WORKSHOP INSTRUCTOR/INSTRUCTOR GRADE II/ DEMONSTRATOR/DRAFTSMAN GRADE II (COMPUTER HARDWARE AND MAINTENANCE)

TECHNICAL EDUCATION DEPARTMENT
(CATEGORY No.636/14)

Part I: General Knowledge, Current Affairs and 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,
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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

Part 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 $\sin (A \pm B)$, $\cos (A \pm B)$ and $\tan (A \pm B)$.

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.

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Part 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.

Part 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.

Part 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.

Part 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.

PART III – CORE SUBJECT

MODULE – I(Digital Electronics and Microprocessor)

Number System and Boolean algebra- binary codes, other codes like ASCII, EBCDIC, etc, binary arithmetic, Introduction to logic gates, Universal property of NAND and NOR gates, the sum of products (SOP) expression, product of sum (POS) expression, Logic simplification and logic families, Boolean theorems and postulates, SSI, MSI, LSI, VLSI and ULSI, existing logic families, positive and negative logic, TTL, TTL inverter, ECL, high threshold logic, CMOS logic family, Comparison of logic families, Combinational Logic Circuits - multiplexer/data selector, Encoders and decoders. Sequential Logic Circuits – Shift registers, counters.

Microprocessors - General Architecture of a Computer System - evolution of Intel microprocessor architecture- Software Architecture of 8086 - Memory Address Space and Data Organization - Data Types Segment Registers and Memory Segmentation Dedicated, Reserved and General Use of Memory, registers, Generating a Memory Address, stack, Input/Output Address Space-Addressing Modes of 8086. Hardware Structure of 8086 – Minimum Mode and Maximum Mode Operation-Bus Cycles and Time states- Hardware organization of the Memory Address Space-Memory Control Signals, Isolated and memory mapped I/O Instruction Set of 8086 – clearing, Setting and Toggling Bits of an operands, isolating the value of a Bit in an operand, Alignment of data in operands, Subroutines and Subroutine Handling, Assembly Language Programming concepts, Interrupts, Interfacing with – Programmable Peripheral Interfac, DMA Controller, Keyboard and Display Interfacing, Pentium Processors Architecture,Introduction to MMX, Intel Pentium II,III, IV Processor – Hyper Threading Technology .

Module II (System Hardware and System Administration)

Motherboard organization, Form Factors, Processor Slots and Sockets. CMOS & BIOS - Plug and Play(PnP), Expansion Bus Architecture – North and South Bridges,Expansion cards – Processor and cache, Chipsets and Controllers, CPU Over clocking and Throttling, SMPS & connectors, Video RAMs, Memory Packages, Memory Parity and ECC, Memory Mapping, Storage devices, Seek time Latency time, acess time, Drive Controllers and Interfaces – construction of hard disk, recording and reading of Optical Storage Devices, Super Disks , Zip Drives, Thumb Drives, Flash Drives and SD cards, need of backups, Input Devices, IRQs, DMAs, I/O addresses, Keyboard organization and encoding methods, construction and working of Mouse and other input devices, Video Display Devices, working of CRT, Video display standards, LCD LED , working of different types of printers, Disk Partitioning, file systems FAT 16, FAT 32, NTFS, HPFS, Linux File System, System assembling procedure – different types of OS and their installation procedure, Trouble shooting & Maintenance systems, computer faults, network faults, data recovery tools, POST , error codes and beep codes, bench marking techniques.

The role of system administrator, different linux distributions, man pages and other documentation, Linux file system hierarchy, Basic File & Directory management commands, streams, pipes filters and redirection, Basic shell programming constructs. Variables, expressions, if for etc; Job and Process Control Adding new users, groups, permissions, Managing File Ownership and File Permissions, File System Concepts, ext3 etc, Creating Partitions and File systems, File System mounting and unmounting, Maintain the integrity of file systems, GNU/LINUX booting sequence. Bootloader, kernel, init system, run levels, Demons/ Services, adding/editing services to run levels,Automating and Schedule System Administration tasks. Data Backup Strategy, Configure and use system log files, Software Installation and Management, Printing Services, Recovering from a crashed system – reinstalling boot loader etc, Kernel of Linux System and Drivers-Configuring/compilation/updating Kerne

Module III (Data Communication and Computer Networks)

Basic terminologies of Communication, different topologies, LAN, MAN,&WAN, analog and digital transmission, protocol architecture, ISO-OST, TCP/IP structures- various transmission impairments, guided transmission media, wireless transmission, signal encoding methods, various digital modulation – PCM – Frequency and Analog modulation, errors during communication, error detection and correction, Multiplexing, RS 232C standard-simplex .HDX and FDX transmission, Advantages of wireless communication - point to point and multi point configuration – switching techniques, polling techniques, data, security-ciphers-public key algorithm-RSA-Digital signatures.

