulation systems, spectral analysis of these operations, super heterodyne receivers; elements of hardware, realizations of analog communication systems; signal-to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions. Fundamentals of information theory and channel capacity theorem. Digital communication systems: pulse code modulation (PCM), differential pulse code modulation (DPCM), digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), matched filter receivers, bandwidth consideration and probability of error calculations for these schemes. Basics of TDMA, FDMA and CDMA and GSM.

**Electromagnetics:** Elements of vector calculus: divergence and curl; Gauss' and Stokes' theorems, Maxwell's equations: differential and integral forms. Wave equation, Poynting vector. Plane waves: propagation through various media; reflection and refraction; phase and group velocity; skin depth. Transmission lines: characteristics impedance; impedance transformation; Smith chart; impedance matching; S parameters, pulse excitation. Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas: Dipole antennas; radiation pattern; antenna gain.

**COMPUTER SCIENCE AND ENGINEERING****Marks:67(67 Questions)**

**Digital Logic:** Boolean algebra, Combinational and sequential circuits, Minimization, Number representations and computer arithmetic (fixed and floating point).

**Computer Organization and Architecture:** Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA Mode).

**Programming and Data Structures:** Programming in C, Recursion, Arrays, Stacks, Queues, linked lists, trees, binary search trees, binary heaps, graphs.

**Algorithms:** Searching, sorting, hashing, Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.

**Theory of Computation:** Regular expression and finite automata.. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability.

**Compiler Design:** Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

**Operating System:** Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory Management and virtual memory. File systems.

**Databases:** ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, Indexing (e.g., B and B+trees). Transactions and concurrency control.

**Computer Networks:** Concept of layering. LAN technologies(Ethernet). Flow and error control techniques, switching, IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS,SMTP,POP,FTP,HTTP). Basics of Wi-Fi, Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.



## M.B.A. PROGRAMME

The objective of M.B.A. programme is to inculcate ethical professional and managerial skills for effectively managing the various functions of business in the era of globalization and privatization.

**(a) Eligibility:**

A Bachelor's Degree, B.Tech., B.E., B.Sc., B.Com or Graduation with Economics and Mathematics from any recognised university with 55% or more marks(50% or more marks for students belong to SC/ST).

OR

A Master's degree in any discipline of any recognized university with 55% or more marks(50% or more marks for students belong to SC/ST).

**Preference will be given to B.E./B.Tech. qualified candidates**

**(b) Duration:** The duration of the M.B.A. programme is 2 years.

**(c) Disciplines and Number of Seats:** The no.of vacancies will be uploaded separately.

Specialization
Marketing Management
Human Resource Development
Material Management
Labour Welfare and Industrial Relations

**\* Minimum number of students to run above programmes shall be as per senate decision.**

**(d) Admission Procedure:**

- i) First preference for admission to MBA Programme, Candidates should be should have a valid Score of CAT for corresponding year or CMAT-2018 or GATE qualified or SET-IV-2018 and will have to appear for Group Discussion and Interview at SLIET Longowal.
- ii) All the candidates aspiring to get admission in MBA Programme will have to fill the online Application Form of SET-2018 (SET-IV) as per schedule.
- III) Candidates with valid CAT or CMAT or GATE score are exempted from appearing in SET-IV-2018
- IV) If seats still remain vacant after above process, the admission shall be made as per merit of SET-IV followed by GD/Interview

**Note: Admission to MBA programme on the basis of GATE or CAT or CMAT or SET-IV does not make a candidate eligible for scholarship.**

**(e) Merit List :**

- Merit list will be prepared on the basis of marks obtained in GATE/ CAT / CMAT – 2018/SET-IV, group discussion and interview.
- For preparing the merit list, the marks obtained in the GATE/ CAT / CMAT-2018/SET-IV shall be converted out of 400. Marks for GD and interview will be awarded out of 25 each.
- Final merit list will be made on basis of marks scored in all three components out of 450.
- Institute shall decide the minimum cut off marks for CAT/CMAT-2018 separately.

