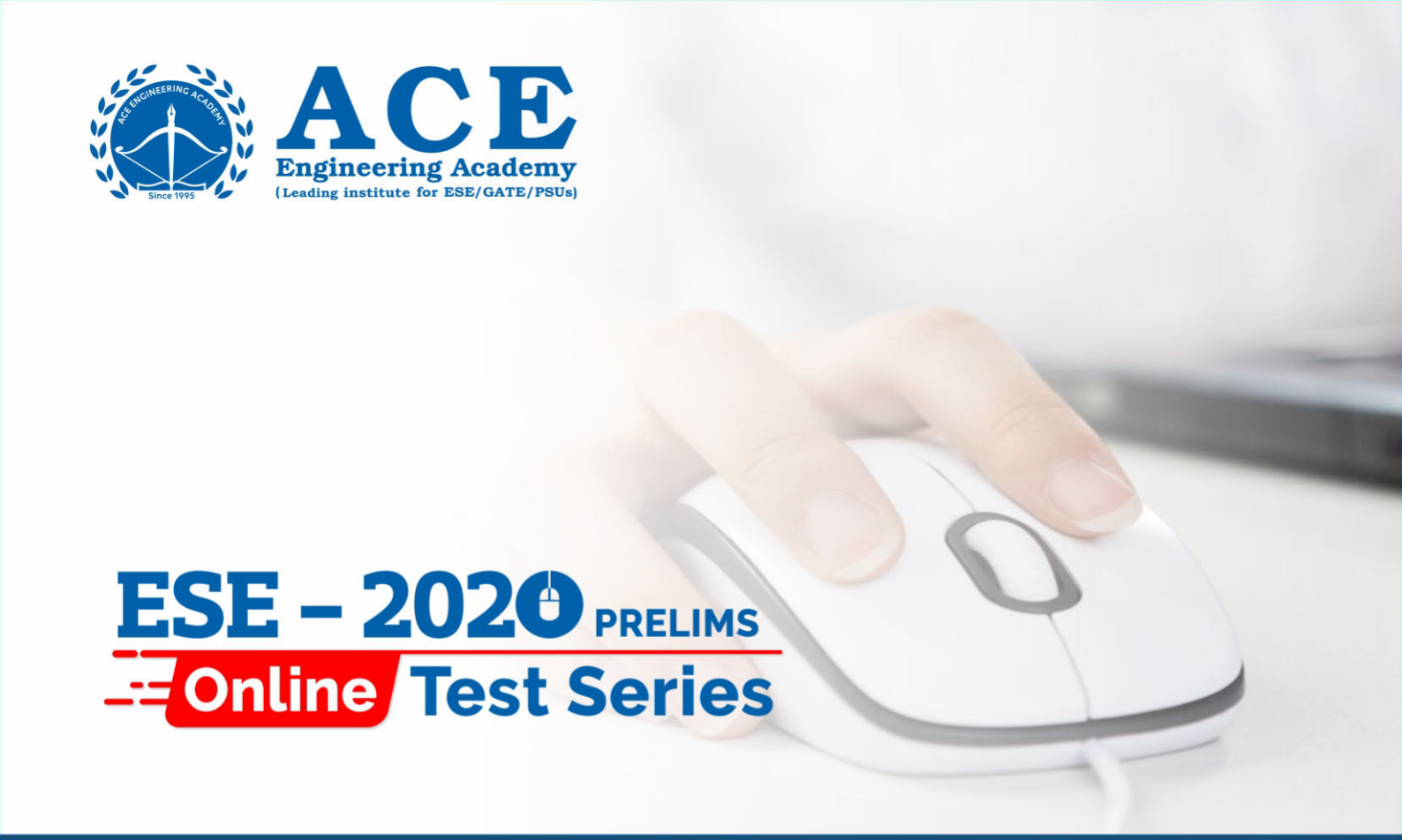
ACE Engineering Academy
(Leading institute for ESE/GATE/PSUs)



ESE – 2020 PRELIMS
Online Test Series

MECHANICAL ENGINEERING (ME)

No. of Tests : 44 + Free 30 Practice Tests of ESE - 2019 Online Test Series

	ESE- 2020 Test Series	Practice Tests ESE - 2019 Test Series
Subject Wise Grand Tests	22	22
Multi Subject Grand Tests	10	-
Full Length Mock Tests	12	8

All tests will be available till ESE -2020 (Prelims) Examination.

