TANCET 2018 Syllabus

Part- I Engineering Mathematics (Common to all candidates)


Vector Calculus: Double and triple integrations and their applications – Gradient, Divergence, Curl and Laplacian – Green’s, Gauss divergence and Stroke’s theorem.


Part- II Basic Engineering and Sciences (Common to all candidates)


Material Science: Fracture – Magnetic and Dielectric materials – Conductor and Semi conductor materials – Ceramic and Super conductor materials.

Civil Engineering: Fluid Statics and Dynamics – Boundary Layer – Pumps and Turbines – Environmental Pollution.


Part- III(https://www.freshersnow.com/)

1. Civil Engineering(https://www.freshersnow.com/)


Steel Structures: Steel Sections – Connections – Design of Tension and Compression Members – Beams, Column Bases – Plate Girders and Trusses.


method) – Pile groups – capacity and settlement – Codal provisions – pile load test – negative friction on piles; Earth pressure theories – Earth pressure on retaining walls – stability analysis of retaining wall.


Environmental Engineering: Water and waste water Engineering; Water requirements; water demand; quality standards; Development of water supply source, conveyance system; basic unit processes and operations for water treatment; water distribution; sewage characteristics; sewage treatment, primary and secondary treatment of sewage, sludge disposal, sewage disposal. Air Pollution and Control: Types of Pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.
Noise pollution and Control: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.


2. Computer Science and Engineering and Information Technology(https://www.freshersnow.com/)


Discrete Mathematical Structures: Formal Language and Automata - Graph Theory.


Programming and Data Structures: Problem Solving Techniques, Trees, Hashing and Priority Queues, Sorting, Graph, Heap Search.


Digital Signal Processing: FFT, Filter Design.


Database Management Systems: Relational Model, Database Design, Implementation Techniques, Distributed Databases, Object Oriented Databases, Object Relational Databases, Data Mining and Data Warehousing.


Artificial Intelligence: Intelligent Agents, Search Strategies, Knowledge Representation, Learning, Applications.

3. Electrical and Electronics Engineering

Electrical Circuits and Fields: KCL, KVL, Nodal & Mesh analysis, transient response of D.C and A.C networks; sinusoidal steady-state analysis; resonance in electrical circuits; concepts of ideal voltage and current sources, network theorems, driving point admittance and transfer functions of two port network, three phase circuits; Fourier series and its application; Gauss theorem, electric field intensity and potential due to point, line plane and spherical charge distribution, dielectric, capacitance calculations for simple configurations; Ampere’s and Biot-Savart’ law, inductance calculations for simple configurations.

Electrical Machines: Single phase transformer – equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformer – connections; auto transformer; principles of energy conversion, windings of rotating machines; D.C generators and motors-characteristics, starting and speed control, armature reaction and communication: three phase induction motors-performance characteristics, starting and speed control; single-phase induction motors; synchronous generators – performance, regulation; synchronous motors – starting characteristics, applications, synchronous condensers; fractional horsepower motors: permanent magnet and stepper motors.

Power Systems: Electric power generation – thermal, hydro, nuclear; transmission line parameters; steady –state performance of overhead transmission lines and cables and surge propagation; distribution system, insulators, bundle conductors, corona and radio interferences effects; per-unit quantities; bus admittance and impedance matrices; load flow; voltage control and power factor correction; economic operation; symmetrical components, analysis of symmetrical and unsymmetrical faults; principle of over current, differential and distance protections; concepts and solid state relays and digital protection; circuit breakers; principles of system stability –swing curves and equal area criterion; HVDC system – Principle of operation, control and design consideration, HVDC circuit breaking; FACTS - Reactive power control, Uncompensated transmission line, Series compensation, SVC, thyristor control, series capacitor, static synchronous compensator, UPFC and applications.

Control Systems: Principles of feedback; transfer function; block diagram; steady –state errors; stability-Routh and Nyquist criteria; Bode plots; compensation; root loci; elementary state variable formulation; state transition matrix and response for Linear time Invariant systems.
Power Electronics and Drives: Semiconductor power devices-diodes, transistors, thyristors, triacs, GTO, MOSFETs and IGBTs-static characteristic and principles of operation; triggering circuits; phase control rectifiers; bridge converters-fully controlled and half controlled; principles of choppers and inverters, basic concepts of adjustable speed dc and ac drives.


