General English (Full Marks : 100)

(a) Essay Writing (Not more than 300 words) ............................................................ 20 Marks
(b) Idioms & Phrases (Objective Type/MCQ) ............................................................ 16 Marks
(c) Comprehension of given passages ........................................................................... 12 Marks
  (Objective Type/MCQ)
(d) Grammar: (Objective Type/MCQ)
  Parts of Speech: Nouns, Adjective, Verb, Adverb, Preposition, etc. ......................... 20 Marks
(e) Composition (Objective Type/MCQ) ....................................................................... 16 Marks
  (i) Analysis of complex and compound sentences.
  (ii) Transformation of sentences.
  (iii) Synthesis of sentences.
(f) Correct usage and vocabularies (Objective Type/MCQ) ........................................ 16 Marks

ELECTRONICS ENGG. (Objective Type/MCQ) Paper-I (Full Marks : 150)

1. ELECTRONIC DEVICES AND CIRCUITS - 40 Marks

Unit-I Semiconductor and Diodes:


Rectifier – Classification of Rectifiers - Half wave rectifier - Fullwave rectifier (Center tapped, Bridge) – Efficiency – Ripple factor – Applications – Filters – C, LC, and PI Filters.

Unit-II Bipolar Junction Transistor:


Unit-III Transistor Oscillators and FET and UJT:

Transistor oscillator – Classifications – Condition for oscillations (Barkhausen criterion) – Hartley Oscillator – Colpitts Oscillator – RC Phase shift oscillator, Crystal oscillator.


Unit-IV : SCR, TRIAC, DIAC, MOSFET:


TRIAC – Working principle – Characteristics – Speed control of fan using DIAC and TRIAC.


Unit-V Opto Electronics Devices and waveshaping circuits:
LDR, LED, Segment LED, LCD, Opto coupler, Opto interrupter – Infrared transmitter and receiver
– Laser diode (Simple treatment) – Solar cell – Avalanche Photo diode – Photo transistor. Clipper,
Clamper – Voltage doubler, Astablemultivibrator, Monostable and Bistable Multivibrators using
Transistor.

2. DIGITAL ELECTRONICS - 34 Marks

Unit-I: Number System and Boolean Algebra:-
LOGIC GATES AND DIGITAL LOGIC FAMILIES : GATES - AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR. Implementation of logic function using gates, Realization of gates using universal
gates - Simplification of expression using Boolean techniques, Boolean expression for outputs -
Digital logic families-TTL, CMOS, Logics and their characteristics - comparison and applications,
Tristate logic.

Unit-II: Combinational Circuits:
Arithmetic circuits - Binary-Addition, subtraction, 1’s and 2’s complement - Signed binary numbers
- Half Adder and Full Adder - half Subtractor and Full Subtractor - Encoder, Decoder, Multiplexer,
Demultiplexer - BCD adder, parity checker and generator.

Unit-III: Sequential Circuits
FLIP-FLOPS - SR, JK, T, D Flip-flops, Triggering of FF - edge & level – Counters -Asynchronous/
ripple counter, Decade counter, Up-Down counter (4 bit Synchronous counter). REGISTERS - 4-
bit shift register - Serial IN Serial OUT, Serial IN parallel OUT, Parallel IN Serial OUT, Parallel IN
Parallel OUT.

Unit-IV : Memory Devices
Classification of memories, RAM organization – Address Lines and Memory Size - Read/write
operations - Static RAM - Dynamic RAM - SAD RAM - DDR RAM - ROM - Expanding memory
- PROM - EPROM – EEPROM - Flash memory.

Unit-V: Microprocessor-8085
Evolution of microprocessor – 8085: Architecture, Instruction sets, Addressing modes, memory
mapped I/O and I/O mapped I/O and its Comparison, Machine cycle-Opcode fetch, memory read,
memory write, I/O read, I/O write.

3. LINEAR INTEGRATED CIRCUITS - 36 Marks

Unit-I: Introduction to Operational Amplifiers
Integrated circuit – Classification of IC-Advantages of IC over discrete components-Operational
amplifier IC 741 - Schematic symbol for opamp - pin diagram of IC 741-Block diagram of an
opamp-Characteristics of an Ideal opamp-Basic linear circuits-Inverting Amplifier, Non Inverting
amplifier-Differential Amplifier.

Unit-II: Opamp Applications
Summing amplifier-Multiplier-Divider-Voltage follower-comparator-Integrator-Differentiator-
Instrumentation amplifier - Waveform generators-square wave, triangular wave, sine wave, saw
tooth wave generators. (Qualitative treatment only)

Unit-III: PLL & Applications
PLL-Basic principles and application of PLL - Basic components of PLL
Unit-IV: D/A and A/D Converters
Digital to analog converter – Basics of D/A conversion-R-2R Ladder D/A Converter
Analog to digital converter-Basics of A/D Conversion-sampling-Sample and hold circuit-
quantization-Types of A/D converter.

Unit-V: Special Function ICs (qualitative treatment only)
IC 555 Timer Applications-Astable multivibrator-monostable multivibrator-Schmitt trigger.