TEST SERIES HIGHLIGHTS

- ★ All India Rank will be given for each test.
- ★ Test wise and overall statistics.
- ★ Comparison with toppers.
- ★ Question wise and test wise time analysis & comparison with toppers on time management.

Subject-wise Tests

Tests will be activated at 06:00 pm on scheduled day

Test No	Subject Name	No. of Questions	Max Marks	Duration	Date of Activation
ME-01	Engineering Mechanics + Strength of Materials	50	100	60 Min	15-05-2019
ME-02	Basic Thermodynamics + Heat transfer	50	100	60 Min	
ME-03	Fluid Mechanics + Turbo Machinery	50	100	60 Min	21-05-2019
ME-04	Engineering Mathematics and Numerical Analysis	33	66	40 Min	
ME-05	Mechanisms and Machines	50	100	60 Min	28-05-2019
ME-06	Basics of Energy and Environment	33	66	40 Min	
ME-07	Power Plant Engineering	50	100	60 Min	04-06-2019
ME-08	General Principles of Design, Drawing, Importance of Safety	33	66	40 Min	
ME-09	IC Engines	50	100	60 Min	11-06-2019
ME-10	Ethics and values in Engineering profession	33	66	40 Min	
ME-11	Design of Machine Elements	50	100	60 Min	18-06-2019
ME-12	Information and Communication Technologies (ICT)	33	66	40 Min	
ME-13	Refrigeration and Air conditioning	50	100	60 Min	25-06-2019
ME-14	Engineering Aptitude covering Logical reasoning and Analytical ability	33	66	40 Min	
ME-15	Manufacturing + Engineering Materials	50	100	60 Min	02-07-2019
ME-16	Basics of Material Science and Engineering	33	66	40 Min	
ME-17	Renewable Sources of Energy	50	100	60 Min	09-07-2019
ME-18	Standards and Quality practices in production, construction, maintenance and services	33	66	40 Min	
ME-19	Industrial and Maintenance Engineering	50	100	60 Min	16-07-2019
ME-20	Basics of Project Management	33	66	40 Min	
ME-21	Mechatronics and Robotics	50	100	60 Min	23-07-2019
ME-22	Current Issues of National and International importance related to social, Economic and Industrial Development	33	66	40 Min	

Full Length Mock Tests -1st Series

Test No	Mock codes	No. of Questions	Max Marks	Duration	Date of Activation
ME-23	Mock-1 PAPER-1	100	200	2 Hours	06-08-2019
ME-24	Mock-1 PAPER-2	150	300	3 Hours	
ME-25	Mock-2 PAPER-1	100	200	2 Hours	13-08-2019
ME-26	Mock-2 PAPER-2	150	300	3 Hours	

Multi Subject Grand Tests

Test No	Subjects codes	No. of Questions	Max Marks	Duration	Date of Activation
ME-27	Fluid Mechanics + Turbo Machinery + Renewable Sources of Energy	50	100	60 Min	20-08-2019
ME-28	Basics of Energy and Environment + Engineering Aptitude covering Logical reasoning and Analytical ability	33	66	40 Min	
ME-29	Engineering Mechanics + Strength of Materials + Design of Machine Elements	50	100	60 Min	27-08-2019
ME-30	Engineering Mathematics and Numerical Analysis + Current Issues of National and International importance related to social, Economic and Industrial Development	33	66	40 Min	
ME-31	Basic Thermodynamics + Heat transfer + IC Engines + Refrigeration and Air conditioning	50	100	60 Min	03-09-2019
ME-32	Basics of Project Management + Basics of Material Science and Engineering	33	66	40 Min	
ME-33	Power Plant Engineering + Mechanisms and Machines	50	100	60 Min	10-09-2019
ME-34	Information and Communication Technologies (ICT) + General Principles of Design, Drawing, Importance of Safety	33	66	40 Min	
ME-35	Manufacturing + Engineering Materials + Industrial and Maintenance Engineering+ Mechatronics and Robotics	50	100	60 Min	17-09-2019
ME-36	Ethics and values in Engineering profession + Standards and Quality practices in production, construction, maintenance and services	33	66	40 Min	

Full Length Mock Tests -2nd Series

Test No	Mock codes	No. of Questions	Max Marks	Duration	Date of Activation
ME-37	Mock-3 PAPER-1	100	200	2 Hours	01-10-2019
ME-38	Mock-3 PAPER-2	150	300	3 Hours	
ME-39	Mock-4 PAPER-1	100	200	2 Hours	15-10-2019
ME-40	Mock-4 PAPER-2	150	300	3 Hours	
ME-41	Mock-5 PAPER-1	100	200	2 Hours	19-12-2019
ME-42	Mock-5 PAPER-2	150	300	3 Hours	
ME-43	Mock-6 PAPER-1	100	200	2 Hours	26-12-2019
ME-44	Mock-6 PAPER-2	150	300	3 Hours	

NOTE: The Dates of above MOCK Tests may Change according to the ESE – 2020(Prelims) Exam schedule.

