

[SYLLABUS FOR WRITTEN EXAMINATION]

ANNEXURE-II**PAPER-I****BASICS OF ENGINEERING (DEGREE STANDARD) Code No.230****UNIT I - MATHEMATICS:**

Matrices: Eigen values - Eigenvectors – Cayley–Hamilton theorem – Similar and Orthogonal Third formations – Reduction of a quadratic form to Canonical form by orthogonal Third formation.

Ordinary differential equations: Order and degree – Types of Equations – Higher order linear ODE with constant coefficients - Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficient.

Functions of several variables: Partial derivatives – Total derivatives – Euler's theorem – Implicit functions–Jacobians– Taylor's theorem – Maxima and Minima.

Integration: Techniques of integration using integration by parts and Bernoulli's formula – Line, Surface and Volume Integrals – Change of order of integration.

Vector Calculus: Vectors and scalars – Directional derivatives – Gradient, Divergence and Curl of vectors – Applications of Green's theorem, Gauss divergence theorem and Stoke's theorem.

Complex variables: Verification of Analyticity – Construction of Analytic functions – Conformal Mappings – Bilinear Third formations.

Complex Integration: Cauchy's integral theorem – Cauchy's fundamental theorem – Cauchy's residue theorem – Taylor's theorem – Laurent's series–Contour integration (excluding poles on the real axis)

Laplace Third form: Existence of Laplace Third form – Laplace Third form of elementary functions– Properties – Laplace Third form of Periodic functions – Inverse Laplace Third form – Convolution theorem – Solution of linear second order ODE by Laplace Third form technique

Unit II - ENGINEERING PHYSICS:

Newton's laws of motion – gravitation – work, energy and power - elasticity – moduli of elasticity and their determination-sound intensity level – reverberation – ultrasonics: production and detection - thermal conductivity and expansion - flow of heat-thermodynamics - heat engines – optical interference, anti-reflection coatings - diffraction and polarization – lasers and types - optical fibres and applications - photoelectric effect - atom models - dual nature of matter and radiation - nuclear models –radioactivity - nuclear fission and fusion - crystal structures - unit cells - packing factor –imperfections –

superconductivity - magnetic and dielectric materials – semiconducting materials - nano materials.

UNIT III - ENGINEERING CHEMISTRY:

Fuel –Classification of fuels - Calorific value – Solid fuel – Liquid fuel – Gaseous fuel – Octane number – Cetane Number – Fuel Cells. Lubricants – Classification – Greases – Solid Lubricants. Water – Sources – Classifications – Softening process – Desalination – RO Method – Internal treatment – Treatment of Water for Municipal purposes. Plastics – High polymer – classification – Polymerization techniques – Thermoplastics – Thermosetting resins – examples. Rubber – Types of Rubber – Vulcanisation – Properties – Unvulcanised and Vulcanised. Natural Rubber – Synthetic Rubber – examples. Refractories – Classification – Manufacture of Refractories – Magnesite – Silica – Zirconia – Chromite. Abrasives – Natural – Artificial–Abrasive paper & cloth. Corrosion: Dry and Wet corrosion – Factors affecting corrosion- Different types of corrosion. Protective coating – Hot dipping- metal cladding, electro deposition – Organic Coatings – Paints – Varnishes. Cement and lime- setting and hardening. Explosives- classifications- characteristics- requirements for good explosives- nitrocellulose- TNT- TNB-DNB-PETN-RDX. Alloys- purpose of making alloy- types of alloys- Ferrous alloys. Electrochemistry – conductors and non conductors – Kohlrausch law – Electrochemical cell-reversible and irreversible cells – EMF- Concentration cell- polarization – over voltage, decomposition potential.