**Group Discussion (GD) [25 Marks]:**

The Group Discussion is primarily aimed at assessing the oral communication skills, convincing power and other managerial capability of candidate. The GD will fetch 25 marks and time allowed for one GD will be 30 minutes. A group of 10 candidates on random basis would be selected to participate in each GD out of the candidates. The topics given for the GD would be from current affairs, economics and management.

**Interview [25 Marks]**

The final stage of the selection process will be an Interview for the candidates undergone earlier stages. The interview will be conducted by a panel of experts consisting of eminent faculty members/persons from industry.

**Note:** Result for admission to M.B.A. Programme will be prepared on the basis of marks obtained in all the above three components i.e. GATE/ CAT of the corresponding year / CMAT -2018/SET-IV, group discussion and interview

**SYLLABUS OF SLIET ENTRANCE TEST (SET-IV)****For admission to MBA Programme-2018****Pattern of SET-IV**

SLIET Entrance Test (SET-IV) for admission to MBA. Programme will consist of one paper of two hours duration. This paper will have 100 objective type questions of 100 marks.

**Note:** Answers of the objective type questions are to be filled in the OMR answer sheet given separately during the examination. There will be 25% negative marking for wrong answers.

**Syllabus for M.B.A.****Marks: 100 (100 Questions)****Time : 2 Hours**

The paper will include questions covering the following topics (minimum 25 questions from each topic) :-

- Language and Communication Skills
- Arithmetic and Quantitative Skills
- Critical Reasoning & General Intelligence
- General Awareness

**Group Discussion (GD) [25 Marks]:**

The Group Discussion is primarily aimed at assessing the oral communication skills, convincing power and other managerial capability of candidate. The GD will fetch 25 marks and time allowed for one GD will be 30 minutes. A group of 10 candidates on random basis would be selected to participate in each GD out of the candidates qualifying the Written Objective Type Test. The topics given for the GD would be from current affairs, economics and management. The Panel of Judges would be consisting of Senior Faculty members and one person from industry.

**Interview [25 Marks]:**

The final stage of the selection process will be an Interview for the candidates going through earlier two stages. The interview will be conducted by a panel of three interviewers again consisting of three members including eminent faculty members and industrialists.

**Note:** Result for admission to M.B.A. Programme will be prepared on the basis of marks obtained in all the above three components i.e. written test (SET-IV for M.B.A.), group discussion and interview.





## M.Sc. Programmes

The four semester (two years) M.Sc. Programmes based on credit system comprise of a number of core and elective courses and project work. The focus of various M.Sc. Programmes offered by Science Departments would be to generate post-graduates who are confident of applying their knowledge to practical problems of industry including R&D organizations. The curriculum maintains a balance between basic & applied aspects of the subject concerned to develop analytical skills of the students which shall be helpful in their career option in academic, research & teaching also.

**(a) Eligibility:**

The minimum eligibility for admission to Master of Science (M.Sc.) Programmes will be at least **55% marks (50% in case of candidates belonging to reserved categories)** in the aggregate in qualifying examination as mentioned hereunder:

- (i) **M.Sc.(Physics)** : Recognized B.Sc. Degree with **Physics** as one of the subject.
- (ii) **M.Sc.(Chemistry)** : Recognized B.Sc. Degree with **Chemistry** as one of the subject.
- (iii) **M.Sc.(Mathematics)** : Recognized B.Sc. Degree with **Mathematics** as one of the subject.

**Note: Eligibility conditions laid down in CCMN-2018 for admission in SLIET shall also be applicable.**

**(b) Duration:** The duration of the M.Sc. Programmes is **02** years

**(c) Disciplines & Seats:** No. of vacant seats will be uploaded separately.

*\* Minimum number of students to run above programmes shall be as per senate decision.*

**(d) Admission Procedure:**

The admission to M.Sc. programmes:

- Preference will be given to JAM-2018 qualified then PUCET/CUCET qualified and SET-VI qualified candidates in their respective order.
- The JAM/PUCET/CUCET qualified candidates are exempted from the SET-VI-2018

**Note: Number of seat has been increased from 20 to 25 in m.Sc.programmes. Out of these 20 seats are to be offered through CCMN and the vacant seats from CCMN shall be offered to the candidates through SET.**



**SYLLABUS OF SLIET ENTRANCE TEST (SET-VI)**  
**For admission to M.Sc. Programme-2018**  
**Pattern of SET-IV**

SLIET Entrance Test (SET-VI) for admission to M.Sc. programme will consist of one paper of two hours duration. This paper will have 100 objective type questions of 100 marks.