4. Electronics and Communication Engineering(https://www.freshersnow.com/)
Circuit Analysis: DC Circuit analysis, Thevenin’s and Norton’s equivalent circuits, Sinusoidal steady state analysis, Transient and resonance in RLC circuits.

Electronic Devices: Diodes, Bipolar Junction Transistors, FET, MOSFET, UJT, Thyristor.


Optical Communication: Optical Fibers, optical transmitters and receivers.


5. Mechanical Engineering(https://www.freshersnow.com/)


Materials Science and Metallurgy: Constitution of alloys and phase diagrams, steels, cast iron, TTT diagram, heat treatment of ferrous and non-ferrous metal, surface modification techniques, non-metallic materials, mechanical properties and testing, crystal defects and strengthening mechanisms, conducting and semi conducting materials, magnetic and dielectric materials, Engineering ceramics, Engineering and commodity polymers.

Production Technology: Foundry Technology, Hot and Cold working, metal forming processes, metal joining processes, welding metallurgy, welding defects, Metal cutting, center lathe and special purpose lathe, drilling, milling, grinding, gear cutting, broaching unconventional machining processes, CNC machine tools, Part programming.

Metrology and Measurements: Linear and angular measurements, Interferometry-laser interferometers – Types, Computer Aided Inspection, Basic concept of CMM- Types of CMM, Machine vision, Form
measurement-Straightness Flatness, Roundness, Surface finish measurement, Measurement of power, flow and temperature.

Thermodynamics: Basic concepts, Zeroth, First and Second laws of thermodynamics; thermodynamic system and processes; Carnot cycle. irreversibility and availability; behaviour of ideal and real gases, thermodynamic relations, properties of pure substances, calculation of work and heat in ideal processes; analysis of thermodynamic cycles related to energy conversion, Fuel and combustion.

Heat and Mass Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins; dimensionless parameters in free and forced convective heat transfer, various correlations for heat transfer in flow over flat plates and through pipes; thermal boundary layer; effect of turbulence; radiative heat transfer, black and grey surfaces, shape factors, network analysis; heat exchanger performance, LMTD and NTU methods.


Fluid Mechanics: Fluid properties; fluid statics, manometry, buoyancy; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli’s equation; viscous flow of incompressible fluids; boundary layer; elementary turbulent flow; flow through pipes, head losses in pipes, bends etc.

6. Automobile Engineering(https://www.freshersnow.com/)

Mechanism, Kinematics of Cam Mechanism, Gears and Gear Trains, Friction, Force Analysis, Balancing and Vibration.


Automotive Chassis: Front axle types front wheel geometry condition for true rolling motion steering geometry Ackermann and Davis steering. Types of steering gear box. Propeller shaft Universal joints. Final drive differential types. Type of brakes and constructional details. Types of suspension, Independent suspension-front and rear Rubber, pneumatic, hydro-elastic suspension.


Pollution and Control: Emission formation in SI and CI Engines. Effects of design and operating variables controlling techniques constant volume sampling systems. Measurement techniques of HC, CO, NOx and Smoke emission. Dilution Tunnel and Sound level meters.

Alternate Fuels: Properties alcohols, vegetable oils, biogas natural gas LPG and hydrogen as engine fuels methods of using all the fuels in SI and CI engines. Performance, emission and combustion behavior of the fuels in SI and CI engines.

7. Aeronautical and Aerospace Engineering(https://www.freshersnow.com/)


Basics of flight mechanics – Aircraft configurations – Airplane structures – Airplane power plants – Airplane control systems – Aircraft instruments – Aircraft engine, air conditioning and pressurization system – Airfoil theory – Subsonic wing theory – Steady level flight, gliding and climbing flight and accelerated flight of airplanes – Fundamentals of hypersonic air breathing and rocket propulsion


Building Materials, Construction and Technology: Lime, Brick, Stone, Clay products; Timber, Industrial timber; Paints and varnishes, Concrete, Special concrete and light weight concrete; Ferrous metals; nonferrous metals; Glass; Plastics; Eco friendly materials; Thermal insulation materials and acoustic materials. Construction techniques and practices using the above listed materials; Damp and water proofing; Pest control;; Construction systems and equipment; Prestressed concrete and Tensile Structures; Grids domes; folded plates; Flat Slabs. Low cost construction & appropriate technologies.

