

**FURTHER DETAILS REGARDING MAIN TOPICS OF
PROGRAMME No. 12/2017 (Item No. 1)**

**ASSISTANT ENGINEER
GROUND WATER DEPARTMENT
(CATEGORY No.215/16)**

1. General Knowledge, Current Affairs & Renaissance in Kerala

Salient Features of Indian Constitution

Salient features of the Constitution - Preamble- Its significance and its place in the interpretation of the Constitution.

Fundamental Rights - Directive Principles of State Policy - Relation between Fundamental Rights and Directive Principles - Fundamental Duties.

Executive - Legislature - Judiciary - Both at Union and State Level. - Other Constitutional Authorities.

Centre-State Relations - Legislative - Administrative and Financial.

Services under the Union and the States.

Emergency Provisions.

Amendment Provisions of the Constitution.

Social Welfare Legislations and Programmes

Social Service Legislations like Right to Information Act, Prevention of atrocities against Women & Children, Food Security Act, Environmental Acts etc. and Social Welfare Programmes like Employment Guarantee Programme, Organ and Blood Donation etc.

RENAISSANCE IN KERALA

Towards A New Society

Introduction to English education - various missionary organisations and their functioning- founding of educational institutions, factories, printing press etc.

Efforts To Reform The Society

(A) Socio-Religious reform Movements

SNDP Yogam, Nair Service Society, Yogakshema Sabha, Sadhu Jana Paripalana Sangham, Vaala Samudaya Parishkarani Sabha, Samathwa Samajam, Islam Dharma Paripalana Sangham, Prathyaksha Raksha Daiva Sabha, Sahodara Prasthanam etc.

(B) Struggles and Social Revolts

Upper cloth revolts. Channar agitation, Vaikom Sathyagraha, Guruvayoor Sathyagraha, Paliyam Sathyagraha. Kuttamkulam Sathyagraha, Temple Entry Proclamation, Temple Entry Act .Malyalee Memorial, Ezhava Memorial etc.

Malabar riots, Civil Disobedience Movement, Abstention movement etc.

Role Of Press In Renaissance

Malayalee, Swadeshabhimani, Vivekodayam, Mithavadi, Swaraj, Malayala Manorama, Bhashaposhini, Mathnubhoomi, Kerala Kaumudi, Samadarsi, Kesari, AI-Ameen, Prabhatham, Yukthivadi, etc

Awakening Through Literature

Novel, Drama, Poetry, *Purogamana Sahithya Prasthanam*, *Nataka Prashtanam*, Library movement etc

Women And Social Change

Parvathi Nenmenimangalam, Arya Pallam, A V Kuttimalu Amma, Lalitha Prabhu. Akkamma Cherian, Anna Chandi, Lalithambika Antharjanam and others

Leaders Of Renaissance

Thycaud Ayya Vaikundar, Sree Narayana Guru, Ayyan Kali. Chattampi Swamikal, Brahmananda Sivayogi, Vagbhadananda, Poikayil Yohannan (Kumara Guru) Dr Palpu, Palakkunnath Abraham Malpan, Mampuram Thangal, Sahodaran Ayyappan, Pandit K P Karuppan, Pampadi John Joseph, Mannathu Padmanabhan, V T Bhattathirippad, Vakkom Abdul Khadar Maulavi, Makthi Thangal, Blessed Elias Kuriakose Chaavra, Barrister G P Pillai, TK Madhavan, Moorkoth Kumaran, C. Krishnan, K P Kesava Menon, Dr. Ayyathan Gopalan, C V Kunjuran, Kuroor Neelakantan Namboothiripad, Velukkutty Arayan, K P Vellon, P K Chathan Master, K Kelappan, P. Krishna Pillai, A K Gopalan, T R Krishnaswami Iyer, C Kesavan. Swami Ananda Theerthan, M C Joseph, Kuttippuzha Krishnapillai and others

Literary Figures

Kodungallur Kunhikkuttan Thampuran, KeralaVarma Valiyakoyi Thampuran, Kandathil Varghese Mappila. Kumaran Asan, Vallathol Narayana Menon, Ulloor S Parameswara Iyer, G Sankara Kurup, Changampuzha Krishna Pillai, Chandu Menon, Vaikom Muhammad Basheer. Kesav Dev, Thakazhi Sivasankara Pillai, Ponkunnam Varky, S K Pottakkad and others

GENERAL KNOWLEDGE AND CURRENT AFFAIRS

General Knowledge and Current Affairs

PART II

MODULE – I ENGINEERING MECHANICS

Mechanics – statistics – Coplanar forces – conditions of equilibrium. Support reactions – Simply supported and overhanging beams. Friction – Laws of friction – applications. Center of gravity and moment of inertia of plane areas. Dynamics – rectilinear motion – Newton's laws of motion – curvilinear motion.

MODULE – II STRENGTH OF MATERIALS

Terms simple stress and strain, longitudinal strain, lateral strain, Poisson's ratio, Hook's law, Modulus of rigidity, shear stress, shear strain, Friction, sliding friction, rolling friction, cone of friction, centre of gravity, moment of inertia, simple equations. Shear force and bending moment - Types of beams and its loading conditions, shear force and bending moment diagrams and

equations in different types of beams and different types of loads, point load, uniform distributed load, cantilever beam, simply supported beam.