**Note:** *Answers of the objective type questions are to be filled in the OMR answer sheet given separately during the examination. There will be 25% negative marking for wrong answers.*

**Syllabus for M.Sc.**

**Marks: 100 (100 Questions)**

**Time : 2 Hours**

Common for all M.Sc.

**Marks: 20 (20 Questions – Minimum 05 from each topic)**

- a) Language and Communication Skills
- b) Arithmetic and Quantitative Skills
- c) Critical Reasoning & General Intelligence
- d) General Awareness

M.Sc. (Physics)

**Marks: 80 (80 Questions)**

**1. Basic Concepts of Classical Mechanics:** Mechanics of a particle, Mechanics of a system of particles, constraints, Holonomic and non-holonomic constraints, virtual work, D'Alembert's principle, Lagrange's equations, simple applications of the Lagrangian formulation.

**2. De Broglie waves and uncertainty principle:** De Broglie Waves, Wave function, De Broglie wave velocity, wave and group velocities, Heisenberg's uncertainty principle and its applications.

**3. Schrodinger equation:** The wave function, schrodinger equation – time dependent form Expectation values, operators, Schrödinger equation–steady state form, Eigen values and eigen functions.

**4. Application of Schrödinger equation:** The particle in a box – energy quantization, wave functions, momentum quantization. The Harmonic oscillator – Energy levels, wave functions, Hydrogen atom, Schrodinger equation for the hydrogen atom, separation of variables, quantum numbers –Total quantum number, orbital quantum number, magnetic quantum number, The normal Zeeman effect.

**5. Atomic Spectra:** Spectra of hydrogen, alkali atoms, spectral terms, doublet fine structure, screening constants of alkali spectra for s, p, d, f states, selection rules singlet, triplet fine structure in alkaline earth spectra, L-S and J-J coupling.

**6. Molecular Spectra:** Molecular spectra – experimental study, Rotational Spectra, Intensities of rotational lines, vibrational spectra, rotational and vibrational bands and their theoretical explanation. Raman spectra – Raman effects, Introduction, Experimental Study, Results of Raman effect, Nature of Raman effect, Theoretical explanation of Raman effect, Practical importance of Raman effect, Raman effect and molecular constitution.

**7. Nuclear Physics:** Nuclear models and accelerators – Introduction to nuclear forces, Nuclear binding energy, shell model and liquid drop model, Nuclear reactions, Fission and Fusion, Particle accelerators – linear accelerator and cyclotron. Elementary Particles – Introduction to elementary particles and their conservative principles, Theory of electron, Antiparticles, mesons, mesons and mesons, Symmetries of elementary particles, conservative principles.

**8. Crystal Structure:** Crystal lattice and translation vectors, unit cell, Basis, symmetry operations, Point groups and space groups, Types of lattices (Plane lattice and space lattice with bcc and fcc) Lattice directions and planes, Interplanar spacings Miller indices, simple crystal structures, close packed structures, Hexagonal close packed structures.

**9. Bonding in Solids:** Introduction, concept of inter-atomic forces, cohesive energy and types of bonding, primary bonds (ionic bonds, covalent bond and metallic bonds), Secondary bonds (Vander wall's bonds and hydrogen bonds)

**10. Heat Capacity:** Classical theory of lattice heat capacity (concept and comparison with experimental value), concepts of Einstein's theory of lattice heat capacity, Density of modes of vibrations (in 1-D, 2-D and 3-D), Debye's model of lattice heat capacity (derivation), Limitations of Debye's model.



**11. Electrical properties of metals:** Classical free electron theory of metals, Drawbacks of classical theory, Quantum theory of free electron, sommerfield's model for free electron (one-dimensional solid, generalization for three-dimensional solid) Fermi-Dirac statistics and electron distribution in solids, Density of energy states and Fermi energy  $f(E)$  at  $E=E_F$ ,  $E<E_F$  and  $E>E_F$ , Fermi-Dirac distribution function, Mean energy of electron gas at absolute zero.