History of Architecture: Indian architecture- Hindu and Islamic; Indo Saracenic; Secular architecture of the princely states; Colonial and Post-Independence Architecture; Works of masters such as Charles Correa; B V Doshi; Ananth Raje; Raj Rewal; Laurie Baker; Nari Gandhi; Kanvinde. Western architecture-Ancient Greek and Rome; Early Christian; Gothic and Renaissance; Baroque; Neo Classicism; Chicago School and development of skyscraper; Modern architecture: Art and Crafts; Art Noveau; Expressionism and Cubism; Bauhaus; International style; Post Modernism and 23 De constructivism; Critical Regionalism; Theories and projects of F L Wright; Le Corbusier; Gaudi; Gropius; Aalto; Mies; Eisenmann; Zaha Hadid; Soleri; Hasan Fathy; Ando; Bawa; Gehry; Libeskind; Toyo Ito; Louis Khan; Tschumi; Greg Lynn; Assymptote.

Theory and principles of Architecture: Elements and ordering principles; Organisation of form and space; Design methodology and Creative thinking; Pattern language; Contemporary process: Diagrams, Shape grammar, fractals, Digital hybrid, Liquid architecture.

Building Services: Water supply and distribution systems; water and waste management; Sewerage system; Electrical systems; Illumination and lighting; Air conditioning; Fire Safety; building automation and IBMS.

Building Science: Climate responsive architecture; design of solar shading devices; acoustics & building design; Architecture & Energy- Active & passive solar architecture, Day lighting & natural ventilation, Landscape designs; Landscape & environment control.
Housing; Urban Design and Town Planning: National Housing Policy; Indra Awas Yogana; Housing standards; housing projects in India; Urban morphology of early and contemporary cities; Case Studies on urban revitalization from developed and developed economies; Planning conceptsPatrick Geddes, Ebeneezer Howard, Le Corbusier, C A Perry; Urban planning, regional planning and Urban renewal in the Indian context.

9. Agriculture and Irrigation Engineering(https://www.freshersnow.com/)

Machine Design: Design and selection of machine elements – gears, pulleys, chains and sprockets and belts; shafts and couplings, temporary and permanent joints, energy storing elements and engine components, bearings – measurement of force, torque, speed, displacement and acceleration on machine elements.

Farm Machinery: Soil tillage forces acting on a tillage tool; hitch systems and hitching of tillage implements; functional requirements, principles of working, construction and operation of manual, animal and power operated equipment for tillage, sowing, planting, fertilizer application, intercultivation, spraying, mowing, chaff cutting, harvesting, threshing and transport; calculation of performance parameters – field capacity, efficiency, application rate and losses; cost analysis of implements and tractors.

Sources of Power: Sources of power on the farm – human, animal mechanical, electrical, wind, solar and biomass; bio-fuels.

Farm Power: Thermodynamic principles of I.C. engines; I.C. engine cycles; engine components; fuels and combustion; lubricants and their properties; I.C. engine systems – fuel, cooling, lubrication, ignition, electrical, intake and exhaust.

Tractors and Power Tillers: Type, selection, maintenance, and repair of tractors and power tillers; tractor clutches and brakes; power transmission systems – gear trains, differential, final drives and power take-off; mechanics of tractor chassis; traction theory; three point hitches; mechanical steering and hydraulic control systems used in tractors.
Fluid Mechanics: Ideal and real fluids, properties of fluids; hydrostatic pressure and its measurement; hydrostatic forces on plane and curved surface; continuity equation; Bernoulli’s theorem; laminar and turbulent flow in pipes, Darcy-Weisbach and Hazen-Williams equations, Moody’s diagram; flow through orifices and notches; flow in open channels.

Soil Mechanics: Engineering properties of soils; fundamental definitions and relationships; index properties of soils permeability and seepage analysis; shear strength, Mohr’s circle of stress, active and passive earth pressures; stability of slopes.

Hydrology: Hydrological cycle and components; meteorological parameters, their measurement and analysis of precipitation data; runoff estimation; hydrograph analysis, unit hydrograph theory and application; stream flow measurement; flood routing.

Surveying and Leveling: Measurement of distance and area; instruments for surveying and leveling; chain surveying, methods of traversing; measurement of angles and bearings, plane table surveying; types of leveling; theodolite traversing; contouring; computation of areas and volume.

Erosion Control: Mechanics of soil erosion, soil erosion types, wind and water erosion, factors affecting erosion; soil loss estimation; biological and engineering measures to control erosion; terraces and bunds; vegetative waterways; gully control structures, drop, drop inlet and chute spillways; earthen dams; land use capability classification; rainwater harvesting structures, check dams and farm ponds.

