

**ANNEXURE I**  
**ELECTRONICS AND COMMUNICATION ENGINEERING**

**1. ELECTRONIC DEVICES AND CIRCUITS:** Semiconductor diodes – varactor diode – zener diode – Clippers and clampers-Transistors– FETs – UJT (characteristics only) – Power supplies – Rectifiers and Filters – HW, FW and Bridge type – RC , LC and CLC filters – Series and Shunt regulators – Transistor amplifiers – CE,CC and CB configurations – Biasing techniques-RC coupled – Transformer coupled amplifiers Differential amplifiers – Feedback, Power and Tuned amplifiers – Operational amplifiers – characteristics and applications – RC , LC and Crystal oscillators – Astable , Bistable and Monostable Multivibrators using Transistors and 555 timers- Schmitt Trigger – Sweep circuits – Miller and Bootstrap circuits.

**2. CIRCUIT THEORY:** Mesh current and Node voltage analysis – Cramer’s Rule – Network theorems – Thevenin’s, Norton’s, Maximum Power transfer, Superposition and Reciprocity theorems– Series and Parallel Resonance – Q- factor – Selectivity – Bandwidth – Linear wave shaping circuits. Transmission Lines – Characteristic Impedance –Reflection Coefficient – SWR – Transmission Line losses and Impedance matching.

**3. ELECTRONIC MEASURING INSTRUMENTS:**

Analog Instruments – Extension of range of Ammeter, Voltmeter and Ohmmeter – FET voltmeter – Differential voltmeter – Digital instruments – Ramp –Dual Slope integration – successive approximation – digital frequency meter-digital LCR meter- CRO – CRT – time base generator – deflection sensitivity – triggered sweep circuits – CRO applications, AF Oscillator – RF Signal generator – AF and RF Power meters – Q meter – Distortion Factor Meter – Digital IC tester

**4. INDUSTRIAL AND POWER ELECTRONICS:** Thyristor family – SCR ,TRIAC, Power BJT –IGBT (characteristics, working principle and applications) – Converters – Single phase HW , FW fully controlled - Choppers – modes of operation – Inverters and Cycloconverters – Series and Parallel Inverters– PWM inverters, Sinusoidal three phase inverters – Single phase center tapped cycloconverters – Speed control of AC / DC motors using converters and choppers. – SMPS – Off Line and On Line UPS – Opto electronic devices – LDR, Photo diode and transistor and Photo voltaic cell (characteristics and applications) – Transducers – LVDT – Strain Gauge, Thermistor, Thermocouple - Ultrasonics - Pulse echo flaw detector.

**5. COMMUNICATION SYSTEMS:** Analog – Need for modulation – Types of modulation – AM , FM , PM – Modulation Index – Bandwidth – Power requirements – Transmitters – Low level , High level and SSB types – Receivers – Super heterodyne – AM and FM receivers – characteristics – Sensitivity , Selectivity , Fidelity – IMRR and choice of IF – Wave Propagation – Ground , Sky and Space waves – Properties. Digital – Pulse modulation – PCM , Delta modulation – Data codes – Synchronous and Asynchronous transmission – error detection and correction - digital modulation – ASK ,FSK, PSK and QAM – generation and detection – Multiplexing – TDM , FDM – Multiple Access – TDMA.

**6. ADVANCED COMMUNICATION SYSTEMS:** Antennas– radiation resistance – beam width – polarization – directivity – efficiency – bandwidth – gain – front to back ratio – folded dipole – arrays – broadside – end fire – Yagi , Log periodic , Turnstile antennas – Parabolic reflectors – beam width, gain and applications. Wave Guides – Rectangular – Dominant mode – Phase and Group velocity – Cut off wavelength - working principle and applications of Magnetron , Klystron ,TWT – Radar – range equation – Pulsed radars – indicators – duplexers – CW radars and MTI radars – Satellite communication – UP link and DOWN link frequencies – types of satellites – satellite on board – earth station systems – satellite applications – Fiber Optic communication – types of fibers – couplers, splices, connectors, switches , optical emitters and detectors – optical repeaters – Wave length

Division multiplexing – Mobile Communication – cellular concept – AMPS , GSM , CDMA systems.

**7. DIGITAL ELECTRONICS:** Number systems – Logic gates – Boolean algebra – Adders and Subtractors – Flip-flops – Registers and Counters – Memories – RAM, ROM, Flash ROM, NVROM – D/A converters – binary weighted – R-2R Ladder, A /D Converter - Counter and Successive approximation types.

**8. MICROCONTROLLERS AND MICROPROCESSORS:** 8051 Architecture – Instruction Set – subroutines – use of input and output machine related statements – time delay programme – assembler directives - peripheral ICs – 8251, 8255, and 8257– 8086 Architecture – Instruction Set – Features of Pentium and its Derivatives.

**9. AUDIO VIDEO SYSTEMS:** Recording and Reproduction of Sound using Magnetic and Optical methods – Television Picture elements – scanning and synchronization – blanking and interlacing – composite video signal , flicker – camera tubes – Image Orthicon – Silicon Diode array – TV receivers – Tuner, IF , Sync separator , deflection circuits , EHT and sound circuits – Color TV – Additive and subtractive mixing – Color Picture tubes – degaussing – types of color TV systems – NTSC , PAL and SECAM – PAL system processing – DTH system.

**10. DATA COMMUNICATIONS AND COMPUTER NETWORKS:** Transmission Media – twisted pair – UTP –STP –Coaxial cable – Optical fibre – comparison – Shannon Capacity theorem – Network Topologies – BUS, STAR , RING – switching – Packet and Message switching – OSI architecture and functions – CSMA , CDMA and token ring – properties and operations – Wireless LAN – Blue tooth technology – WAN architecture – Packet transmission – ARPA Net – ISP and ISDN architectures – WAN Protocols – X .25 , Frame Relay , ATM ,TCP / IP features and comparison –Ports and Sockets – Domain Name System – POP and SMTP server – File transfer protocol – Proxy server and Web server architecture.

## ANNEXURE II

### Number of Questions to be Set Unit Wise

#### ELECTRONICS AND COMMUNICATION ENGINEERING

UNIT NO	TOPICS	MARKS
I	<b>ELECTRONIC DEVICES AND CIRCUITS</b>	15
II	<b>CIRCUIT THEORY</b>	08
III	<b>ELECTRONIC MEASURING INSTRUMENTS</b>	10
IV	<b>INDUSTRIAL AND POWER ELECTRONICS</b>	10
V	<b>COMMUNICATION SYSTEMS</b>	15
VI	<b>ADVANCED COMMUNICATION SYSTEMS</b>	10
VII	<b>DIGITAL ELECTRONICS</b>	10
VIII	<b>MICROCONTROLLERS AND MICROPROCESSORS</b>	10
IX	<b>AUDIO VIDEO SYSTEMS</b>	05
X	<b>DATA COMMUNICATIONS AND COMPUTER NETWORKS</b>	07
	<b>Total</b>	100

### ANNEXURE III

#### MODEL QUESTIONS FOR ELECTRONICS AND COMMUNICATION ENGINEERING

1. The largest unsigned decimal number that can be represented in binary using 6 bits is
  1. 63
  2. 64
  3. 127
  4. 128
  
2. A 0-10mA Ammeter with  $30\Omega$  internal resistance is to be extended to measure up to 20mA . What value of Shunt resistance is to be connected?
  1.  $10\Omega$
  2.  $20\Omega$
  3.  $30\Omega$
  4.  $60\Omega$
  
3. The maximum value of modulation index in amplitude modulation is
  1. 10
  2. 5
  3. Infinite
  4. 1