Free Practice Tests of ESE (Prelims)-2019 Online Test Series

Subject-wise Tests

Test No	Subject Name	No. of Questions	Max Marks	Duration	Date of Activation
ME-P1	Fluid Mechanics + Hydraulic Machines	50	100	60 Min	15-05-2019
ME-P2	Engineering Mechanics + Strength of Materials	50	100	60 Min	
ME-P3	Basic Thermodynamics + Heat transfer	50	100	60 Min	
ME-P4	Mechanisms and Machines	50	100	60 Min	
ME-P5	Power Plant Engineering	50	100	60 Min	
ME-P6	IC Engines	50	100	60 Min	
ME-P7	Design of Machine Elements	50	100	60 Min	
ME-P8	Refrigeration and Air conditioning	50	100	60 Min	
ME-P9	Manufacturing + Engineering Materials	50	100	60 Min	
ME-P10	Renewable Sources of Energy	50	100	60 Min	
ME-P11	Industrial and Maintenance Engineering	50	100	60 Min	
ME-P12	Mechatronics and Robotics	50	100	60 Min	
ME-P13	Basics of Energy and Environment	33	66	40 Min	30-05-2019
ME-P14	Standards and Quality practices in production, construction, maintenance and services	33	66	40 Min	
ME-P15	Basics of Project Management	33	66	40 Min	
ME-P16	Information and Communication Technologies (ICT)	33	66	40 Min	
ME-P17	Ethics and values in Engineering profession	33	66	40 Min	
ME-P18	Engineering Aptitude covering Logical reasoning and Analytical ability	33	66	40 Min	
ME-P19	Basics of Material Science and Engineering	33	66	40 Min	
ME-P20	General Principles of Design, Drawing, Importance of Safety	33	66	40 Min	
ME-P21	Engineering Mathematics and Numerical Analysis	33	66	40 Min	
ME-P22	Current Issues of National and International importance related to social, Economic and Industrial Development	33	66	40 Min	

Full Length Mock Tests

Test No	Mock codes	No. of Questions	Max Marks	Duration	Date of Activation
ME-P23	Mock-1 PAPER-1	100	200	2 Hours	20-06-2019
ME-P24	Mock-1 PAPER-2	150	300	3 Hours	
ME-P25	Mock-2 PAPER-1	100	200	2 Hours	
ME-P26	Mock-2 PAPER-2	150	300	3 Hours	
ME-P27	Mock-3 PAPER-1	100	200	2 Hours	
ME-P28	Mock-3 PAPER-2	150	300	3 Hours	
ME-P29	Mock-4 PAPER-1	100	200	2 Hours	
ME-P30	Mock-4 PAPER-2	150	300	3 Hours	