UNIT IV - ENGLISH :

Grammar: Articles – Prepositions – Tenses (simple present, present continuous, simple past, past continuous, future, & perfect tenses) – Modal verbs – Clauses – Conditional clauses – Subject-Verb agreement – conjunctions – Active & passive voice – Reported speech (Direct to Indirect speech) – Error correction – Combining sentences using connectives – Cause & effect expressions (because, so, due to, on account of, etc.) – Framing questions (converting statements into questions)

Vocabulary: Synonyms & antonyms – Prefixes, suffixes & intensifying prefixes (e.g. Flammable – inflammable) – Phrasal verbs – Idioms – Fixed expressions (e.g. adhere to, lodge a complaint to, etc.) – One word substitution – Collocation – Expansion of compound nouns (e.g. keyboard)

Reading: Reading comprehension passage – Data interpretation (e.g. comprehension questions based on table /chart) – Choosing appropriate title for a given short passage – Inferential questions based on a short reading passage – Reading comprehension questions making use of scanning & skimming strategies – Jumbled Sentences.

Writing: Definitions (instrument & technical terms) – Visual interpretation (picture/photo/chart etc.) – process description – Letter writing (formal / official) – email communication (email etiquette) – essays.

UNIT V - BASICS OF COMPUTER ENGINEERING:

Computer Organization - CPU and Microprocessor [ALU, Control Unit and Bus Structure] – Data Storage [Primary, Secondary and Virtual] – Input and Output Devices

Systems Software – Assembler – Compiler – Loader – Linker – Operating Systems

Programming Languages – Classification of Programming Language, High-Level Languages

Basic Computer Networking – Network Components [Routers, Bridges, Gateways] – ISO-OSI Reference Model – LAN – WAN – Client-Server Architecture – Internet

Applications– Office Tools – Word-processor – Spreadsheet – Powerpoint – Database – E-mail – Browser

IT Enabled Services – E-Government – E-Commerce – Multimedia

UNIT VI - BASICS OF CIVIL AND MECHANICAL ENGINEERING:

Introduction to Engineering mechanics – Units and Dimensions – Laws of Mechanics – Coplanar Forces – Static Equilibrium of Rigid body – Moment of a force – free body diagram – friction – laws of friction – sliding friction – wedge friction – Rolling resistance – Lader friction - Friction in screws – Screw jack – Belt friction – Properties of surfaces and solids – Centroids and centre of mass – line and areas – Rectangular, circular, triangular areas by integration – T-section, I- Section, Angle section, Hollow section – Area moment of inertia of plane areas – Parallel axis theorem – Centroid of the simple solids – Dynamics of particle – Displacement, velocity and acceleration – Different types of motion – Rectilinear, Curvilinear and Projectile motions – Newton's II-law of motion – Work Energy equation – Impulse and momentum principles.

UNIT VII - BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING:

Ohm's law- Kirchoff's laws - Introduction to DC and AC circuits –Power and powerfactor- single phase and three phase circuits Operating principles of moving coil and moving iron instruments (voltmeters and ammeters)-watt meters and energy meters

Construction and principle of operation:DC motors- DC generators-Thirdformers-Induction motors Characteristics of PN junction diode-zener diode- half wave and full wave rectifiers- Bipolar junction Thirddistor (CC,CE,CB configurations)-Amplifiers-Operational amplifiers Binary number system- logic gates- Boolean algebra – Half and full adders- Flip-flops – registers and counters- A/D and D/A conversion Types of analog and digital signals- Modulation and Demodulation(amplitude and frequency)Communication systems: Radio-TV- Fax- Microwave-Satellite and optical fibre

UNIT VIII - PRINCIPLES OF MANAGEMENT:

Management- Definition, Evolution- Taylor, Fayol, Elton Mayo, Peter Drucker Planning- Types, Steps, Forecasting, MBO, MBE Organising- Departmentation- Line and staff, Delegation and Decentralization Staffing- Manpower planning, Recruitment and selection, Training, Performance Appraisal IDirecting- Leadership styles, Discipline, Communication in business Controlling- Types, Control Techniques, Budgetary Control, Statistical Control

UNIT IX - TOTAL QUALITY MANAGEMENT:

Quality - vision, mission and policy statement, dimensions of product and service quality, contributions of quality gurus-Deming, Juran, Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Cost of Quality, continuous process improvement- PDCA, Quality Circle, 5S, Kaizen, Statistical Process Control (SPC), 7 QC Tools, new management tools, benchmarking, 6 sigma, Process Quality, Quality Function Deployment(QFD), POKA YOKE, Total Productive Maintenance (TPM), Business Process Reengineering(BPR), ISO 9004: 2000 - QMS, ISO-14000.

