Lecturer in
ELECTRICAL ENGINEERING

Module I : General Knowledge and Current Affairs

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

GENERAL KNOWLEDGE AND CURRENT AFFAIRS
General Knowledge and Current Affairs

Module II (a): Technical Mathematics

   I. Matrices – Identification of Matrices, matrix operations, adjoint and inverse.

  II. Determinants – Evaluation of second and third order, minors and cofactors, solutions of simultaneous linear equation in three unknown using Cramer's rule.

 III. Binomial Series – Expansions using Binomial theorem.

  IV. Trigonometric functions – Signs of functions in each quadrant. Trigonometric values of angles, properties of trigonometric functions, applications of the identities sin (A ± B), cos (A ± B) and tan (A ± B).

   V. Coordinate geometry – Equations to a straight line – slope-intercept form, intercept form, Angle between two lines, condition for two lines to be perpendicular, parallel.

  VI. Differentiation – Limits and continuity, derivatives of functions, equation to tangents and normals. Maxima and minima of functions of one variable.

 VII. Integration of functions – Integration of different types of functions.

VIII. Applications of integration – Area bounded by a curve and X or Y axis, solutions of differential equations using the method of variable separable, solutions of linear differential equations of first order.

Module II (b): Basic Civil Engineering

Materials: Brick – varieties and strength, characteristics of good brick. Cement – varieties and grade of cement and its uses. Steel – types of steel for reinforcement bars, steel structural sections. Aggregates – types & requirements of good aggregates. Concrete – grades of concrete as per IS code, water cement ratio. Workability, mixing, batching, compaction and curing.

Construction: Parts of building – foundation – types of foundations – spread footing, isolated footing, combined footing, Raft, pile and well foundations. Masonry – types rubble masonry, brick masonry, English bond and Flemish bond. (One brick wall).

Surveying: Chain surveying – principles, instruments, ranging, and chaining survey lines, field work and field book, selection of survey stations, units of land area.

Levelling: Levelling instruments, different types, bench mark, reduced level of points, booking of field notes, reduction of levels by height of collimation method (simple problem). Modern survey – instruments – Total station, Electronics theodolite, Distomat.

Module II (c): Basic Mechanical Engineering

The importance of IC Engines: Definition, classification – two stroke engines, four stroke engines, working of two stroke engines and four stroke engines with the help of line sketches, comparison between two stroke and four stroke engines, comparison between petrol and diesel engines, function of fly wheel, clutch, gearbox, propeller shaft and differential in power transmission, explain with sketch the working of differential, briefly explain power transmission of 4 wheel vehicle with line diagram.

The importance of Power Plants: Introduction, classification of power plants – working of hydroelectric power plant with schematic sketches – working of thermal (Steam and Diesel) power plant with schematic sketches – working of nuclear power plant with schematic sketches.

Module II (d): Basic Electrical Engineering

Review with discussion of electric current, potential difference, power, EMF, resistance and its laws, Ohms law and series parallel circuit, electromagnetism, generation of AC and DC supply.

Idea of Basic electrical circuit: Electrical supply and load and its functioning, division of voltage and current in a parallel and series circuit – simple problems, units of power and energy, solution of DC circuit with calculation of energy consumption in an installation.

Circuit parameters: Resistance, Capacitance and inductance. AC circuit with R, L, C. Simple solution of typical AC circuit with resistance, impedance, power and power factor.

Electrical circuit of an installation: Earthing, lightning protection.

Module II (e): Essentials of Electronics Engineering

Active and passive devices – review only. LED – working, applications, comparison of LED lighting and CFL lighting. Full wave rectifier – diagram and explanation, 5 V power supply – with bridge rectifier and 7805. SMPS – block diagram and advantages. Integrated circuits. SMDs – advantages. Static electricity – precautions in handling electronic circuits.

Switches: ON / OFF, push to ON, push to OFF, push to ON / OFF, SPST, SPDT, DPDT. Working and application of limit switches, proximity switches, relays.

Microcontrollers: Simple block diagram of 8 bit microcontrollers – application.

Mobile technology: CDMA and GSM. Compare – 2G and 3G technologies.

Inverter & UPS: Block diagram. Compare – inverter and UPS. Online and off line UPS – differentiate. Battery selection for UPS and inverter.

E-waste: Health hazards of e-waste.

Module III :
DC machines – generator types, construction, emf equation, windings, characteristics armature reaction, commutation, trouble shooting and application.
DC motor – voltage equation, speed and torque, starting methods speed control, starters.
Transformer – single phase and three phase – equivalent circuits, phasor diagrams, tests, regulation and efficiency. Connections – parallel operation, autotransformer – principle.
Induction motor – Squirrel cage and slip ring, principle and operation, slip, rotor current frequency and rotor emf. Torque equation, max torque, characteristics, power stages, equivalent circuits.
Speed control – starting methods, starters and applications.
Synchronous Generator – construction – salient pole & non salient pole, excitation – methods, emf equation, armature reaction, armature reactance, leakage reactance, Vector diagram, Voltage regulation, cooling system.
Synchronous Motor – methods of starting, characteristic, application, Phaser, hunting.

Module IV :

Power System: Power generation – system – hydel, thermal, nuclear, - layouts, site selection, advantages and disadvantages of different systems.
Transmission – line constants, line insulators, string efficiency, sag, skin, corona and Ferranti effect, DC transmission system.
Cables – terms and definitions. Types. Distribution – systems, overhead – Radial, ring & inter connected.

Protection – primary and secondary, fuses – terms and definitions, types.
Circuit breaker – principle, operation and types. Protection of alternator, transmission line and neutral earthing.
Utilisation electric heating, materials advantages, types, devices.
Electrical welding principle and types, Traction, terms, definitions, speed time characteristic
Breaking – types.

Module V :

Measurements & estimating: Instruments – Function, terms and definitions. Principle construction and application. Instruments used for current, voltage, power, power factor, frequency and energy. Digital voltmeter, digital multimeter, and cathode ray oscilloscope (CRO).
Transducers and gauges – stain gauge – LVDT, burden tube, capacitor transducer, Piezoelectric transducer, bellows,
Illumination – terms and definitions, laws of illumination lighting schemes, design and calculation. Lamps – different types – working. IS code, I E rule, busbar design. Industrial electrification.

Module VI :

Electronics and Op-amp: Transistor – characteristics, configuration and application.
Amplifier – classification, working, circuit diagram and application.
Oscillator – concept of Barkhausen's criteria, types.
Multi Vibrates – types circuit diagram and application.
Number system – conversion of decimal, octal and hexadecimal into binary and vice versa.
Binary addition, subtraction and division.
Systems of signed binary number – true magnitude form, 1's compliment, 2's compliment.
Logic gates – basic logic gates – verification of Truth table – Boolean's algebra – axioms and postulates, universal logical gates. K-Map, De Morgan's theorem, half adder, full adder, multiplexing and demultiplexing. Flip flop circuit and clocked flip-flop circuits, operational amplifier – working characteristic and applications.

Module VII :

Power Electronics and Microcontroller: UJT, FET, Diac, Triac, SCR – principle, construction, operation, characteristic, Electric Drives – DC, single phase, semi converter, single full converter single phase duel converter.
Speed control of 3 phase induction, stator control, voltage and frequency.
Microcontroller – 8051 microcontrollers – features, block diagram, architecture, register structure, special function registers, internal and external memory, pin details, ports, counters and timers in 8052. Serial I/Os, associated registers, interrupts.
PLC – applications, importance, block diagram, operation types of PLCs, programming – methods – ladder diagram.