

17302

21819

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.
 - (5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. (a) Attempt any SIX :

6 × 2 = 12

- (i) Draw V-I characteristics of P-N junction diode.
- (ii) State types of real time mechatronics system.
- (iii) What is rectifier ? How are they classified ?
- (iv) Sketch pin diagram of IC555 and label all pins.
- (v) Draw the logical symbol of 4 : 1 multiplexer.
- (vi) What is mechatronics ?
- (vii) List any four application of Op-amp.
- (viii) Draw logical symbol of 2 : 1 multiplexer and write its truth table.

(b) Attempt any TWO :**4 × 2 = 8**

- (i) What is filter ? List types of filter. Draw circuit diagram of any one type.
- (ii) Why multistage amplifier circuit is used ? List out any two coupling methods used for multistage amplifier.
- (iii) Draw the circuit diagram of inverting amplifier. Calculate RF if gain is 10 and $R_1 = 1.5 \text{ k}\Omega$.

2. Attempt any FOUR :**4 × 4 = 16**

- (i) Compare HWR and FWR with respect to ripple factor and efficiency.
- (ii) How BJT works as a switch ?
- (iii) Define Oscillator. State Barkhausen criteria for oscillation.
- (iv) Draw the logical symbol and write truth table for (a) AND, (b) NOR gate.
- (v) Draw block diagram of ADC and write function of each block.
- (vi) Explain the criteria for the selection of PLC for an application.

3. Attempt any FOUR :**4 × 4 = 16**

- (i) Draw block diagram of regulated power supply and give function of each block.
- (ii) Draw two stage RC coupled amplifier and its frequency response.
- (iii) How Op-amp offers high input impedance ? List out any four specifications of ideal Op-amp.

- (iv) Draw the half adder circuit. Also write its truth table.
- (v) Draw single channel DAS (Data Acquisition System). Give function of each block.
- (vi) Draw the block dia of FMS and explain the function of each block.

4. Attempt any FOUR :**4 × 4 = 16**

- (i) What do you mean by load regulation and line regulation ?
- (ii) What is thermal runaway ? What is the use of heat sink ?
- (iii) Sketch logical circuit of differentiator and write its output voltage equation.
- (iv) Compare microprocessor and microcontroller (any 4 points).
- (v) State classification of transducer on the basis of signals with one example each.
- (vi) Sketch block diagram of CNC system from mechatronics view and state function of each block.

5. Attempt any FOUR :**4 × 4 = 16**

- (i) Draw the symbol and write any two application of (a) UJT, (b) Zener diode.
- (ii) Draw the symbol of NPN and PNP transistor. List the configuration of it with diagram.
- (iii) Draw and explain Op-amp as an adder with waveform.
- (iv) Draw the construction of decade counter using T flip-flop.
- (v) What is data logger ? State its applications.
- (vi) What is PLC ? Sketch architecture of PLC and label all blocks.

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6. Attempt any FOUR :**4 × 4 = 16**

- (i) State applications of 7 segment display and opto-coupler.
 - (ii) Draw circuit diagram and waveform of Astable multivibrator using IC 555.
 - (iii) Draw the block diagram of SR flip-flop. Write its truth table.
 - (iv) What is decoder ? Draw logic diagram of 3 : 8 decoder and write its truth table.
 - (v) What is signal conditioning ? Explain with the help of diagram A.C. signal conditioning.
 - (vi) Draw ladder diagram of start-stop logic with one input push button for start and one push button for stop and one output for motor to activate solenoid valve.
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