Computer networks - applications, overview of ISO-OSI architecture, Data link layer, framing, error control, flow control, MAC sub layer, Aloha-CSMA-CSMA/CD-Ethernet-LLC-ATM networks, Network layer – routing algorithms, congestion control algorithms, IP protocol, flow control crash recovery, Application layer, DNS-email,Network management service – Virtual LAN,Wireless technology, Wireless Access Point, IEEE 802.11 standard, bluetooth protocols.

Module IV(Programming using C&Java and Database Management Systems)

C Language-Date types, Tokens, Control structures, arrays, strings, user defined & library functions, storage class, Structures, Nested structures, Arrays of structures, pointers, dynamic memory allocation(DMA). File handling – Data organization, File attributes, File

Operations, Text and Binary files, streams, working with streams, Direct access file – Preprocessors and macors, Command Line arguments, Error handling and Graphics

Java Language – Object oriented Programming, POP and OOPs, concepts of OOPs, Overview of Java , Classes, objects and methods, constructors, Operator overloading, Function overloading, Inheritance, Polymorphism, Visibility Controls in Java, Interfaces, Multithreading and Exception Handling , Java API Packages, System packages, creating packages, Accessing Packages, Threads, Exception handling , Files in java, Concepts of streams, Stream classes, Applet programming, Applet life cycle.

Windows and AWT, URL, Sockets, server side programming method, client side programming method, Remote class and interfaces.

Database Systems – Entity tuple attribute, advantages and disadvantages, application Areas, database Users, Three sachems, Data Independence, Physical and logical data independence, Data models, Database Languages, ER model , ER diagram, Relational-model-concepts-keys-Relational algebra, Relational database Design, Mapping E-R Model to Relational Model ,Constraints, Referential integrity, Foreign keys, Functional dependency, Normalization, Transaction   management – Transaction concept, Properties of transactions, Concurrent Executions, Serializability, SQL -Features of SQL, Data types in SQL, keys, referential Integrity, Transaction commands, Views, Triggers , Cursers, stored procedures and functions, database connectivity – ODBC, JDBC.

MODULE V(Computer Architecture and Operating Systems)

Computer Types, Functional units, Basic Operational Concepts, Bus Structures, performance, Multiprocessor and Multiprogramming, Memory Operations, Instructions and Instruction sequencing, Assembly Language, Basic Input/Output Operations. Accessing I/O Devices, Interrupts, Direct Memory Access, Buses, Interface Circuits, standard I/O Interfaces, Memory System Basic concepts, Semiconductor RAM Memories, Read-only Memories, Cache Memories, Virtual Memories, Secondary Storage, Fundamental Concepts of CPU, Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control, Micro Programmed Control, Pipelining.

System software-assembler, loader, compiler , OS, types of operating systems, OS components.   Process Management concepts, CPU scheduling concepts, process synchronization, critical section problem, deadlock Memory management concepts, paging, segmentation, virtual memory, Files Systems, I/O systems and management

UNIT VI (Mobile computing and Embedded Systems)

Introduction to mobile computing – application- cellular systems, internet working, Hidden&Exposed terminals, Near and Far terminals, SDMA, FDMA,TDMA,CDMA,GSM Architecture, handover , Satellite Systems – Applications, GEO,LEO,MEO Broadcast systems, cyclic repetition, digital audio and video broadcasting Wireless LAN – infrared/radio transmission, IEEE 802.11-architecture, Blue Tooth – applications, standard, usage models, Piconets, Scatternets, WAP, Wireless Local Loop(WLL),Virtual Private Networks(VPN),CDMA 2000, Wimax,WIFI,Voice Internet Protocol(VOIP), Mobile operating systems.

Need for Microcontroller, comparison with microprocessor, concept of embedded systems, features of AVR family, Block diagram of AVR Microcontroller, Comparison of AVR with other controllers, data memory of the AVR Microcontroller, 10 Memory (SFRS), Internal memory in AVR Chips, AVR status register, General purpose registers of the AVR Microcontroller, Instructions of AVR, Assembly programming, Structure of assembly program,

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program counter and program ROM space in AVR Microcontroller, Harward architecture in the AVR Microcontroller, RISC architecture in the AVR Microcontroller, AVR time delay and instruction pipeline, 10 port pins of AVR, Different addressing modes, Accessing EEPROM in AVR, Macros, Macros Vs Subroutines. AVR Programming in C, Data types and time delays programs in C, I/O programming, Logic operations, AVR interrupts, Serial Communication of AVR, Interfacing different Ics/peripherals with AVR.

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.