4. MICROCONTROLLER - 20 Marks

Unit-I: Architecture & Instruction set of 8051:
Comparison of Microprocessor and Microcontroller – Block diagram of Microcontroller – Functions
of each block. Pin details of 8051 – ALU – ROM – RAM – Memory Organization of 8051-Special
function registers-Program Counter-PSW register-Stack-I/O Ports-Timer-Interrupt-Serial Port-
Oscillator ad Clock-Clock Cycle-State-Machine Cycle-Instruction cycle-Reset-Power on Reset-
Overview 8051 family.
Instruction set of 8051-Classification of 8051 Instructions-Data transfer instructions-Arithmetic
Instructions-Logical instructions.

Unit-II: Programming Examples:
Structure of Assembly Language - Different addressing modes of 8051.

Unit-III: I/P and Timer:
Bit addresses for I/O and RAM-I/O programming-Programming 8051 Timers-Different modes of
Timer.

5. ELECTRONIC SYSTEM DESIGN - 20 Marks

UNIT-I:
Design of Power Supply : DC power supply with filters, regulators & protection circuits, Multi
output and variable power supply design.

UNIT-II:
Design of small signal amplifiers : Emitter follower, two stage direct coupled amplifiers.

UNIT-III:
Data acquisition system: ADC, DAC, Design of Instrumentation amplifier. Design of Electronic
voltmeter and ammeter.

UNIT-IV
Design of function generator : Design of AM signal using multiplier IC, AM signal demodulation
using envelope detector, Design of FM signal using VCO (using IC NE566).

UNIT-V:
High voltage/high current driver : Circuit for Relay and motor control applications. Microcontroller
based closed loop system, security systems, Microcontroller based stepper motor control system.
1. **ELECTRICAL CIRCUITS AND INSTRUMENTATION**  
   - **40 Marks**

   **Unit-I: D.C. CIRCUITS AND THEOREMS**
   - Definition and unit for voltage, current, power, resistance, conductance, resistivity – Ohm’s law – Kirchoff’s current law and voltage law.
   - Series circuits – parallel circuits – series parallel circuits – Thevenin’s, Norton’s, super position and maximum power transfer theorem – Statement and explanation.

   **Unit-II: A.C. CIRCUITS AND RESONANCE**
   - AC through single pure resistance, pure inductance, pure capacitance – voltage and current relationship – the equation for power and power factor in each case - Definition for impedance, reactance, admittance, conductance, impedance, phase angle, power factor and power.

   **Unit-III: TRANSFORMERS AND MACHINES**

   **Unit-IV: MEASURING INSTRUMENTS AND CRO**
   - Indicating instruments - Basic forces for indicating instruments - construction and operation of permanent magnet moving coil Instrument – Advantages - Disadvantages of PMMC - Shunts and Multipliers - DC ammeter - DC volt meter - volt meter sensitivity principle of operation of CRO - operation of CRT Applications of CRO - Types of CRO.

   **Unit-V: TRANSDUCERS & TEST INSTRUMENTS**
   - Transducers – classification of transducer – Types - uses.
   - Construction, operation and application of photo electric transducer, LVDT and Load cell. Principle of working of Thermocouple - Temperature measurement using thermocouple - list of applications - Principle of working of Thermistor - Temperature measurement using thermistors – types (NTC, PTC) – List of applications.
   - Digital voltmeter – Types (to list only) Advantages over analog instruments.

2. **INDUSTRIAL ELECTRONICS**  
   - **40 Marks**

   **Unit-I: POWER DEVICES AND TRIGGER CIRCUITS**
UNIT-II: CONVERTERS AND CHOPPERS (Qualitative treatment only)


Commutation - Natural commutation - Forced commutation - Type of forced commutation.

Chopper – Definition - principle of DC chopper operation - Applications of DC chopper - Principle of working of single phase AC chopper.

UNIT-III INVERTERS & APPLICATIONS

Inverter – Definition – Requirement of an inverter – Single phase inverter with resistive load - Single phase inverter with RL load - Methods to obtain sine wave output from an inverter - Output voltage control in inverters - Parallel inverter using IGBT.

HVDC Transmission – principle – advantages – drawbacks

SMPS – Block diagram of SMPS – Working principle – advantages and disadvantages.

UPS – Working principle - Type (ON Line, OFF Line), Comparison.

UNIT-IV: PROGRAMMABLE LOGIC CONTROLLER

Relays - Basics of Input and Output module (digital input and output module) - Logic functions – AND logic, OR logic, NAND logic, EX-OR logic - Star delta starter - Converyer control and Lift control.

UNIT-V NUMERICAL CONTROL SYSTEMS

Basic concepts of numerical control - advantages, disadvantages - applications of numerical control system - Programming systems (mention the names only) - Data processing unit.

3. COMMUNICATION ENGINEERING

Unit-I: Networks, Antenna and Propagation

Networks - Symmetrical and asymmetrical networks - Equaliser - types, applications - Attenuator – types - Filters - types and definitions – circuit elements and cutoff frequencies of LPF, HPF and BPF- Antennas - Basic antenna principle - Propagation (short theory only) Ground wave propagation, sky wave, space wave propagation.

