

**ELECTRONICS & COMMUNICATION –EC****Max Marks: 100**

**1. Basics Of Electrical and Electronics Engg. :-** Electric Current, EMF, Electric Potential, potential difference, Resistance ,Ohm's law , Specific Resistance, Series and Parallel Combination of Resistance, Kirchoff's Current and Voltage law , Power, Energy and units. -----**3 marks**

**AC CIRCUITS-**Pure Resistive , Inductive and Capacitive circuits, R-L, R-C and R-L-C circuits. Impedance and power factor. Principle of operation of Transformer , EMF equation, turns ratio, Voltage transformation ratio, losses, Efficiency, Regulation, Batteries, Relays & Passive components -----**4 marks**

**SEMICONDUCTOR DEVICES:-** Characteristics and applications of following semiconductor devices: PN junction diode, Zener diode, Bipolar junction transistor, Unijunction Transistor, SCR, DIAC, TRIAC, varactor diode, tunnel diode, Gunn Diode, Pin diode. Classification of FET, Construction and operation of P-channel and N-channel JFET, characteristics of JFET, Comparison of JFET and BJT, advantages and applications of JFET, MOSFET, Types of MOSFET ,Microwavedevices,Laser & Maser. -----**7 marks**

**2. Digital Electronics & Microprocessors:-** Number Systems, Digital signals, Types of logics , logic gates-Basic gates, truth table, Universal gates, Sequential logic circuits, Combinational logic circuits, Logic families. -----**6 marks**

**Data Conversion circuits-** Digital to Analog converters, Types of D/A converters, Modes of Operation. A/D converters- Types of A/D converters. Memory Terminology, Random Access Memory, Read only memory, Secondary storage. Programmable logic devices- PLA, PAL. -----**4 marks**

**Microprocessors:-** Programming system- machine, assembly program, assembler directives, compilers and operating system, instruction format, basic Microprocessor instructions, Addressing modes, Programming Microprocessors, RISC verses CISC. -----**3 marks**

**3. C-Programming:-** Character set, Variable and Identifiers, Built-in Data Types, Variable Definition, Declaration, C Key Words-Rules & Guidelines for Naming Variables. Arithmetic operators and Expressions, Constants and Literals, Precedence and Order of Evaluation. Relational Operators, Logical Operator. if statement, if-else statement. Break, Continue, Switch, Goto and Labels. Loop statements. Arrays- Declaring an Array, Initializing an Array. One dimensional arrays, Array manipulation, Declaring & Initialisation of Two dimensional arrays -----**8 marks**

**4. Analog Electronics:-** Rectifiers, Regulators & Power supplies, Operating point and biasing of bipolar transistor and FET, Loadline, Classification Of Amplifiers, Small signal and Large Signal Amplifiers, common emitter RC coupled amplifier, Power Amplifiers, Efficiency of Power Amplifiers, and Voltage Gain of Multistage Amplifiers. Differential amplifier, Ideal characteristics, parameters, open loop configuration of opamp. RC Differentiator and Integrator circuits, Clippers and Clampers, Oscillators, Multivibrators, 555 Timer . -----**8 marks**

**5. Analog communication:-** Superposition theorem , Thevenin's theorem, Maximum Power Transfer theorem . Types, characteristics, Frequency, applications of resonance, Condition for resonance. Expressions for Impedance, current, voltage, Q factor and power factor, Bandwidth in terms of Q -----**3 marks**

**Electronic communication system:-**Distinguish between analog and digital communication, need for modulation, various analog modulation techniques, 'Amplitude modulation', Carrier ,Components present in the AM output, Modulation index , SSB, DSB. 'Frequency Modulation',Pulse Modulation,PAM,PWM,PCM. ---4 marks

**6. ELECTRONIC MEASUREMENT AND INSTRUMENTATION:-**Measurements- methods, electronic measurement system, Errors–types, dynamic characteristics of an instrument, statistical analysis. Standards, Bridges-DC and AC. PMMC meter, multi range voltmeters and ammeters. Electrodynamometer –voltmeter, ammeter,wattmeter,CRO, Signal generators & Wave analyser -----6 marks

Electrical transducers, Strain gauge, capacitive transducers, Hall effect type, LVDT, -thermistor, thermocouple, piezoelectric, , proximity sensors, digital optical encoders -digital voltmeters, Atomization in DVM, Electronic counters, Digital frequency meters, Digital multimeter, IEEE 488 GPIB instruments . -----4 marks