Syllabus for ESE (Prelims), Paper-1

Subject Name	Syllabus
Basics of Energy and Environment : Conservation, environmental pollution and degradation, Climate Change, Environmental impact assessment	**Energy –Basics of Environment– Conservation** **Energy:** Concept of Energy, Classification of Energy Resources , Energy Resources in India Energy Policies and Acts in India. **Basics of Environment:** Components of Ecosystem, Ecosystem, Types of Ecosystem, Structure of Ecosystem, Terminology of Species, Nutrient Cycles. **Conservation:** ***Biodiversity*** **-** Types of Biodiversity, Value of Biodiversity, Loss of Biodiversity, Threat to Biodiversity, Conservation of Biodiversity, International & National Policies of Biodiversity, International & National Organizations related to Biodiversity, Acts related to biodiversity. ***Sustainable Development***- Concept of Sustainable Development, Carrying Capacity, Ecological Foot Print, Earth Debt day, Principles of Sustainable Development, Initiatives of Sustainable Development , Millennium Development Goals,Sustainable Development Goal, Sustainable Agriculture. **Climate Change – Degradation– Pollution** ***Climate Change:*** Introduction- Basic of Climate Change-Green House Effect, Causes , Impacts. Ozone Depletion-Causes, Impacts , International & National Measures to Control Ozone Depletion. Acid Rains-Causes, Effects, International & National Measures to Control Climate Change. ***Degradation:*** Deforestation-Causes, Impact, Preventive measures, Soil erosion-Causes, Impact, Preventive measures, Desertification-Causes, Impact, Preventive measures. ***Pollution:*** Basic Concepts- Types of Pollution, Air Pollution, Sources, Impacts, Controls, Water Pollution, Sources, Impacts, Controls, Noise Pollution, Sources, Impacts, Controls , Soil Pollution, Sources, Impacts, Controls, Radiation Pollution, Sources, Impacts, Controls, Solid Waste, Sources, Impacts, Controls. **Environmental Impact Assessment(EIA):** Concept; Principles; Process; stakeholders; Projects requiring EIA; Social Impact Assessment; Merits and Demerits of EIA;
Engineering Aptitude covering Logical reasoning and Analytical ability	Engineering Aptitude . Logical reasoning & Analytical ability.
Engineering Mathematics and Numerical Analysis	Matrix theory, Eigen values & Eigen vectors, system of linear equations, Numerical methods for solution of non-linear algebraic equations and differential equations, integral calculus, partial derivatives, maxima and minima, Line, Surface and Volume Integrals . Fourier series, linear, nonlinear and partial differential equations, initial and boundary value problems, complex variables, Taylor's and Laurent's series, residue theorem, probability and statistics fundamentals, Sampling theorem, random variables, Normal and Poisson distributions, correlation and regression analysis.

Subject Name	Syllabus
Current Issues of National and International importance related to social, Economic and Industrial Development	**Background Concepts** ***Economic and Industrial Development*** Development - Growth; three Sectors of Economy - Agriculture, Industry and Services; National Income; Inflation; Banking; Financial Markets; Public Finance; External Sector ; Economic Infrastructure; and Related Policies and Schemes of Govt. ***Social Development :*** Planning-NITI Ayog; Poverty-Unemployment; Rural and Urban Development; Education; Welfare; Women and Childern; International Issues: Indias bilateral and Multilateral issues; UNO- Agencies, Funds; Economic Institutions-World Bank, IMF,WTO,ADB,AIIB; Agreements and Summits. **Current Affairs:**
Basics of Project Management	**Intoduction:** Project and project management, classification of project, project life cycle, tools & techniques in Project management. **Project Planning:** Selection of a project, objective and goals, work break down structure (WBS). **Project Scheduling:** Scheduling tools, charts, network diagrams, CPM Networks, PERT Networks **Resource Allocation:** project crashing, resource leveling & smoothening. **Project Monitoring & Controlling:** Monitoring tools, project controlling. **Project Auditing & Termination:** Purpose of auditing-goals of the system, project termination (Closeout), project procurement and materials management.
Basics of Material Science and Engineering	**Crystal structures and Defects:-**Primary bonds, Space lattice, unit cell, lattice parameters, crystal structures, coordination number and packing factor of SC, BCC, FCC, Diamond structures, point defects, line defects, crystallographic planes and directions. Crystalline materials and amorphous materials. **Electrical Materials:-** Conductors – Ohm's Law, specific resistance, high conductivity materials, Low conductivity materials, contact materials, alloy conductors and applications, semiconductors, Energy band gap theory, Insulators and super conductors. **Nano materials:-** definition, preparation and properties, Graphite, CNT, Fulerene, Graphene, Quantum dots and their properties and applications, MEMS, NEMS. **Iron-Carbon Diagram and Steel alloys:-** Basics of phase diagram, Types of steels and steel alloys, properties of steel **Polymers:-** Structure and Types of polymers, characteristics and applications of polymers. **Nuclear materials:-** Basics of Nuclear Physics (Fission, Fussion), applications. **Dielectric Materials:-** Polarization, dielectric strength, break down, polar, non polar solids, Ferroelectrics, Piezo electrics, pyro electrics and their materials and applications. **Magnetic Materials:-** Magnetization, susceptibility and classification of magnetic materials – dia, para, ferro, anti ferro and ferri magnetic materials, hard and soft magnetic materials, influence of temperature on magnetic materials. **Ceramic materials:-** Types and application of different ceramics and their advanced types. **Composite materials:-** Types and their applications. **Material Properties and Testing:-** Elasticity, plasticity, ductility, Stiffness, malleability, fatigue, Toughness, creep, hardness etc.Material Testing methods, Non destructive testing methods.
General Principles of Design, Drawing, Importance of Safety	Design Process, Team Behavior, Problem Definition-Customer Requirements, Concept Generation, Decision Making & Concepts Evaluation, Embodiment Design, Detail Design, Introduction to Scales and Curves, Orthographic Projections, Isometric & Perspective Projections, Conventional Representation, AUTO CAD and Importance of Safety