**12. Band Theory of Solids:** The Bloch theorem (only statement and properties), The Kronig –Penny model, Energy versus wave-vector relationship – different representations (Brillouin Zones), Distinction between metals, insulators and semiconductors.

**13. Magnetic Properties of Solids:** Concept of Magnetic permeability, magnetization, susceptibility, Electric current in atoms, Bohr Magnetron, Electron Spin and Magnetic Moment, Magnetic moment due to nuclear spin, classical theory of diamagnetism and paramagnetism, Quantum theory of paramagnetism, Domain theory of ferromagnetism, Experimental demonstration of domain structure, I-H curve.

**14. Bipolar Junction Transistor – BJT :** BJT (Revision), Load line, Transistor biasing, voltage divider bias, Hybrid parameters (or h parameters) Determination of h-parameters, common – emitter amplifier, Analysis of common emitter amplifier and common – collector amplifier using h-parameters current gain, voltage gain, power gain, input resistance and output resistance)

**15. Digital Electronics:** Binary and Hexadecimal number system, Binary Arithmetic, Basic logic gates (NOT, OR, AND using electrical switch circuit only), Derived logic gates (NAND, NOR, EXOR using electrical switch circuit only) De Morgan's theorem, NAND gate as a universal building block, half adder and full adder, RS flip flop and JK flip flop (using logic gates only)

**16. Second law of Thermodynamics:** Conversion of work in to heat and vice versa, Kelvin-Planck and Clausius statements of Second law of Thermodynamics and their equivalence, Carnot's cycle, Carnot's theorem and corollary, thermodynamic scale of temperature, absolute zero and efficiency, gasoline engine(Otto), Diesel engine, reversibility and irreversibility, condition for reversibility.

**17. Entropy:** Reversible part of the second law, Entropy, principle of Carathéodory, entropy of an ideal gas -- T- S diagram of entropy and reversibility, entropy and irreversibility, irreversible part of second law, heat and entropy of irreversible processes, entropy and nonequilibrium states, principle of increase of entropy, applications of entropy principle, entropy and disorder, enthalpy, Helmholtz and Gibbs functions, Maxwell's relations, TDS equations, internal energy equation, heat capacity equation.

**18. Interference by Division of Amplitude:** Interference in thin films, the cosine law, nonreflecting films, high reflectivity by thin film deposition, interference by wedge shaped film, Newton's rings, the Michelson interferometer

**19. Fraunhofer and Fresnel Diffraction:** Single slit, double slit, N slit diffraction patterns, positions of maxima and minima, width of the principal maxima, the diffraction grating, resolving power of grating, resolving power of a prism, Fresnel half period zones, zone plate, diffraction at a straight edge, Fresnel diffraction by a circular aperture.

**20. Polarization and double refraction:** Introduction-production of polarized light, polarization by reflection, polarization by double refraction, polarization by scattering, Malus law, Superposition of two disturbances, Mathematical analysis, Double refraction, Normal incidence, oblique incidence, interference of polarized light, QWP, HWP, Analysis of Polarised light, Optical activity.

### M.Sc. (Chemistry)

**Marks: 80(80 Questions)**

#### **Inorganic Chemistry**

*Atomic Structure and Chemical bonding:* Schrodinger wave equation; H atom; Radial and angular wave functions: quantum numbers and concept of orbitals; Slater orbitals; Periodic trends and properties: Size, Ionization Energy, Electron Affinity, Electronegativity, Lattice and Hydration Energies; Chemical Bonding: VB and MO approach of  $H_2$  molecule; MO treatment of homonuclear and heteronuclear (CO & NO) diatomic molecules; VSEPR theory; Structure of simple molecules and ions of main group elements; theories of bonding in metals; Free electron, VB and Band theories; Hydrogen bonding and Vander Waal's interactions.

*Chemistry of elements:* s and p-block: Alkali and alkaline earth metals, Hydrides and Complexation tendencies, Structural features of hydrides, halides, oxides and oxyacids;

d-block: Salient features, characteristic properties of 3d-elements and general comparative treatment of 4d and 5d elements with reference to oxidation states, colour, magnetic behaviour, and complex formation tendency, methods of determining magnetic susceptibility, Correlation of magnetic moment data and stereochemistry of Co(II) and Ni(II) complexes.



