

GULBARGA UNIVERSITY, KALABURAGI-585 106
Ph D Entrance Test Syllabus of Applied Electronics
[w.e.f. 2016-2017]

UNIT I: Electronic Instrumentation: Types of transducers, classification of transducers, resistive, inductive, capacitive, piezoelectric, photoelectric transducers. Temperature transducers, pressure and displacement transducers, strain gauges, optical transducers, detectors, biomedical electrode and transducers.

UNIT II: Control systems: Open loop and closed loop control systems. Transfer functions of first order and second order linear system, block diagram and signal flow graphs. Time domain and frequency domain analysis: Absolute stability, relative stability and steady state error. Routh's Hurwitz stability criterion. Nyquist stability criterion and applications.

UNIT III: Microprocessors and Microcontrollers: Architecture, memory organization, input and output structure, interrupts and interrupts service routines hardware and software interrupts. 8086 instructions and assembly language programming. Assembler directives. Data communication and networks: Asynchronous serial data communication, serial data transmission and protocol. Design with Atmel Microcontrollers: Atmel 89C51 and Atmel 89C2051, Atmel 89CXX and 89C20XX, power saving option. Applications - waveform generation. PIC Microcontrollers: Overview and features, PIC 16C6X/7X, instructions, addressing modes, I/O ports, interrupts, PIC 16C61/71 timer and A/D converter. Interfacing, Industrial applications.

UNIT IV: Electromagnetics: TE and TM waves and their characteristics, Smith chart, impedance matching, rectangular waveguides and Q of waveguides, power dissipation in a lossy waveguide. Waveguide components and networks: S parameters, waveguide Tees, directional couplers, phase shifters, attenuators and slide screw tuner.

UNIT V: Antennas: antenna parameters: Radiation pattern, radiation intensity, directivity, radiation resistance, efficiency and gain, dipole antenna, helical antenna, horn antennas and aperture antennas. Antenna and arrays: Array of two isotropic sources, principle of pattern multiplication. Array of n-isotropic point sources, principle of pattern multiplication technique, suppression of side lobes.

UNIT VI: Microwave devices: Klystron, Magnetron and Travelling wave tubes: Principle of operation and microwave characteristics. Helix TWT's. Microwave transistor, MESFETs, transferred electron devices, Gunn effect, principle of operation. LSA diode, Read diode, IMPATT and TRAPATT diodes, parametric devices and applications.

UNIT VII: Impedance matching, tuning and RADAR: Matching with lumped elements; lumped elements for microwave integrated circuits, single and double stub tuning. Quarter wave transformers, Chebyshev transformer and tapered lines. Power dividers and directional couplers: T junction power divider, Wilkinson power divider, coupled line directional couplers, the large couplers. Radar block diagram and operation, Doppler effect, CW Doppler radar, MTI, frequency modulated CW radar and radar antennas.

UNIT VIII: Microwave measurements: Basic field equation, unit of measurement, free space attenuation, conversion of transmitter and receiver power and voltage to electric field intensities. Microwave enclosures and hazards: Electromagnetic compatibility, plane wave propagation in shielded room, Anechoic chamber, microwave biological effects, Safety standards of microwave radiation.

UNIT IX: Digital Communication and Fibre Optic Communication: ASK, FSK, PSK, DPSK, QPSK. Optical fibers: Numerical aperture, launching angles, types of optical fibers, rays and modes, mode theory of circular waveguides, fiber materials. Signal degradation: Attenuation, scattering losses, dispersion losses, radiation losses, core and cladding losses, signal distortion, pulse broadening in optical waveguides. Optical sources: Photo detectors, PIN photo diodes, avalanche photo diodes, photo detector noise, signal to noise ratio, photo diode materials.

UNIT X: Satellite and wireless communication systems: Introduction, Kepler's laws, orbits, geostationary orbits, attitude control, uplink and downlink budget calculations, Special purpose communication satellites: DBS, INMARSAT, INTELSAT, data broadcast satellites (VSATs), MSAT, SRSAT, GPS. Mobile radio communication, Mobile radio telephony, mobile radio system around the world, examples of wireless communication systems.

Reference Books:

1. B. C. Nakra and K. K. Choudry: Instrumentation, Measurement and Analysis, TMH, 1995.
2. K. Ogata: Modern Control Engineering, 2/e, PHI, 1990.
3. D. V. Hall: Microprocessors and interfacing - Programming and Hardware, TMH, 1995.
4. Ajay V. Deshmukh, Microcontrollers: Theory and Applications, TMH, New Delhi, 2005.
5. C. A. Balanis: Antenna theory-Analysis and Design, Harper Row, 1982.
6. S. Y. Liao: Microwave Devices and Circuits, PHI, 1980.
7. D. M. Pozar: Microwave Engineering, John-Wiley & Sons, 1998.
8. D Roddy and J Coolen: Electronics Communications, PHI, 4/e, 1995.

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