Subject Name	Syllabus
Ethics and values in Engineering profession	Introduction to Ethics and Values in Engineering Profession, Moral Reasoning and Ethical Theories, Codes of Ethics, Engineering-Social Experimentation, Engineer's Responsibility for Safety and Risk, Responsibilities and Rights of Engineers, Global Issues, Ethical Audit & Ethical Governance and Public Servants
Information and Communication Technologies (ICT) based tools and their applications in Engineering such as networking, e-governance and technology based education.	**Information and Communication Technologies** **ICT & Networks:** Introduction to ICT and Networks, Network Typologies: PAN, LAN, MAN,WAN, Internet; Modems, ASDL, Ethernet; Inter-networking: Repeaters, switches, routers, gateways, IPv4, IPv6;DNS, e-mail, WWW; **Modern wireless technologies:** RFID, Near Field Communication, Bluetooth, Wi-Fi, WIMAX, Li-Fi, White-Fi etc. **Cellular Network Technologies:** 1G,2G,3G,4G, 5G, GSM, CDMA, EDGE, GPRS, UMTS, LTE. Satellite technologies :types of satellite , orbits **Cyber Security:** Types, Threats: E-Mail Tracking , Social Engineering, Identity Theft, Phishing, Trojans, Backdoors, Viruses, Worms, DoS and DDoS Attacks, BOTs/BOTNETs; Defenses: Digital Signatures, Firewall, Virtual Private Networks (VPN) etc.; **Computing:** Parallel, Distributed, Grid, Cloud, Super computers etc **Computer Data Storage Devices:** Types and Technologies like magnetic storage devices, optical storage devices CD, DVD, Blu-ray Disc, USB Flash Drive etc,holostore **Advanced Topics and Recent trends:** Social networks, Big data, Project Loon, White Spaces, Internet of Things; Social Networking and its platforms like Facebook, Twitter, Google Talk, Skype and e-commerce; Internet Governance: Digital Divide, Net Neutrality, Internet.org;virtual reality , augmented reality ,software engineering , **Government Policies and Schemes on ICT.** **e -Governance and Technology based Education** **e-Governance:** Meaning, Models, Scope, Advantages, Challenges; Good Governance and e-Governance; **e-governance in India:** NeGP, e-Governance Infrastructure, GoI Cloud Initiative – Meghraj; Digital India: Broadband Highways, e-Kranti, Digital Locker, BAS, eSign, National Digital Literacy Mission, Bharat Net (National Optical Fibre Network (NOFN)), e-Hospital, e-Education etc. eNAM, e-District, e-Haat; **Technology based Education:** Concept, mechanisms, merits and demerits; Applications; International practices like MOOC, Open Course Ware Consortium, Open Learn Project; ICT tools: MatLab, Mathematica, AutoCAD, SkyDrive, MS Office 365, Google Docs, etc. **e-education in India:** National Mission on Education through Information and Communication Technology (NMEICT), National Programme on Technology Enhanced Learning (NPTEL), e-Shodh Sindhu, Virtual Labs, EDUSAT, eBasta, Digital Library of India (DLI), National Digital Library(NDL), ENVIS, Indian Sign Language Education and Recognition System etc.
Standards and Quality practices in production, construction, maintenance and services	Introduction, Quality costs, Quality philosophy, Service Quality, Tools of Quality Control, Continuous Improvement Techniques, Maintenance, ISO and TQM & Construction Quality