Soil-Water–Plant Relationship: Water requirement of crops; consumptive use and evapotranspiration; measurement of infiltration, soil moisture and irrigation water infiltration.

Irrigation Engineering: Design of irrigation channels and underground pipelines; irrigation scheduling; surface, sprinkler and micro irrigation methods, design and evaluation of irrigation methods; irrigation efficiencies.

Agricultural Drainage: Drainage coefficient; planning, design and layout of surface and sub-surface drainage systems; leaching requirement and salinity control; irrigation and drainage water quality and reuse.
Groundwater Hydrology: Groundwater occurrence; Darcy’s Law, steady flow in confined and unconfined aquifers, evaluation of aquifer properties; groundwater recharge.

Wells and Pumps: Types of wells, steady flow through wells; classification of pumps; pump characteristics; pump selection and installation.

Drying: Steady state heat transfer in conduction, convection and radiation; Psychrometry; concentration and drying of liquid foods- evaporators, tray, drum and spray dryers; hydrothermal treatment; drying and milling of cereals, pulses and oilseeds.

Size Reduction and Conveying: Mechanics and energy requirement in size reduction of granular solids, particle size analysis for comminuted solids; size separation by screening; pneumatic, bucket, screw and belt conveying; cleaning and grading; effectiveness of grain cleaners; centrifugal separation of solids, liquids and gases.

Storage Systems: Controlled and modified atmosphere storage; godowns, bins and grains silos.

Preservation of Food: Water activity, sorption and desorption isotherms; kinetics of microbial death – pasteurization and sterilization of milk and other liquid foods; preservation of food by cooling and freezing.

Systems Analysis: Linear programming, Irrigation water allocation – cropping pattern optimization; Dynamic Programming – Application to design and operation of reservoirs, Irrigation management; Simulation, application to irrigation scheduling; Decision support systems.

IT in Agricultural Systems: Precision farming; Crop production modeling; on-line measurement of plant growth in the greenhouse, models of plants production and expert systems in horticulture; egovernance, e-commerce, e-business systems & applications, Technology enhanced learning systems and solutions.


Bioprocess Engineering: Analysis of STR, Analysis of other configurations, Bioreactor scale-up, Modeling and simulation of Bioprocesses, Bioreactor considerations in Enzyme systems.

Cell and Molecular Biology: Cells, Cell lines, Cell culture, Cell Organelles and its functions, types of Cell divisions, cell cycle and its regulation mechanism. Transport mechanism (passive, Active, ATPase pumps and Na+ /K+ pumps), receptors, signal Transduction, models of signal Amplification Secondary messengers, Structure of Nucleic Acids, Replication, Transcription, Translation and DNA repair mechanism in Prokaryotes and Eukaryotes. Promoters, Enhancers and Transcription factors. Genetic Codes and Lac & trp operons.


Genetic Engineering: Genes, Control of gene expression, Restriction enzymes, Vectors (prokaryotic and Eukaryotic) construction of cDNA and genomic Library. Screening of DNA libraries, PCR, RACE, PCR, RAPD, RFLP, AFLP, site directed mutagenesis, Methods of Nucleic acid sequencing. Cloning vectors in plants, Transgenic and Knockout animals.

Immunology: Immune system, immunity, lymphoid organs, antigens, adjuvants, types of immune response. Activation and different ion of T-cells and B –cells, Antibodies, Genes and generation of diversity, monoclonal antibodies. MHC APC, regulation of T-cell and B-cell responses. Immunity to viruses, Bacteria fungi and parasites, cytokines, complements, immunosuppression, allergy and hypersensitivity. Vaccines, Transplantation, Tumor, Immunology, Autoimmunity and Autoimmune disorders.
Bioinformatics: Search engines and algorithms, data management, data technology, biological databases and their uses. Pair wise sequence alignment (local and global), multiple sequence alignment, dot matrix, and dynamic programming and Bayesian methods. BLAST, FASTA, machine learning and Hidden Markov models. Phylogenetic tree analysis. Bimolecular and cellular computing, microarray analysis and system Biology.


Physiology: Cell, cell potentials, sodium potassium pump, joints, respiratory mechanism conducting system of heart, volume and pressure changes, regulation of heart rate, structure of neuron conduction of action potential in neuron, brain lobes.

Biochemistry: Carbohydrates, structural importance, metabolic pathways and metabolic disorders, lipid chemistry, its metabolic pathways and disorders.