*f - block*: Comparative study of lanthanides and actinide elements with respect to electronic configuration, atomic and ionic radii, oxidation states and complex formation, occurrence and principles of separation.

*Coordination chemistry*: Nomenclature, Werner's theory, *Isomerism*. Sidgwick's EAN concept and Valence Bond Theory, Limitations of valence bond theory; Crystal-field theory and crystal-field splitting in octahedral, tetrahedral and square planar complexes, Jahn-Teller distortion, Factors affecting the crystal-field splitting; Stereochemistry of coordination compounds with coordination no. 4, 5 and 6; thermodynamic and kinetic stabilities of metal complexes and factors affecting the stability; Types of electronic transitions, selection rule for d-d transitions, spectroscopic ground states.

*Organometallic Chemistry*: Definition, nomenclature and classification of organometallic Compounds; Preparation, properties, bonding and applications

*Bioinorganic Chemistry*: Essential and trace element in biological process, oxygen transport with reference to haemoglobin; synthetic models of O<sub>2</sub> carriers, Biological role of alkali metals ions; Vitamin B-12

### **Organic Chemistry**

*Concepts*: Atomic orbitals, hybridization, Polarity of bonds: Inductive, resonance and steric effects, hyperconjugation, and their influence on acidity and basicity of organic compounds; Fischer, Saw-horse and Newman projection formulae,

Chirality-optical activity, enantiomers and diastereoisomerism involving one and two chiral centres; Configuration; D/L, erythrose, threose and R/S nomenclatures; Geometrical isomerism and E/Z nomenclatures; Conformations of n-butane; Aromaticity and Huckel rule - A general concept; Molecular orbital picture of benzene, Nomenclature of organic compounds

*Chemistry of organic compounds*- Hydrocarbons: Alkanes, Alkenes, Alkynes and benzene: Preparation and properties; Alkyl Halides: Nucleophilic substitution: SN<sub>1</sub>, SN<sub>2</sub> mechanisms; Eliminations reactions: E<sub>1</sub> and E<sub>2</sub> mechanisms, Elimination versus substitution reactions; energy profile diagrams-transition states (general considerations). Grignard reagents:

Preparation and synthetic applications; Chlorobenzene, electrophilic and nucleophilic aromatic substitutions; side chain chlorination of toluene, DDT and BHC; Alcohols: Comparative study of substitution, dehydration, oxidation, and esterification of primary, secondary and tertiary alcohols; Phenols: General methods of preparation and reactions; Reimer-Tiemann and Kolbe reactions; Relative acidity of phenol, alcohol and carboxylic acid; Carbonyl compounds: Preparations and reactions: addition and condensation reactions; Cannizzaro, Perkin, aldol, benzoin, haloform, oxidation and reduction reactions; Important reactions of acids, HVZ reaction, Relative reactivity of acid chlorides, acid anhydrides, amides and esters; Comparative acidity of carboxylic and sulphonic acids; Nitrogen containing compounds: Nitrobenzene and reduction products; Comparative basicity of aliphatic and aromatic amines; Diazonium Salts: Preparation and synthetic applications.

*Reactive intermediates and related Rearrangement reactions*: Generation, stability and reactivity of Free radicals (Anti Markovnikov's, Birch Reduction, Bouveault-Blanc reduction, oxidation of phenol by metal ions); *Carbocations* (Pinacol-Pinacolone, Wagner-Meerwein Rearrangement, Baeyer-Villiger oxidation, Hydroperoxide reaction and Beckmann.) and *Carbanions* (Robinson Anuulation and Michael Addition); *Carbenes* and *Nitrenes* (Hofmann, Curtius reactions); *Ylides*: Sulphur ylides, phosphorous ylides, Michaelis-Arbuzov phosphonate synthesis, Wittig reactions, Mitsunobu reaction.