Syllabus for ESE (Prelims), Paper-2

Subject Name	Syllabus
Fluid Mechanics	Basic Concepts and Properties of Fluids, Manometry, Fluid Statics, Buoyancy, Equations of Motion, Bernoulli's equation and applications, Viscous flow of incompressible fluids, Laminar and Turbulent flows, Flow through pipes and head losses in pipes.
Turbo Machinery	Reciprocating and Rotary pumps, Pelton wheel, Kaplan and Francis Turbines, velocity diagrams
Engineering Mechanics	Analysis of System of Forces, Friction, Centroid and Centre of Gravity, Dynamics;
Strength of Materials	Stresses and Strains-Compound Stresses and Strains, Bending Moment and Shear Force Diagrams, Theory of Bending Stresses-Slope and deflection-Torsion, Thin and thick Cylinders, Spheres.
Basic Thermodynamics	Thermodynamic systems and processes; properties of pure substance; Zeroth, First and Second Laws of Thermodynamics; Entropy, Irreversibility and availability; ideal and real gases; compressibility factor; Gas mixtures.
Heat transfer	Modes of heat transfer, Steady and unsteady heat conduction, Thermal resistance, Fins, Free and forced convection, Correlations for convective heat transfer, Radiative heat transfer – Radiation heat transfer coefficient; boiling and condensation, Heat exchanger performance analysis
Mechanisms and Machines	Types of Kinematics Pair, Mobility, Inversions, Kinematic Analysis, Velocity and Acceleration Analysis of Planar Mechanisms, CAMs with uniform acceleration and retardation, cycloidal motion, oscillating followers; Vibrations –Free and forced vibration of undamped and damped SDOF systems, Transmissibility Ratio, Vibration Isolation, Critical Speed of Shafts. Gears – Geometry of tooth profiles, Law of gearing, Involute profile, Interference, Helical, Spiral and Worm Gears, Gear Trains- Simple, compound and Epicyclic; Dynamic Analysis – Slider – crank mechanisms, turning moment computations, balancing of Revolving & Reciprocating masses, Gyroscopes –Effect of Gyroscopic couple on automobiles, ships and aircrafts, Governors.
Power Plant Engineering	Rankine and Brayton cycles with regeneration and reheat, Fuels and their properties, Flue gas analysis, Boilers, steam turbines and other power plant components like condensers, air ejectors, electrostatic precipitators and cooling towers – their theory and design, types and applications; Impulse and Reaction principles, Steam and Gas Turbines, Theory of Jet Propulsion – Pulse jet and Ram Jet Engines, Reciprocating and Rotary Compressors – Theory and Applications
IC Engines	Otto, Diesel and Dual Cycles. SI and CI Engines, Engine Systems and Components, Performance characteristics and testing of IC Engines; Fuels; Emissions and Emission Control.
Design of Machine Elements	Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as riveted, welded and bolted joints. Shafts, Spur gears, rolling and sliding contact bearings, Brakes and clutches, flywheels.

Subject Name	Syllabus
Refrigeration and Air conditioning	Vapour compression refrigeration, Refrigerants and Working cycles, Compressors, Condensers, Evaporators and Expansion devices, Other types of refrigeration systems like Vapour Absorption, Vapour jet, thermo electric and Vortex tube refrigeration. Psychometric properties and processes, Comfort chart, Comfort and industrial air conditioning, Load calculations and Heat pumps.
Manufacturing	Metal casting-Metal forming, Metal Joining, Machining and machine tool operations, Limits, fits and tolerances, Metrology and inspection, computer Integrated manufacturing, FMS.
Engineering Materials	Basic Crystallography, Alloys and Phase diagrams, Heat Treatment, Ferrous and Non Ferrous Metals, Non metallic materials, Basics of Nano-materials, Mechanical Properties and Testing, Corrosion prevention and control
Renewable Sources of Energy	Solar Radiation, Solar Thermal Energy collection - Flat Plate and focusing collectors their materials and performance. Solar Thermal Energy Storage, Applications – heating, cooling and Power Generation; Solar Photovoltaic Conversion; Harnessing of Wind Energy, Bio-mass and Tidal Energy – Methods and Applications, Working principles of Fuel Cells.
Industrial and Maintenance Engineering	Production planning and Control, Inventory control and operations research - CPM-PERT. Failure concepts and characteristics-Reliability, Failure analysis, Machine Vibration, Data acquisition, Fault Detection, Vibration Monitoring, Field Balancing of Rotors, Noise Monitoring, Wear and Debris Analysis, Signature Analysis, NDT Techniques in Condition Monitoring.
Mechatronics and Robotics	Microprocessors and Microcontrollers: Architecture, programming, I/O, Computer interfacing, Programmable logic controller. Sensors and actuators, Piezoelectric accelerometer, Hall effect sensor, OpticalEncoder, Resolver, Inductosyn, Pneumatic and Hydraulic actuators, stepper motor, Control Systems- Mathematical modeling of Physical systems, control signals, controllability and observability. Robotics, Robot Classification, Robot Specification, notation; Direct and Inverse Kinematics; Homogeneous Coordinates and Arm Equation of four Axis SCARA Robot