MODULE – III THERMODYNAMICS

Basic concepts and definitions, microscopic and macroscopic approaches, definitions of heat and work, zeroth law of thermodynamics, first law of thermodynamics, Applications of first law to processes, Properties of Pure Substances, Second Law of Thermodynamics, Kelvin – Planck and Clausius statements. Reversible Processes and Cycles. The Carnot cycle – corollaries of the Second Law. Available and unavailable energy, Availability function, Availability and irreversibility open and closed systems. General Thermodynamics Relations – combined First and Second Law equations – Helmholtz and Gibb's functions - Maxwell's Relations. Throttling process, Joule Thomson Coefficient, inversion curve. Properties of Gas Mixtures : composition of a gas mixture – Mass and Mole Fraction, Dalton's law, Gibbs – Daltons Law, equivalent molecular weight and gas constant, properties of gas mixtures – Specific Heats, Internal energy, enthalpy and Entropy.

MODULE – IV FLUID MECHANICS AND MACHINES

Properties of fluids: Ideal and real fluid. Pressure and its measurement, Pascal's law, pressure forces on plane and curved surfaces, centre of pressure , buoyancy, metacentre and metacentric height, condition of floatation and stability of submerged and floating bodies. Kinematics of fluid flow: Lagrangian and Eulerian description of fluid motion, continuity equation, path lines, streak lines and stream lines, stream function, velocity potential and flownet. Types of fluid flow, translation, rotation, circulation and vorticity, Vortex motion; Dynamics of fluid flow, Bernoulli's theorem. Flow through pipes – Turbulent flow through pipes, Head loss due to friction, friction factor, Mody's chart, Darcy-weisbach equation, Chezy's formula. Hydraulic Turbines: Impulse and Reaction Turbines – Pelton Wheel – Velocity triangles – Euler's equation – Speed ratio, jet ratio & work done, losses and efficiencies, design of Pelton wheel inward and outward flow reaction turbines, Francis Turbine – Positive displacement pumps – reciprocating pump – air vessels and their purposes – separation and cavitation – slip negative slip and work required and efficiency indicator diagram – effect of acceleration and friction on indicator diagram.

MODULE – V MACHINE DESIGN

Design of spur gear, helical gear, bevel gear and worm gear – AGMA standards. Design of I.C engine parts – cylinder, piston connecting rod, Crankshaft, Flywheel. Thread standards – stresses in screw threads, Power screw – analysis of power screws. Shaft couplings – stresses in couplings design of couplings. Welded joints – types of welded joints – stresses in butt and fillet welds – torsion and bending in welded joints – pressure vessels, thin cylinders, Thick cylinder equation, classification and use of springs – deflection of helical springs – design of helical springs for static and fatigue loading – design of leaf springs.

MODULE – VI MANUFACTURING ENGINEERING

Metal casting – sand casting, die casting, investment casting, centrifugal casting, gating and riser design, melting furnaces, forming – hot and cold processes, forging, drawing, extrusion, shearing, bending, high energy forming, joining processes welding, weldability, metallurgy of welding, machining processes, power metallurgy – single and multi point cutting tools, tool geometry and materials, mechanics of machining , tool life and wear, jigs and fixtures, unconventional methods, EBM, ECM, LBM, Ultrasonic machining, computer integrated manufacturing , CNC machining, metrology and instrumentation – limits, fits and tolerances, accuracy, precision, repeatability, comparators, gauges, interferometry, surface structure, measurement of displacement, velocity, acceleration, temperature, Transducers.

MODULE – VII METALLURGY & MATERIAL SCIENCE

Equilibrium diagrams – construction and uses-Equilibrium diagram of binary alloys: Eutectic, Eutectoid, Peritectic and peritectoid reactions. Iron-Carbon Equilibrium diagram, Isothermal TTT diagrams, Critical cooling rate. Heat treatment processes, Hardenability tests. Surface treatments, Case Hardening, Carburising, Nitriding, Cyaniding, Induction hardening, Properties, composition and uses of various types of Cast Iron and Steels – Effect of various alloying elements. Properties, composition and uses of Copper, Aluminium, Titanium and its alloys.

MODULE – VIII PRINCIPLES OF MANAGEMENT

Principles and functions of scientific management, Levels and skills of management, organizational structure, system concept of management – line, line and staff, project and matrix organizations, proprietary partnership and joint stock companies, private limited, public limited companies, cooperative organizations and Government organizations. Plant layout, types of layouts: process, product, fixed and group layouts. Marketing management – objectives and function, forecasting – moving average, exponential smoothing, break-even analysis, capacity planning inventory control, ABC analysis, EOQ model, work study – Job evaluation and merit rating, quality control, control charts for variables and attributes, acceptance sampling, TQM, SPC tools, ISO standards, linear programming – Graphical and Simplex solution methods, Transportation and assignment models, single server queuing models, network theory – CPM – crashing of networks, PERT – probability of completion.

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.