DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTRONICS AND INSTRUMENTATION ENGINEERING

SYLLABUS FOR DOCTORAL ENTRANCE TEST (DET)

(Effective from 28th Sep 2021)

PART B

Section-B shall consist of 50 objective type compulsory questions of (01) mark each based on the syllabus of the subject as follows:

UNIT 1- ANALOG AND DIGITAL ELECTRONICS

Binary arithmetic, Logic families, Combinational logic design, Sequential logic design, Multivibrators, Programmable logic devices, Digital design using VHDL.

Types of diodes and their applications, BJT current components, Transistor as amplifier, Eber Moll's model, CB, CE and CC configuration, transistor at low frequency, Two port devices and hybrid model, Feedback amplifier, classification of amplifiers, Operational amplifier, Basic op-amp circuits, Oscillators and signal generators, ,Active filters, IC voltage Regulators. Types of MOSFETS, Structure and operation of MOS transistor, CS and CD amplifier, PMOS, NMOS and CMOS, Transfer characteristics, CMOS Inverter, CMOS based low power digital circuit design.

UNIT II- SIGNALS AND SYSTEMS, CONTROL SYSTEM

LTI systems and their properties, continuous and discrete time systems, Laplace transform, Z-transform and their properties, Inverse Z-transform, Discrete Fourier transform, FFT, IIR and FIR systems.

Basic control system, Block Diagrams and their reduction, Open loop and closed loop systems and stability analysis, Signal flow graphs, transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators lead and lag compensation, elements of Proportional-Integral-Derivative (PID) control. State variable representation and solution of state equation of LTI control systems.

UNIT III- MICROPROCESSOR, MICROCONTROLLER AND EMBEDDED SYSTEMS

Comparison among microprocessors: Architecture, Instruction set, Addressing modes, Counter and time delay, Stack and subroutine, code conversion, Basic interfacing concept, memory interfacing, Memory mapped and peripheral mapped I/O techniques.

Embedded Systems and General Computing Systems; Comparison, characteristics and

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applications, Comparison among various 8 bit Microcontrollers: 8051, Atmega32, and PIC18; RISC and CISC Architecture; Harvard and VonNumann Architecture.

ATmega 32 Microcontrollers: Architecture, I/O ports structure and functioning; Assembly language/Embedded C programming: I/O port programming, Programming using data transfer,arithmetic, logical, branch instructions and bit-related instructions; ATmega 32 Features: Interrupts, Timers/Counters, ADC and DAC, Serial Port programming, Interfacing: Keyboard, LCD, Various Sensors, Stepper motor, DC motor, waveform generation.

General Purpose and Domain Specific Processors; ARM Processors: History, Basic Architecture, Features, Functioning, Various versions and Applications; ARM Cortex M3: Fundamentals, Various Registers, Multi-level pipelining concepts and basic level programming.

UNIT IV- PROBABILITY, COMMUNICATION AND NETWORKING

Random signals and noise: probability, random variables and Processes, Mean, variance and moments, CDF & PDF;

Amplitude Modulation and its types, Frequency Modulation, their frequency domain analysis, generation and reception, noise in communication systems, sampling theorem, various digital encoding techniques, digital modulation techniques, Cellular system concept, Multiple access Techniques, GSM and CDMA system, Introduction to optical fiber communication system, Switching systems- basics of switching systems,

OSI and TCP/IP Model, Data rate Limitations, Transmission Media, Data link layer Protocols, MAC Protocols, Connecting Devices, Addressing Modes, Routing Protocols, IPv4 and IPv6, UDP and TCP Protocols, QOS and Congestion control, ETHERNET, WLAN, BLUETOOTH and WIMAX.

UNIT V - MEASUREMENT TECHNIQUES, SENSORS AND INSTRUMENTATION ENGINEERING

Measurement of R, Land C. Measurements of voltage, current, power, power factor and energy, Time, phase and frequency measurements. Resistive, capacitive, inductive, piezoelectric, Hall effect sensors and associated signal conditioning circuits; Transducers for industrial instrumentation: displacement (linear and angular), velocity, acceleration, force, torque, vibration, shock, pressure (including low pressure), flow (differential pressure, variable area, electromagnetic, ultrasonic, turbine and open channel flow meters) temperature (thermocouple, bolometer, RTD, thermistor, pyrometer and semiconductor); liquid level, pH, conductivity and viscosity measurement.

Measurement Performance Characteristics: range, span, accuracy, precision, drift, sensitivity, reproducibility, repeatability, dead zone, resolution, hysteresis, threshold, zero error, noise, linearity, loading effect, static characteristics, Dynamic Characteristics: Dynamic response; Transient response; speed of response, fidelity, measuring lag etc,

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