Circuit analysis: DC circuit analysis, Thevenin’s and Norton’s equivalent circuits, sinusoidal steady state analysis, Transient and resonance in RLC circuits.


Linear Integrated Circuits: Operational amplifiers and its applications, voltage regulators, A/D and D/A converters.

Microprocessor and Applications: Microprocessors – 8085 and 8086 architectures and interfaces, microcontrollers and applications.

Signals and Systems: Continuous time signals and systems, Fourier transform, Laplace transform, Discrete time signals and systems, DTFT, DFT, Z transforms.
Digital signal processing: IIR and FIR filters, realisation and implementation.

Control systems: Transfer function, Time and frequency response analysis, stability analysis.

Communication theory: AM, FM, PM, sampling and quantisation, TDM, FDM, Entropy, Huffman coding, FDMA, TDMA.

Bio Medical Instrumentation: Strain gauge, applications, capacitive transducer, RTD, Scintillation counter, Photo multiplier tube, phototransistor, piezoelectric transducer, thermal recorder, indirect measurement of blood pressure, pH electrode, GSR, spirometer, Electrodes, Half-cell potential, offset potential, types of electrodes and their equivalent circuits, artifacts during biopotential recording, characteristics of bio amplifier. ECG and EEG, lead system.

Bio Medical Equipment: Blood cell counter, Holter monitor, pacemaker and types, Need for defibrillator, types of defibrillator, biofeedback, Waveforms in stimulators, need for telemetry, modulation schemes used in telemetry, parameters to be monitored in heart lung machine and hemodialyser units, tissue response to different types of diathermy, physiological effects of electricity.


Medical Imaging Systems: Ionising radiation and non ionising radiation, effects, cavitation effect, types of radioactive decay, interaction with matter, attenuation, annihilation, Compton scattering, Production of X-Ray, radiation units: Roentgen, Gray Sievert, CT generations, MR signal generation, T1 and T2 relaxation processes, Doppler shift, ultrasound Echo generation, PACS.

12. Chemical Engineering(https://www.freshersnow.com/)

Fluids Mechanics and Particle Technology: Classification of fluids, flow patterns, manometry, continuity equation, Navier-Stokes’ equation, Bernoulli equation, Dimensional analysis, Flow through pipes,
Boundary layer concepts, Flow through fixed and fluidized beds, pumps – classification affinity laws, performance curves. Characteristics of solids, size analysis, screening, storage, Conveyance, Size reduction, Classifier, Centrifuges, Cyclones. Filtration, Mixing and agitation.

Chemical Technology and Process Calculations: Gas calculations, Material balance and Energy balance – Steady and unsteady state, Humidity and Saturation, Combustion, Thermo chemistry, Role of chemical Engineers in process industry, Cement, glass and ceramic industries, paper industry – oil, soap, detergent industries, petroleum refining and petrochemicals – polymer industry, Fertilizers, Food industry and other important process industries.


Environmental Pollution and Control: Various methods of reduction of pollution, types of pollution, Air pollution- sources and effects – control techniques, water pollution – sources and effects – control techniques, Soil pollution – sources and effects – control techniques and solid waste disposal.

13. Earth Sciences(https://www.freshersnow.com/)


vii) RS and GIS Applications: RS and GIS applications in the fields of agriculture and forestry, urban planning, hydrology and water resources, oceanography, geology, meteorology, environmental management, climate change and disaster mitigation & management.

15. Instrumentation, Electronics & Control Engineering(https://www.freshersnow.com/)

Electrical Circuits: Voltage and current sources: independent, dependent, ideal and practical; v-i relationships of resistor, inductor, and capacitor; transient analysis of RLC circuits with dc excitation. Kirchoff’s laws, mesh and nodal analysis, superposition, Thevenin, Norton, maximum power transfer and reciprocity theorems. Peak, average and rms values of ac quantities; apparent, active and reactive powers; phasor analysis, impedance and admittance; series and parallel resonance, realization of basic filters with R, L and C elements. One-port and two-port networks, driving point impedance and admittance, open-circuit, and short circuit parameters.

Signals and Systems: Periodic, aperiodic and impulse signals; Laplace, Fourier and z-transforms; transfer function, time response and frequency response of first and second order linear time invariant systems; convolution and correlation. Discrete time system: impulse response, frequency response, pulse transfer function; DFT and FFT; basics of IIR and FIR filters.