**7. Microcontroller:-**Types of a microcontroller and applications, 8051 features, various registers, SFRs, register banks, internal memory organization , stack & stack pointer external memory- interfacing, I/O ports-port1 details. instruction set, classification, arithmetic and logical instructions, PORT PROGRAMMING-Byte size I/O, bit addressability ----- 4 marks

**INTERRUPTS OF 8051-**Polling & Interrupt methods, executing an interrupt, different types, IE and IP registers, enabling, disabling and priority setting. **TIMERS AND COUNTERS-**TMOD and TCON registers, mode 1 & mode 2 operation of timers and counters. **SERIAL I/O-**SBUF & SCON registers, working of serial port, Serial data transmission & reception. ----- 3 marks

**8. DCCN:-** Categories of computer network. switching techniques- Circuit switching, Packet Switching & Message, Multiplexing and its types – TDM, FDM, STDM, Connectionless and connection oriented packet switching. OSI reference model - functions of different layers of OSI Model, physical layer, data link layer .Types, operation & standards of Modem. Functioning of Routers, Bridges, Switches and Gateways. -----5marks

Network Topology, Types of network topology -Bus , Star, Ring, mesh, tree, hybrid, local area network, Ethernet properties . IP Address and Physical address, Different classes of IP addresses, Dotted Decimal notation of IP address, Routing, TCP Basics and features of TCP. ----- 3 marks

**9. DIGITAL COMMUNICATION :-** Base band and pass band transmission, information capacity, bits, bit-rate, baud rate and Bandwidth of digital data, sampling theorem, analog pulse modulation-PAM, PPM, PWM. Quantization, PCM, quantization process. TDMA,FDMA and CDMA. -----2 marks

**10. Industrial Automation:-** Triggering,Natural and forced Commutation & types, Principle of operation of controlled rectifiers, Single Phase half wave and full wave controlled rectifiers Choppers - working principle - Control Schemes - Step-up chopper-Chopper classifications - Applications of choppers, Introduction to inverters - working principle of Half Bridge Inverter and Full Bridge Inverter, series inverter, Variable DC Link Inverter-Voltage Source and Current Source Inverters , PWM techniques used in inverters, Applications of Inverters, Cycloconverters - Single phase to single phase midpoint cycloconverter – Applications of Cycloconverters-Dual Converter. ----6 marks

**PLC:-** relay logic panel ,Scanning considerations, Sensors and Actuators . Programming PLC - relation to Digital Logic Gates - relation to Boolean Algebra, PLC Register Basics-General characteristics - Holding Registers, Input & Output Registers . PLC Timer functions, PLC Counter functions, Basic Number Comparison Functions, MOVE Functions. **---3 marks**

**11. Advanced Microprocessor:-**8086-Internal architecture. Physical address calculation.Memory organization, Addressing modes. Instruction format- Instruction set of 8086-Assembler directives. Interrupts of 8086 & Interrupt Vector table- Interrupt hierarchy. DOS & BIOS Interrupts **---3 marks**

**Programmable Peripheral ICs-** 8255 (PPI) -list operating modes- 8253-List operating modes- 8251 (USART)-list operating modes - 8259 (PIC)-list operating modes- 8257 and DMA operation **----3 marks**

**12. Bio medical:-** Characteristic of human cell. Bio electric potential- Origin- Resting and action potential. Propagation of action potential and its wave form. Electrodes- need- types. Electro Cardio Gram-waveform - Electrodes for Electro cardio gram- lead system for ECG-Artefacts. Brain -Neuronal activity. Electro Encephalogram - electro encephalogram waveform, electrodes for EEG- Applications of Biomedical recordings. Defibrillators .Pacemaker . Diathermy. Ventilators, oxygenator. Blood pump – Haemo dialysis. Prosthetic devices- Hearing aid . Endoscopy. Blood constituents-blood tests. Blood cell counter-PH meter-spectro photometer, BP measurement. Blood flow meter. **-----5 marks**

X-Rays- properties- Generation. Computerized tomography. Magnetic resonance imaging. Diagnostic Ultra sound. Foetal monitoring instrument- cardio tocograph. Echocardiograph. Patient monitoring . Laser-Principle and application in medical field. Bio telemetry system- single channel bio telemetry system. Medical data communication through telephone lines and wire less .Telemedicine **-----3 marks**