*Chemistry of Bio-molecules*: Amino acids-preparative methods, physical properties, dipolar nature, chemical reactions and configuration; peptide linkage, peptide synthesis and structure of poly peptides, General characteristics and secondary structure; Carbohydrates -Characteristic reactions of aldoses and ketoses; Glucose- structure (Open and Cyclic), Fructose (only reactions), Mutarotations, Sucrose, starch and cellulose (Structural aspects only).

*Application of Spectroscopic Techniques*: Infrared Spectroscopy: Working and experimental considerations in spectral recording; Characteristic group frequencies; carbonyl frequencies; effect of structure: aldehydes, ketones; esters, amides, acid anhydrides, carboxylic acids, acid chlorides; effect of conjugation; cyclization; ambidentate ligands and metal carbonyls.

Ultraviolet and Visible Spectroscopy: Basic working principle and measurement technique;  $\sigma\text{-}\sigma^*$ ,  $\pi\text{-}\pi^*$ ,  $n\text{-}\sigma^*$  and  $n\text{-}\pi^*$  transitions, dienes and conjugated poly-enes; Woodward-Fieser rules; spectra of transition metal complexes (*d-d* transitions).

NMR Spectroscopy: Working principle and method of measurement; factors influencing chemical shift, spin-spin splitting; applications.

### **Physical Chemistry**

*States of Matter*: Gaseous state: Kinetic theory of gases, ideal gas laws based on kinetic theory, mean free path, collision diameter, collision number; van der Waal's equation and critical state,

Liquid State: Surface tension of liquids - capillary action, temperature effect on surface tension; Viscosity of liquids, experimental determination of viscosity coefficient, variation with temperature.

*Solid State*: Crystal lattices, space lattice, unit cell, crystal systems, law of rational indices, Miller indices, crystals and x-rays (the Bragg's equation); Crystal structure of NaCl, graphite, and diamond; Types of crystal (molecular, covalent, metallic, ionic); Imperfection in crystals: point defect-Schottky and Frankel defects.



**Thermodynamics:** First Law of thermodynamics and internal energy, heat and work, Enthalpy, heat changes at constant volume and constant pressure, heat capacities (CV, CP). Thermodynamic quantities ( $w$ ,  $q$ ,  $\Delta U$ ,  $\Delta H$ ) for isothermal and adiabatic reversible expansion of ideal gases, Relation between  $\Delta U$  and  $\Delta H$ , variation of heat of reaction with temperature (Kirchhoff's equation); Second Law of Thermodynamics, Carnot cycle, entropy, entropy changes in reversible and irreversible processes and of universe and changes of an ideal gas in different processes; Free energy and its concept, Gibbs and Helmholtz free energies and their relationship, variation of free energy with temperature and pressure; Free energy and equilibrium constant, Maxwell's relations, Gibbs-Helmholtz equations, Chemical potential, Fugacity and activity.

**Thermodynamics of colligative properties:** Ideal solutions and their characteristic properties, Duhem-Margules equation and its application, Henry and Raoult's laws, Freezing point depression, elevation of boiling point, osmotic pressure, van't Hoff equation, Measurement of osmotic pressure and determination of molecular weight of macromolecules.

**Electrochemistry:** Arrhenius theory of electrolytic dissociation, Hydrolysis of salts, hydrolysis constant, Bronsted-Lowry and Lewis concepts of acids and bases, HSAB theory and applications buffer solutions, indicators and theory of acid-base indicators, degree of dissociation and dissociation constant of weak electrolytes/acids, solubility of sparingly soluble salts; Migration of ions: transference number and its determination by Hittorf methods; Conductance of electrolyte solutions, Kohlrausch law of independent migration of ions, ionic mobility; Single electrode potential (Nernst equation), Emf of reversible cell from electrode potentials and its applications; Types of reversible electrodes, reference electrodes; Concentration cells with and without transference; Liquid junction potential and its elimination, Qualitative idea of Debye-Huckel theory of ion-ion interactions.

**Phase Equilibria:** Thermodynamics of phase transition-Clapeyron-Clausius equation and its applications, Phase rule, phase, component, degree of freedom, thermodynamic derivation of phase rule, phase diagrams of one-component system (water), two component systems (phenol-water, lead-silver). The distribution law, solvent extraction, equilibrium constant from distribution coefficient ( $K_1 + I_2 = KI_3$ ).

