FURTHER DETAILS REGARDING MAIN TOPICS OF PROGRAMME NO. 04/2017 (Item No. 34)

ASSISTANT DIRECTOR

INDUSTRIES AND COMMERCE DEPARTMENT

CATEGORY No.02/15

PART -I

(a) CIVIL ENGINEERING

Structural engineering: Stress and strain, principal stresses and strains, temperature stress, theory of simple bending, torsion formula, thin cylinders, thick cylinders, analysis of frames, direct and bending stresses, core of a section, short columns and long columns, consistent deformation method.

Geotechnical engineering: Three phase system, index properties, shear strength, consolidation characteristics, compaction, stability of slopes, bearing capacity, settlement, shallow foundations, pile foundations.

Building materials and Concrete technology: Stone, brick, timber, alternate building materials, types of cement, tests for cement, types of concrete, workability, tests for hardened concrete, non destructive tests.

(b) MECHANICAL ENGINEERING

Thermodynamics and power cycles: Concepts of thermodynamics, system, process, cycle Three Laws of thermodynamics, Carnot cycle, Air cycles, properties of steam, Rankine cycle, Brayton cycle, methods for improving the efficiency of these cycles

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Fluid Mechanics: Density, specific weight, viscosity, surface tension, pressure, Pascal's law, fluid dynamics: velocity, acceleration, Bernoulli's theorem, continuity equation, momentum equation, pressure loss, major and minor losses, Hydraulic Machines**:** Impact of jets, Hydraulic Turbines: Impulse and Reaction and related accessories, Positive displacement pumps, rotodynamic pumps-, selection of pumps

Mechanics of machines: Machine and mechanisms, Types of Mechanisms, Mechanical vibrations: Types of vibrations, Basic elements of a vibrating system, Un-damped force vibrations, Free vibrations with viscous damping, logarithmic decrement, forced vibrations, vibration isolation and transmissibility

Manufacturing process: Casting, forging, rolling, welding, soldering and brazing. Machining processes, turning, taper turning, thread cutting, shaping, drilling, grinding,

milling. Principle, application and advantages of CNC machines. Electro chemical and discharge machining.

(c) ELECTRICAL ENGINEERING

Elementary concepts of electric circuits: Kirchhoff's laws, node voltage and mesh current methods, super node and super mesh analysis; average, RMS values and form factor of alternating current, Analysis of simple ac circuits, Solution of RL, RC and RLC circuits;

Three phase systems: star and delta connection, power in three phase circuits; Measurement of power in three phase circuits - Working of energy meters;

Generation of power, Power transmission and distribution:: hydroelectric, thermal and nuclear power plants. Renewable energy sources; Typical electrical power transmission scheme, substation equipments, primary and secondary transmission and distribution systems;

Electrical Machines: Transformers- single and three phase construction, losses, efficiency; D.C. Machines-Types, characteristics, applications**;** A.C. Machines **–** three phase and single phase induction motors, alternators and synchronous motors;

Tariff and Wiring systems: Different types of LT and HT consumers, tariff schemes; wiring different types, meter board and distribution board, earthing of installations, protective fuses, MCB, ELCB.

(d) ELECTRONICS ENGINEERING

P, N type semiconductors - doping - principles and characteristics of diodes, transistors - half bridge and full bridge rectifiers - RC filters for power supply

Principles of amplifiers - performance parameters of amplifiers - RC oscillators- negative feedback - boolean algebra - truth table - adder, multiplexer, encoder, using primary gates - flip flops as memory elements - synchronous counters

Principles of amplitude modulation and frequency modulation - frequency and time division multiplexing - sampling of information signals - analog to digital conversion principles - digital to analog conversion principles.