Analog Electronics: Characteristics and applications of diode, Zener diode, BJT and MOSFET; small signal analysis of transistor circuits; feedback amplifiers. Characteristics of operational amplifiers; applications of opamps: difference amplifier, adder, subtractor, integrator, differentiator, instrumentation amplifier, precision rectifier, active filters and other circuits. Oscillators, signal generators, voltage controlled oscillators and phase locked loop.
Digital Electronics: Combinational logic circuits, minimization of Boolean functions; IC families: TTL and CMOS; Arithmetic circuits, comparators, Schmitt trigger, multi-vibrators, sequential circuits, flip-flops, shift registers, timers and counters. Sample-and-hold circuit, multiplexer, analog-to-digital (successive approximation, integrating, flash and sigma-delta) and digital-to-analog converters (weighted R and R-2R ladder). Characteristics of ADC and DAC (resolution, quantization, significant bits, conversion/settling time). 8-bit microprocessor and microcontroller: applications, memory and input-output interfacing; basics of data acquisition systems.

Measurements: SI units; systematic and random errors in measurement, expression of uncertainty, accuracy and precision, propagation of errors; PMMC, MI and dynamometer type instruments; dc potentiometer; bridges for measurement of R, L and C; Q-meter; Measurement of voltage, current and power in single and three phase circuits; true rms meters; instrument transformers; time, phase and frequency measurements; digital voltmeter and digital multi-meter; oscilloscope; shielding and grounding.

Sensors and Industrial Instrumentation: Resistive, capacitive, inductive, piezoelectric, Hall effect sensors and associated signal conditioning circuits; transducers for industrial instrumentation: displacement (linear and angular), velocity, acceleration, force, torque, vibration, shock, pressure (including low pressure), flow (differential pressure, variable area, electromagnetic, ultrasonic, turbine and open channel flow meters) 33 temperature (thermocouple, RTD (3/4 wire), thermistor, pyrometer and semiconductor); liquid level, pH, conductivity and viscosity measurement.

Analytical Instrumentation: Spectral methods of analysis: Spectro-Photometers, sampling systems, source detectors and applications; conductivity and pH meters; Chromatography; NMR & X ray spectroscopy; GM and proportional counters; Mass spectrometer.

Communication and Optical Instrumentation: Amplitude and frequency modulation and demodulation; Shannon's sampling theorem; frequency and time division multiplexing; Digital Communication : PCM, DPC, amplitude, phase, frequency, pulse shift keying for digital modulation; optical sources and detectors: LED, laser, photo-diode, light dependent resistor and their characteristics; Basics of fiber optic sensing.

Control System and Computer Control of Processes: Feedback principles, signal flow graphs, transient response, steady-state-errors, Bode plot, phase and gain margins, Routh and Nyquist criteria, root loci, design of lead, lag and lead-lag compensators, state-space representation of systems; time-delay
systems; mechanical, hydraulic and pneumatic system components, synchro- pair, servo and stepper motors; on-off, P, PI, PID, cascade, feed-forward, and ratio controllers. State models and state equations, controllability and observability, pole assignment. Programmable logic controllers, SCADA, Distributed Control System and HART & Foundation Fieldbus.

16. Leather Technology(https://www.freshersnow.com/)


Machines for leather products manufacture - mechanics & operation - IT applications for leather & product design. Professional Ethics and human values.

17. Mathematics

Algebra: Group, subgroups, Normal subgroups, Quotient Groups, Homomorphisms, Cyclic Groups, permutation Groups, Cayley's Theorem, Rings, Ideals, Integral Domains, Fields, Polynomial Rings.

Linear Algebra: Finite dimensional vector spaces, linear transformations – Finite dimensional inner product spaces, self-adjoint and Normal linear operations, spectral theorem, Quadratic forms.

Real Analysis: Sequences and series of functions, uniform convergence, power series, Fourier series, functions of several variables, maxima, minima, multiple integrals, line, surface and volume integrals, theorems of Green, Strokes and Gauss; metric spaces, completeness, Weierstrass approximation theorem, compactness.

Complex Analysis: Analytic functions, conformal mappings, bilinear transformations, complex integration: Cauchy's integral theorem and formula, Taylor and Laurent's series, residue theorem and applications for evaluating real integrals.

Topology: Basic concepts of topology, product topology, connectedness, compactness, countability and separation axioms, Urysohn's Lemma, Tietze extension theorem, metrization theorems, Tychonoff theorem on compactness of product spaces.