UNIT X - ENVIRONMENTAL SCIENCE AND ENGINEERING:

Environment– Global perspective- awareness of environmental pollution- Classification of Pollutants- Air Pollution- Composition of Air – Major sources of air pollution. Gaseous Pollutants- effect of air pollution on weather, climate, atmospheric process, NOX, SO₂, CO, CO₂, Fly ash, Vehicular pollution- automobile emission- prevention- green house effect – chlorofluoro carbon- ozone layer -ozone depletion- smog- photochemical smog, acid rain. Water pollution- types of water pollution- Factors affecting surface water – sewage and domestic waste – BOD, COD.Industrial effluent- harmful effects of industrial pollutants- agricultural discharge – detergent and toxic metal – siltation. Thermal pollutants- effect of thermal pollution- radioactive pollutant – inorganic pollutants and its detrimental effects. Soil Pollution- sources of soil pollution- effect of carbon waste- noise pollution- sources of noises of pollution- types of noise pollution- prevention and control

SYLLABUS FOR WRITTEN EXAMINATION
GENERAL STUDIES (DEGREE STANDARD)

CODE NO.003

UNIT-I:GENERAL SCIENCE

- (i) Scientific Knowledge and Scientific temper-Power of Reasoning
-Rote Learning Vs Conceptual Learning-Science as a tool to understand the past, present and future.
- (ii) Nature of Universe- General Scientific Laws–Mechanics- Properties of Matter, Force, Motion and Energy- Everyday application of the basic principles of Mechanics, Electricity and Magnetism, Light, Sound, Heat, Nuclear Physics, Laser, Electronics and Communications.
- (iii) Elements and Compounds, Acids, Bases, Salts, Petroleum Products, Fertilizers, Pesticides.
- (iv) Main concepts of Life Science, Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Human diseases.
- (v) Environment and Ecology.

UNIT-II: CURRENT EVENTS

- (i) History-Latest diary of events-National symbols-Profile of States-Eminent personalities and places in news–Sports- Books and authors.
- (ii) Polity-Political parties and political system in India-Public awareness and General administration-Welfare oriented Government schemes and their utility, Problems in Public Delivery Systems.
- (iii) Geography -Geographical landmarks.
- (iv) Economics –Current socio-economic issues.
- (v) Science –Latest inventions in Science and Technology.

UNIT- III:GEOGRAPHY OF INDIA

- (i) Location–Physical features-Monsoon, rainfall, weather and climate-
Water resources- Rivers in India-Soil, minerals and natural
resources-Forest and wildlife-Agricultural pattern.
- (ii) Thirdport -Communication.
- (iii)Social geography–Population density and distribution-Racial,
linguistic groups and major tribes.
- (iv) Natural calamity – Disaster Management – Environmental
pollution: Reasons and preventive measures–Climate change–
Green energy.

UNIT – IV:HISTORY AND CULTUREOF INDIA

- (i) Indus valley civilization- Guptas, Delhi Sultans, Mughals and
Marathas-Age of Vijayanagaram and Bahmani Kingdoms- South
Indian history.
- (ii)Change and Continuity in the Socio-Cultural History of India.
- (iii)Characteristics of Indian culture, Unity in diversity – Race,
language, custom.
- (iv)India as a Secular State, Social Harmony.

