

**FURTHER DETAILS REGARDING MAIN TOPICS OF
PROGRAMME NO. 04/2017 (Item No. 13)**

ASSISTANT ENGINEER(ELECTRONICS)

PUBLIC WORKS

CATEGORY No.506/13

PART I

Module-1

Basics of electrical engineering –single phase and three phase circuits Kirchoffs voltage and Kirchoffs current law. Nodal analysis, mesh current analysis, Transient response of ac and dc networks, Sinuosoidal steady state analysis, Resonance, passive filters, ideal current and voltage sources, Thevinins Theorem, Nortons theorem, Superposition theorem, maximum power transfer theorem, 2 port networks, three phase circuits, power and power factor in ac circuits

Electromagnetic field theory

Coulombs law, electric field intensity, electric flux density, Gauss law, divergence, electric field due to potential, line, plane and spherical charge distributions, effect of dielectric medium, capacitance of simple configurations, bio savart's law, amperes law, curl, Faradays laws, lawrece force, inductance, magneto motive force, reluctance, magnetic circuits, self and mutual inductance of simple configurations.

Module-II

Electrical Machines: Single phase transformer – equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers – connections, parallel operation; autotransformer; energy conversion principles; DC machines – types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors – principles, types, performance characteristics, starting and speed control; single phase induction motors; synchronous machines – performance, regulation and parallel operation of generators, motor starting, characteristics and applications; servo and stepper motors.

Module-III

Power Systems: Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference; distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow; voltage control; power factor correction; economic operation; symmetrical components; fault analysis; principles of overcurrent, differential and distance protection; solid state relays and digital protection; circuit breakers; system stability concepts, swing curves and equal area criterion; HVDC transmission and FACTS concepts.

Control Systems: Principles of feedback; transfer function; block diagrams; steady-state errors, Routh and Niquist techniques; Bode plots; root loci; lag, lead and lead-lag compensation; statespace model; state transition matrix, controllability and observability.

Module-IV

Electrical and Electronic Measurements: Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments; measurement of voltage, current, power, energy and power factor; instrument transformers; digital voltmeters and multi meters, phase, time and frequency measurement; Q-meters; oscilloscopes; potentiometric recorders; error analysis.

Types of Earthing, Methods of measurements of earth resistance and insulation resistance, testing of electrical installations(house wiring and industrial wiring)-fuses- Types and characteristics, materials used Electric Traction- Speed time curves- Illumination – Measurement of luminous Intensity- Integrating spheres.

Module V

Analog and Integrated Circuits:

Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and analog CMOS. Simple diode circuits, clipping, clamping, rectifier. Amplifiers: single-and multi-stage, differential amplifiers, OPAMP applications, bandwidth and performance of amplifiers. Sinusoidal oscillators; criterion for oscillation; single-transistor and op-amp configurations. Function generators and wave-shaping circuits, 555 Timers, PLL principles and applications.

Module VI

Digital circuits

Truth table, minimization of Boolean functions, realization of truth table - Combinational circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs, implementations using universal gates, Sequential circuits: latches and flip-flops, state machine representation, counters and shift registers, Sample and hold circuits, ADCs, DACs, Semiconductor memories – FPGA

Module VII

Communication Systems

Analog communication systems: amplitude and frequency modulation and demodulation systems- spectral analysis of these operations, super heterodyne receivers; realizations of analog communication systems; signal-to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM). Fundamentals of information theory - Digital communication systems: pulse code modulation (PCM), differential pulse code modulation (DPCM), digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK) - Basics of TDMA, FDMA - Maxwell's equations: differential and integral forms, Wave equation, Poynting vector- Transmission lines: characteristic impedance; impedance transformation, Basics of Antennas: Dipole antennas; radiation pattern; antenna parameters.

Module VIII

Power Electronics

Characteristics and principle of operation of Diac, Triac, Power MOSFET, SCR, IGBT – Rectifiers and filters: half bridge and full bridge rectifiers with RC filters- Voltage Regulators, voltage and current protection- DC to DC Converters : Buck and Boost Converters, half bridge and full bridge converters- Inverters, Pulse width modulation techniques, SMPS, principles of DC and AC motor control.

PART II : 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, Swadeshbhimani, Vivekodayam, Mithavadi, Swaraj, Malayala Manorama, Bhashaposhini, Mathnubhoomi, Kerala Kaumudi, Samadarsi, Kesari, Al-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.