**B.Tech(ECE)VIII Semester**

**Comprehensive VIVA**

**Course code:EEC492 Category: CE Credits:2**

**Module-I :Networks, Signals and Systems**

* Network Solutions methods: Nodal and Mesh analysis Network theorems: Superposition, Thevenin and Norton’s, maximum power transfer Wye-Delta transformation, Steady state sinusoidal analysis using phasors Time domain analysis of simple linear circuits Solution of network- equations using Laplace transform; Frequency domain analysis of RLC circuits Linear two port network parameters: driving point and transfer functions; state equations for networks
* Continuous-time signals: Fourier series and Fourier transform representations Sampling theorem and applications, Discrete –time signals: discrete-time Fourier transform(DTFT) DFT,FFT, Z-transform, interpolation of discrete time signals LTI systems: definition and properties, causality, stability, impulse response, convolution Parallel and cascade structure, frequency response, group delay, phase delay IIR Filter design FIR Filter design

**Module 2: Electronic Devices & Analog Circuits**

* Energy bands in intrinsic and Extrinsic silicon, Carrier transport: diffusion current, drift current, mobility and resistivity Generation and Recombination of carriers; Poisson and continuity equations; PN junction, Zener diode, LED, photo diode and solar cell Small signal equivalent circuits of diodes, Simple diode circuits: clipping, clamping and rectifiers BJT, BJT biasing, bias stability Small signal equivalent circuit of BJT, small signal analysis of single-stage BJT amplifiers MOS capacitor, MOSFET, Small signal equivalent circuit of MOSFET, single-stage MOSFET amplifiers Multi stage, differential amplifiers using BJT and MOSFET Feedback, power amplifiers using BJT and MOSFET Criterion for oscillation, sinusoidal oscillators Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process Linear applications of Op-Amp Non-Linear applications of Op-Amp, Function generators, wave shaping circuits Active filters 555 timers Voltage reference circuits; Power supplies; ripple removal and regulation

**Module-III: Digital Circuits & Control systems**

* Number systems; Combinational circuits: Boolean algebra, minimization of functions using Boolean identities Karnaugh map, logic gates and their static CMOS implementations Arithmetic circuits, code converters, multiplexers, decoders and PLA’s Sequential circuits: latches and flip flops, counters Shift registers and finite state machines Data converters: sample and hold circuits, ADCs and DACs; Semiconductor memories: ROM,SRAM,DRAM 8 bit microprocessor(8085): architecture, programming, memory and I/O interfacing
* Basic control system components; Feedback principles; Transfer function; Block diagram representation; signal flow graph Transient and steady state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria Bode and root locus plots; Lag, lead and lag-lead compensation State variable model and solution of state equation of LTI systems

**Module-IV: Communications**

* Random processes: auto correlation and power spectral density Properties of white noise, filtering of random signals through LTI systems
* Analog Communications: amplitude modulation and demodulation Angle Modulation and demodulation, spectra of AM and FM Super heterodyne receivers, circuits for analog Communications Information theory: Entropy, mutual information, and channel capacity theorem
* Digital Communications: PCM, DPCM Digital Modulation schemes: Amplitude ,Phase and Frequency shift keying (ASK,PSK,FSK) QAM, MAP and ML decoding, Matched Filter receiver Calculation of bandwidth, SNR and BER for digital modulation Fundamentals of error correction, Hamming codes Timing and Frequency synchronization, inter symbol interference and its mitigation Basics of TDMA, FDMA and CDMA

**Module-V:Electromagnetics**

* Electrostatics; Maxwell’s equations Differential and integral forms and their interpretation, boundary conditions Wave Equation, Poynting vector
* Plane waves and properties: reflection and refraction, Polarization, phase and group velocity Propagation through various media, skin depth
* Transmission lines: equations, characteristic impedance Impedance matching, impedance transformation, S-parameters, Smith chart
* Waveguides: modes, boundary conditions, cut-off frequencies, dispersion relations
* Antennas: antenna types, radiation pattern, gain and directivity, return loss, antenna arrays Basics of RADAR; Light propagation in optical fiber