**Chemical Kinetics:** Order and molecularity of chemical reactions, pseudo order, Kinetic law for second order reactions, determination of the rate constant and order of reaction from kinetic data, Effect of temperature on rate of reaction: collision theory of rates of bimolecular reactions and its comparison with Arrhenius equation.

**Photochemistry:** Law of photochemical equivalence, quantum efficiency, reasons for low and high quantum efficiency; Kinetics of photochemical reaction ( $H_2 + Br_2 = HBr$ ), photostationary state, Chemical actinometers (uranyl oxalate).

**Quantum Chemistry:** Postulates of quantum mechanics, Schrödinger's wave equation, Eigen functions and Eigen values, Orthogonality of wave functions, Particle in a one dimensional box problem.

**Molecular Spectroscopy:** Region of electromagnetic spectrum, Emission and absorption spectra, Transition probabilities and selection rules; Width and intensity of spectral transitions Pure rotational spectra, Diatomic molecules-Rigid rotor & non-rigid rotors. Vibrational-rotational spectra of diatomic molecules, Harmonic oscillator-rigid rotor approximation, Anharmonicity, Normal modes of vibration, Infrared spectra of linear and bent AB<sub>2</sub> molecules; Electronic spectra of diatomic molecules, Franck-Condon principle; Nuclear Magnetic Resonance Spectroscopy: Principle, Chemical shifts, Spin-spin splitting, Relaxation times.

### M.Sc. (Mathematics)

#### **Marks: 80 (80 Questions)**

**Sequences and Series:** Sequences of real numbers. Cauchy's criteria for convergence. Convergent sequences.

Series. Tests for convergence. Absolute and conditional convergence. Uniform convergence.

**Differential Calculus:** Limit. Continuity. Differentiability. Successive differentiation. Asymptotes. Curvature. Envelopes and evolutes. Mean value theorem. Taylor's theorem. Maxima and minima of functions of a single variable. Functions of two and three variables. Partial derivatives, maxima and minima. Tangent plane and normal to a surface. Errors and Approximations.

**Integral Calculus:** Integration. Reduction formulae. Quadrature and rectification. Double and triple integrals, Surface areas and volumes. Centre of gravity. Moment of inertia. Root mean square value. Beta, Gamma and error functions.

**Vector Calculus:** Scalar and vector triple products. Vector differentiation and integration. Gradient, divergence and curl. Green's, Stokes and Gauss theorems.

**Differential Equations:** Ordinary differential equations of the first order. Linear differential equations of higher order with constant coefficients. Methods of variation of parameters and undetermined coefficients. Series solution of differential equations. Bessel's and Legendre's equations. Orthogonality and recurrence relations of Bessel's functions and Legendre polynomials.

Partial differential equations. Lagrange's linear PDE. Non-linear PDE of first order. Charpit's method. Homogenous linear and non-linear PDEs. Application of ODE and PDE.





**Algebra:** Groups, subgroups and normal subgroups, Lagrange's Theorem for finite groups, group homomorphisms and basic concepts of quotient groups, rings, ideals, quotient rings and fields.

**Linear Algebra:** Systems of linear equations. Matrices, rank, determinant, inverse. Eigenvalues and eigenvectors. Cayley Hamilton theorem. Finite dimensional vector spaces over real and complex numbers. Basis. Dimension. Linear transformations.

**Analysis:** Riemann integral. Fundamental and mean value theorems of integral calculus. Improper integrals. Open and closed sets, limit points, completeness of  $\mathbb{R}$ . Limit of a complex function. Differentiation. Analyticity. Cauchy-Riemann equations. Harmonic functions. Conformal mapping. Some special transformations - translation, inversion and rotation. Bilinear transformation.

**Laplace Transform and Fourier series:** Laplace transforms and its properties. Inverse Laplace transforms. Convolution theorem. Unit step function and unit impulse function. Applications to differential equations.

Fourier series. Change of interval. Even and odd functions. Half-range series. Applications to standard waveforms.

**Solid Geometry:** Sphere. Cone. Cylinder. Conicoid. Tangent plane and normal. Reduction of second degree equations to standard forms.