Functional Analysis: Banach spaces, Hahn-Banach theorems, open mapping and closed graph theorems, principle of uniform boundedness; Hilbert spaces, orthonormal sets, Riesz representation theorem, self-adjoint, unitary and normal linear operators on Hilbert Spaces.

Ordinary Differential Equations: First order ordinary differential equations, existence and uniqueness theorems, systems of linear first order ordinary differential equations, linear ordinary differential
equations of higher order with constant coefficients; linear second order ordinary differential equations with variable coefficients, method of Laplace transforms for solving ordinary differential equations.

Partial Differential Equations: Linear and quasilinear first order partial differential equations, method of characteristics; second order linear equations in two variables and their classification; Cauchy, Dirichlet and Neumann problems, Green’s functions; solutions of Laplace, wave and diffusion equations using Fourier series and transform methods.

Calculus of Variations and Integral Equations: Variational problems with fixed boundaries; sufficient conditions for extremum, linear integral equations of Fredholm and Volterra type, their iterative solutions, Fredholm alternative.


18. Material Science and Ceramic Technology

Atomic structure and chemical bonding – crystal structure of materials – Miller indices of directions and planes – packing geometry in metallic, ionic and covalent solids – determination of crystal structures by X-ray diffraction – crystal growth techniques – imperfections in crystalline solids and their role in influencing various properties – Strengthening mechanisms – Diffusion: Fick’s laws and application of diffusion in sintering, doping of semiconductors and surface hardening of metals.

Metals and Alloys: Solid solutions, Solubility limit, phase rule, binary phase diagrams, lever rule, intermediate phases, intermetallic compounds, iron-iron carbide phase diagram, heat treatment of steels, cold, hot working of metals, recovery, recrystallization and grain growth-microstructure, properties and applications of ferrous and non-ferrous alloys. Polymers: Classification, polymerization, structure, properties, processing and applications. Composites: properties, processing and applications


Ceramic Raw materials: Occurrence, properties and uses of clays, feldspar, quartz, sillimanite, bauxite, limestone, dolomite, magnesite, rutile, zircon. Synthesis, properties and applications of calcined alumina, mullite, silicon carbide, boron carbide, tungsten carbide, silicon nitride, boron nitrate, silicides, SiAlON, cermet, Carbon compounds.

Conventional ceramics: Body formulation and preparation of tiles, sanitary ware, tableware, insulators, stoneware products. Glaze raw materials, fritting process, glaze application methods, causes and remedies for glaze defects. Formation and structure of glass, glass batch preparation and melting annealing, special glasses. Different types of refractories, important refractory properties and applications. Coated abrasives preparation, types of bonds in bonded abrasives, different types of grinding wheels and grinding process.

Special Ceramics: Preparation and properties of glass fibers, alumina fibers, carbonaceous fibers, boron fibers. Composites with different matrices and their properties. Basic principle and fabrication of ceramic capacitors, ferroelectric ceramics, Magnetic ceramics, Varistors and fuel cells. Special coatings by PVD, CVD, plasma spray, dip coating, electro coatings. Calcium phosphate based and non-calcium phosphate based bio-ceramic materials and their applications.


Post Press: Finishing operations for different jobs, Mail room operations, Print finishing machines, Print finishing Consumables, Converting operation for packaging, Surface finishing operation, Quality in post press operation.

Printing and Packaging Materials: Manufacturing of printing and packaging substrates – Properties and Testing, Printing Inks for major printing processes – Manufacturing properties and testing, Quality control aspects.

Print Management: Print operation Management, Cost estimation for various Printing jobs, Design Management, Financial, Quality and Maintenance, Management for Printing.

20. Physics(https://www.freshersnow.com/)


Superconducting materials: General properties of superconducting materials – Meissner effect – types of superconductors – Hi Tc superconductors- applications.


22. Social Sciences(https://www.freshersnow.com/)

Geography: Settlement geography-rank-size relationship, urban environment- physical and social, regional delimitation, central place theory, urbanization in India and Tamil Nadu, relationship, concept and types of region, regional development planning in India, globalization and economic reforms and competitiveness.

Sociology: Social institution, society, community, social roles, norms, status, values, social structure in India, social change and its relevance to economic development, urbanization as a way of life, social problems of developed and developing countries, impact of urbanization on society and rural development, impact of IT industry on society and development.

Economics: Agglomeration economics- internal, external and urbanization economics, economic base of cities- meaning, types of economic base and methods of identifying economic base, multiplier concept, and approaches of development, Indian national economy –five year plans, environmental economics, economic geography of India. Land economics and industrialization policy, SEZs, IT, ITES industries.