(e) COMPUTER SCIENCE& ENGINEERING

Introduction to digital computer – A simple model of computer with acquisition of data, storage of data, processing of data, output of processed data. Details of functional units of a computer, primary storage and secondary storage;

Data representation – Number systems – Binary numbers - representation of integers – representation of fractions – octal and hexadecimal representations - conversion from one system to another - representation of BCD numbers. Simple arithmetic operations;

Introduction to programming languages: Types of programming languages - high level language, assembly language and machine language, System software - Operating systems – objectives of operating systems, compiler, assembler and interpreter (concepts only);

Problem Solving strategies: Problem analysis – formal definition of problem – Solution – breaking a problem into sub problems- overview of the solution to the sub problems by writing step by step procedure (algorithm) - representation of procedure by flowchart;

(f) CHEMICAL ENGINEERING

Fluid solid systems and particle technology

Properties of fluids, pressure measurement, material, momentum and energy balance in fluid flow through pipes and conduits, equation of continuity, equation of motion - Navier-Stoke's equation, Euler equation, Bernoulli's equation and its application, flow measuring equipments, design of fluid moving machinery. Newtonian and Non-Newtonian flow.

Particle technology: particle size analysis, solid handling- particle size distribution, particle shape and size. concepts involved in size reduction, associated equipments, Solid-solid separation: concepts of different types of settling, sedimentation and associated solid-liquid and gas-solid separation equipments, packed beds and fluidized beds.

Water Engineering

Water quality parameters and standards, Standards adopted by CPCB and SPCB; drinking water quality standards; effluent discharge standards for disposal on land, rivers and streams. water pollution: classification and characterization of water pollutants, sources, causes, effects of water pollution; control processes, wastewater sampling and analysis, bacteriological measurements, monitoring and quality standards, water pollution laws and compliance with standards.

(g) AGRICULTURE ENGINEERING

Crop management practices: Weed management, irrigation and moisture conservation, nutrient application methods in horticultural crops, Root architecture, Special practices, training, pruning, ringing, notching, disbudding and pinching, Canopy management and crop regulation, physical and chemical regulation.

Harvesting and post harvest engineering: Harvest operations Maturity indices, harvesting methods, pre cooling, packaging, packing methods, storage of horticultural crops. Post harvest engineering, objectives, post harvest losses of cereals, pulses and oil seeds, optimum stage of harvest. Threshing, traditional methods mechanical threshers, moisture content, measurement, direct and indirect methods, moisture meters, equilibrium moisture content. Psychrometry and Drying, Psychrometric charts and its uses, Drying, principles and theory of drying, thin layer and deep bed drying, Hot air drying, methods of producing hot air , Types of grain dryers, selection, construction and operation and maintenance of dryers Cleaning

and grading air screen cleaners, cylinder separator, spiral separator, magnetic separator, colour sorter, inclined belt separator, length separators, effectiveness of separation and performance index. Shelling and handling, Principles and operation, maize sheller, husker sheller for maize, groundnut decorticator, castor sheller.

Agriculture Machines and operations: Classification of tractors, Tractor engines, construction of engine blocks, cylinder head and crankcase, features of cylinder, piston, connecting rod and crankshaft, firing order, combustion chambers. Power tiller and Tractor Testing Power tiller, special features, clutch, gear box, steering and brake. Makes of tractors and power tillers. Types of tests, test procedure, need for testing and evaluation of farm tractor, Test code for performance testing of tractors and power tillers- material handling: belt conveyor, screw conveyor, chain conveyor, bucket elevators, pneumatic conveying.

(h) MANAGEMENT

Principle of Management-Functions of Management-Planning, Organizing, Staffing, Directing, Controlling- Line & Staff functions, Matrix Organization-Sole proprietorship, Joint stock, Private Limited and Public Limited Companies

Operations Management (Planning)-Demand Forecasting-Moving average and Exponential-Differences between products and services-Factors in site selection-Types of layout -capacity Planning- Capacity Utilization-Break even analysis-Make or Buy decision

Operations Management (Execution)-Productivity-Work Study, Method Study-inventory Management-EOQ Model-Quality-Control charts for variables and attributes-six sigma-LP Models-Transportation and assignment Models-Project Management-PERT and CPM-Crashing networks-probability of Completion

Start-up companies-SWOT Analysis-Business Plan-Viability assessment-constitution of statutory compliances-industry Analysis-Projected cash flow statement-Debt Service Coverage Ratio-profitability Ratios-Implementation schedule-Growth and exit strategy-

Communication-Channels of Communication-Barriers to communication-Tips on powerful presentation-conflict management

PART II

Module I : General Knowledge and 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 Cheriyan, 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 Kunjuraman, 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

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.