**Mechanics:** Coplaner forces. Virtual work. Catenary. Equilibrium. Wrenches. Simple harmonic motion. Elastic strings. Central orbits. Kepler's law of motion.

**Statistics:** Measures of central tendency and dispersion. Skewness and kurtosis. Correlation and regression. Probability theory. Baye's theorem. Binomial, Poisson and Normal distributions.





## INSTRUCTIONS FOR FILLING ONLINE APPLICATION FORM AND SENDING THE REGISTRATION PAGE BY POST

- i. Candidate shall log on to [www.sliet.ac.in](http://www.sliet.ac.in) and click proceeds for Admission and then registration.
- ii. Click on to **NEW REGISTRATION** and for already registered users, enter Login & Password.
- iii. Before you proceed to register yourself, you must ensure that you have read and understood the eligibility criteria & reservation policy for the COURSE / PROGRAMME you are applying for.
- iv. Candidate should fill his / her basic details like Date of Birth (DOB), Address, State, City, Religion, Contact / Mobile Numbers and Email very carefully.
- v. Choose your password at least of 6-10 characters. Please remember your password and don't share with others.
- vi. Before final submission of online Application Form, read the declaration given on the website carefully and given your consent on it, failing which you will not be able to complete your registration. So, you must check the information details carefully before final submission of Registration Form.
- vii. Please note that after successfully submitting the Application Form, the candidate will get a SMS on his / her Mobile that will ensure his/her provisional registration successfully with a Form Number and Password. For this, candidate should provide valid mobile number.
- viii. After successfully submitting Online Application Form for SET-2018, kindly note down your Form Number for future reference. The processing of Application Form will begin only after the successful payment of Application Fee.
- ix. Select mode of fee payment. If a candidate opts to pay application fee through E-Challan mode, he/she has to effect the payment of application fee within 48 hrs. from the date of registration.
- x. Once the payment is confirmed, the online Registration Page for PRINT shall be available to the candidate.
- xi. Take PRINT of Registration Page.
- xii. **OVERWRITING, CUTTINGS, ERASING IN THE REGISTRATION PAGE OR INCOMPLETE REGISTRATION PAGE MAY LEAD TO REJECTION OF FORM AND SHOULD BE AVOIDED. ANY ERROR ARISING ON THIS ACCOUNT SHALL BE THE RESPONSIBILITY OF THE CANDIDATE.**
- xiii. The Registration Page duly filled in / signed should be sent to **THE CHAIRMAN SET-2018, SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY (SLIET), LONGOWAL – 148106 (DISTT. SANGRUR), PUNJAB** in the envelope by Registered/Speed Post only, so as to reach **within week from last date**. The candidate must retain photocopy of his / her filled in Registration Page for future correspondence, if required. The registration page shall be accepted by post within one week of the dates mentioned above.
- xiv. If a candidate submits more than one Registration Page, his / her candidature shall liable to be cancelled and debarred for future examination(s). No communication will be sent in this regard.
- xv. **Photograph** : Firmly affix two recent high contrast passport size coloured photograph (taken on or after 15.03.2018) with gum / fevicol (not to be pinned or stapled) in the space provided for it in the Registration Page. The photograph must indicate clearly the name of the candidate along with the date of taking the photograph. It should be without cap or goggles. Spectacles are allowed. **Polaroid photos are not acceptable**. Candidates not complying with these instructions or with unclear photograph are liable to be rejected. Candidates shall keep 10 identical photographs in reserve for use at the time of Entrance Examination / Counselling / Document Verification / Admission.

**PROUD OF SLIET**  
**Overall Winners in BAJA SAE India (2009 & 2011)**  
**Overall Winner in Efficycle (2015)**



**SLIET team**  
**'Junkyard Warriors' and 'Green Rangers'**  
**participation in**  
**BAJA SAE India and Efficycle**

संत लौगोवाल अभियांत्रिकी एवं प्रौद्योगिकी संस्थान  
**SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY**  
(Deemed University – Estd. By: MHRD, Govt. of India)  
LONGOWAL – 148 106, Distt. Sangrur (Punjab) INDIA