Social work: Role of social worker and NGO’s in development – community, rural, social, and national level; public participation in developmental framework- city, regional, and national level, awareness programme on policies, counseling- rational emotive therapy, behavior modification therapy, family counseling, group work- treatment group, task group, community work- rural and urban community developments/micro credit/micro finance\SHGs.

23. Textile Technology(https://www.freshersnow.com/)
Fibre Science and Technology: Cotton varieties and their properties; silk – pre and post cocoon operations; varieties of silk and their properties; varieties of wool and their properties; properties of other natural fibres. Production and properties of viscose rayon and other regenerated fibres. Requirements of fibre forming polymers; structural principles of polymeric fibres; fluid flow during spinning; technology of melt, wet, dry, dry jet wet, liquid crystal and gel spinning of polymeric fibres. Production, properties and applications of PET polyester, nylon 6, nylon 66, polyacrylonitrile and polypropylene. Spin finishes; drawing; heat setting; crimping and texturisation; tow to top converters and tow to staple converters. Structural investigation of fibres; study of moisture absorption, tensile behaviour, torsional rigidity and flexural rigidity, and optical, frictional, electrical and thermal properties of fibres.

Yarn Engineering: Yarn numbering systems- direct, indirect and conversions. Description and working of short staple spinning machinery - blow-room machinery, card, comber preparatory machines, comber, draw-frame, speed-frame, ring-frame; calculation of process parameters and process efficiencies; production calculations. Methods of mixing and blending; two-folding of yarns; two for one twist principle; man-made fibre processing. Principle and details of yarn formation in condensed yarn spinning, rotor spinning, friction spinning, air-jet spinning and other new spinning systems; structure of yarns produced from different spinning systems. Control of waste, productivity and quality.

Fabric Engineering: Fundamental concepts in winding, modern automatic winders; yarn clearing; winding synthetic and blended yarns and sewing threads; weft winding; Creels used in warping machines; beam and sectional warping machines; Sizing materials and recipes: size preparation and application; control systems used in sizing machine; sizing filament yarns; combined dyeing and sizing; energy conservation in sizing; process control in weaving preparation; preparation of warp beam for weaving.

Yarns quality requirements and preparations for high speed weaving machines. Principles and limitations of various shedding, picking mechanisms; power required for picking; timing different mechanisms; automation and modern developments in weaving machine; cloth formation; loom accessories; process control in weaving.

Cloth geometry; cover factor; concepts in fundamental and advanced woven fabric designs. Quality and preparation of yarn required for knitting; basic weft knitted structures and their production; needle control in weft knitting machines; factors affecting the formation of loop; effect of loop length and shape on fabric properties; process control in knitting; warp knitting fundamentals. Web forming
techniques for dry method of web preparation; production of bonded fabrics by mechanical, chemical and thermal methods; productions of spun bonded and melt blown fabrics; end uses of bonded fabrics.

Chemical Processing: Chemical structure and chemical properties of natural and man-made fibres; singeing; desizing; scouring; bio preparatory operations; Mercerization; bleaching; heat setting; processing machines. Adsorption isotherms; dye-fibre interaction; properties and application of direct, azoic, vat, Sulphur, reactive, acid, mordant, metal-complex, disperse and basic dyes; dyeing of blends; garment dyeing; assessment of colour fastness. Fundamentals of colour measurement; whiteness and yellowness indices; colour matching; spectrophotometers. Methods and styles of printing; printing machines; printing paste; printing with direct, reactive, acid and disperse dyes and pigments. Calendaring; crease proofing; anti-shrinking; softening; felting and non-felting of wool; bio-polishing; assessment of finishes; assessment of eco-friendliness of textiles; finishing of knits; garment washing.

Quality Evaluation: Textile quality parameters; online and off line testing methods. Measurement of length and length uniformity, fineness, strength, maturity, trash content, moisture content of fibres using conventional and modern testing methods; advanced fibre information systems, high volume testing; measurement of lap, sliver and roving irregularity. Assessment of count, twist, hairiness, strength and extension, evenness, imperfection, friction, crimp rigidity, work of rupture, fatigue, abrasion resistance of yarn; classification of yarn faults. Determination of fabric construction parameters; assessment of tensile, bursting and tear strengths, low-stress mechanical properties, permeability, insulation properties, durability, comfort and handle properties of fabrics; grading of fabrics based on defects. Sampling; statistical significance tests; control charts.