Unit-II: Amplitude Modulation

Modulations - Frequency spectrum - Relationship between wavelength and frequency, types of modulation - Amplitude modulation – Expression - AM Transmitter - Types of transmitters - AM Receiver - TRF receiver - super heterodyne radio receiver.

Unit-III: Angle and Pulse Modulation

Frequency modulation - Frequency spectrum - effects of noise in FM - comparison of AM and FM - FM Transmitters & Receiver - Direct and Indirect methods - Phase Modulation Principles Pulse Modulation types - Generation and detection of PA, PWM, PPM, PCM, DPCM, Delta modulation.

Unit-IV : Audio systems

Principles, types, classifications, advantages and disadvantages of Microphones, Loud speakers, Audio recording and reproduction

Unit-V : Video systems

Colours TV : Principles of colour transmission and reception - LCD, LED display unit – plasma display.
4. COMPUTER HARDWARE AND NETWORKS - 24 Marks

**Unit-I: MOTHERBOARD COMPONENTS AND MEMORY STORAGE DEVICES**

Introduction: Parts – Mother board, expansion slots, memory, power supply, drives and front panel and rear panel connectors-Hardware, Software and Firmware.

Processors: Architecture and block diagram of multicore Processor

Bus Standards Overview and features of USB

Primary Memory: Introduction-Main Memory, Cache memory-DDR2-DDR3, RAM versions-1TB RAM


Blue-ray: Introduction

**Unit-II: I/O DEVICES AND INTERFACE**


I/O Ports: Serial, Parallel, USB, Game Port, Bluetooth interface, IR connector, fire ware.

Displays and Graphic Cards: Panel Displays-Principles of LED, LCD and TFT Displays. SVGA Port Signals-common problems and solutions.

Modem: Working principles-common problems and solutions.

Power Supply: online and offline UPS – Working principles; Surge suppressors and spike isolators.


**Unit-III: MAINTENNACE AND TROUBLE SHOOTING OF DESKTOP AND LAPTOPS**

Standard CMOS setup, Advanced BIOS setup, Power management, beep codes and error messages.

Diagnostic Software and Viruses: Computer Viruses-Precautions-Anti-Virus Software-identify the signature of viruses-Firewalls and latest diagnostic software’s.

Laptop: Difference between laptop and desktop-Types of laptop-working principles-configuring laptops and power settings.

Laptop components: Adapter-types, Battery-types and basic problems, RAM-types, CPU-types, Laptop Mother Board-Laptop Keyboard-Mouse and Touchpad-Ports.

Installation and Troubleshooting: Formatting, Partitioning and Installation of OS-Trouble Shooting Laptop Hardware problems-Preventive maintenance techniques for laptops.

**Unit-IV: COMPUTER NETWORK DEVICES AND OSI LAYERS**

Data Communication: Components of a data communication-Networks-Definition-Types of Connections: Point to point-multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid-Advantages and Disadvantages of each topology. Internet-Intranet-Extranet-Guided-Twisted pair, Coaxial, Fiber optic; Unguided-Radio waves-Infrared.
5. EMBEDDED SYSTEM - 10 marks

Unit-I:
ARM PROCESSOR ARCHITECTURE: The RISC and ARM design philosophy, Embedded System Hardware.
ARM PROCESSOR FUNDAMENTALS: Data Flow Model, registers, modes of operation.

Unit-II:
ARM INSTRUCTIONS SETS: ARM and Thumb Instruction Sets, Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, Program Status Register Instructions.

Unit-III:
CACHE MECHANISM: Introduction to cache memory, memory hierarchy and cache memory.

Unit-IV:
MEMORY PROTECTION AND MANAGEMENT UNIT: Introduction to protection unit.

Unit-V:
EMBEDDED OS AND RTOS: Fundamental Components to Embedded OS.

6. APTITUDE TEST - 20 Marks

(a) Numerical And Figurework Tests: (4 Marks)
These tests are reflections of fluency with numbers and calculations. It shows how easily a person can think with numbers. The subject will be given a series of numbers. His/Her task is to see how the numbers go together to form a relationship with each other. He/She has to choose a number which would go next in the series.

(b) Verbal Analysis And Vocabulary Tests: (6 Marks)
These tests measure the degree of comfort and fluency with the English language. These tests will measure how a person will reason with words. The subject will be given questions with alternative answers, that will reflect his/her command of the rule and use of English language.

(c) Visual And Spatial/3-D Ability Tests: (4 Marks)
These tests are used to measure perceptual speed and acuity. The subject will be shown pictures where he/she is asked to identify the odd one out; or which comes next in the sequence or explores how easily he/she can see and turn around objects in space.

(d) Abstract Reasoning Tests: (6 Marks)
This test measures the ability to analyse information and solve problems on a complex, thought based level. It measures a person’s ability to quickly identify patterns, logical rules and trends in new data, integrate this information, and apply it to solve problems.

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