UNIT-V:INDIANPOLITY

- (i) Constitution of India-Preamble to the Constitution-Salient features
of the Constitution-Union, State and Union Territory.
- (ii) Citizenship, Fundamental rights, Fundamental duties, Directive
Principles of State Policy.
- (iii) Union Executive, Union legislature – State Executive, State
Legislature– Local governments, Panchayat Raj.
- (iv) Spirit of Federalism: Centre- State Relationships.
- (v) Election-Judiciary in India– Rule of law.
- (vi) Corruption in public life–Anti-corruption measures–Lokpal and Lok
Ayukta - Right to Information - Empowerment of women -
Consumer protection forums, Human rights charter.

UNIT-VI:INDIANECONOMY

- (i) Nature of Indian economy – Five year plan models - an assessment –Planning Commission and Niti Ayog.
- (ii) Sources of revenue – Reserve Bank of India – Fiscal Policy and Monetary Policy - Finance Commission – Resource sharing between Union and State Governments-Goods and Services Tax.
- (iii) Structure of Indian Economy and Employment Generation, Land reforms and Agriculture-Application of Science and Technology in agriculture- Industrial growth-Rural welfare oriented programmes– Social problems–Population, education, health, employment, poverty.

UNIT-VII:INDIAN NATIONAL MOVEMENT

- (i) National renaissance–Early uprising against British rule- Indian National Congress - Emergence of leaders – B.R.Ambedkar, Bhagat Singh, Bharathiar, V.O.Chidambaranar, Jawaharlal Nehru, Kamarajar, Mahatma Gandhi,Maulana Abul Kalam Azad, Thanthai Periyar, Rajaji, Subash Chandra Bose and others.
- (ii) Different modes of Agitation: Growth of Satyagraha and Militant movements.
- (iii)Communalism and partition.

UNIT- VIII: History, Culture, Heritage and Socio- Political Movements in Tamil Nadu

- (i) History of Tamil Society, related Archaeological discoveries, Tamil Literature from Sangam age till contemporary times.
- (ii)Thirukkural: (a)Significance as a Secular literature
 - (b) Relevance to Everyday Life
 - (c) Impact of Thirukkural on Humanity
 - (d)Thirukkura land Universal Values-Equality, Humanism, etc
 - (e)Relevance to Socio- Politico-Economic affairs
 - (f) Philosophical content in Thirukkural

- (iii) Role of Tamil Nadu in freedom struggle - Early agitations against British Rule-Role of women in freedom struggle.
- (iv) Evolution of 19th and 20th Century Socio-Political movements in Tamil Nadu - Justice Party, Growth of Rationalism - Self Respect Movement, Dravidian movement and Principles underlying both these movements, Contributions of Thanthai Periyar and Perarignar Anna.

UNIT – IX: Development Administration in Tamil Nadu

- (i) Human Development Indicators in Tamil Nadu and a comparative assessment across the Country- Impact of Social Reform movements in the Socio- Economic Development of Tamil Nadu.
- (ii) Political parties and Welfare schemes for various sections of people- Rationale behind Reservation Policy and access to Social Resources- Economic trends in Tamil Nadu-Role and impact of social welfare schemes in the Socio- economic development of Tamil Nadu.
- (iii) Social Justice and Social Harmony as the Cornerstones of Socio-Economic development.
- (iv) Education and Health systems in Tamil Nadu.
- (v) Geography of Tamil Nadu and its impact on Economic growth.
- (vi) Achievements of Tamil Nadu in various fields.
- (vii) e-governance in Tamil Nadu.

UNIT-X: APTITUDE AND MENTAL ABILITY

- (i) Simplification-Percentage-Highest Common Factor (HCF)- Lowest Common Multiple (LCM).
- (ii) Ratio and Proportion.
- (iii) Simple interest-Compound interest-Area-Volume-Time and Work.
- (iv) Logical Reasoning-Puzzles-Dice-Visual Reasoning-Alpha numeric Reasoning-Number Series.