



# 17302

**16172**

**3 Hours / 100 Marks**

Seat No.

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- Instructions :**
- (1) *All questions are compulsory.*
  - (2) *Answer each next main question on a new page.*
  - (3) *Illustrate your answers with neat sketches wherever necessary.*
  - (4) *Figures to the right indicate full marks.*
  - (5) *Assume suitable data, if necessary.*

**Marks**

**1. a) Attempt any six :**

**12**

- i) Draw symbols of LDR and Diode.
- ii) Define thermal runaway.
- iii) State Barkhausen criteria for oscillations.
- iv) Draw logical symbol of 1 : 2 demultiplexer and write its truth table.
- v) What is transducer ? Classify transducers.
- vi) What is Mechatronics ?
- vii) Draw symbol and label terminals of NPN and PNP transistors.
- viii) State the types of ADC and DAC.

**b) Attempt any two :**

**8**

- i) Explain load and line regulation.
- ii) Draw and explain the circuit of op-amp as adder.
- iii) List selection criteria of PLC for any particular applications.

**2. Attempt any four :**

**16**

- a) Sketch circuit diagram, input and output waveform of half wave rectifier.
- b) Draw instrumentation amplifier and write its output voltage equation.
- c) Draw symbol and write truth table of NAND and OR gate.
- d) Draw and explain the transistor as a switch.
- e) What is DAS ? State its applications.
- f) Draw and explain the functional block diagram of AVCS.

**P.T.O.**

**3. Attempt any four :****16**

- a) Draw block diagram of regulated power supply and write function of each block.
- b) Draw 4 bit ring counter circuit with truth table.
- c) Define biasing. Draw the voltage divider bias circuit for transistors (BJT).
- d) What is the need of signal conditioning ? Draw AC signal conditioning system.
- e) Draw ladder diagram for 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.
- f) Sketch pin out diagram of IC 741, label all pins and state function of each pin.

**4. Attempt any four :****16**

- a) Define intrinsic and extrinsic semiconductor.
- b) Draw two stage RC coupled amplifier and its frequency response.
- c) What is real time mechatronics system ? State its advantages and disadvantages.
- d) What is half adder ? Sketch logical circuit of half adder along with truth table.
- e) What is oscillator ? Which type of feedback is used in oscillator ? State types of oscillator.
- f) Draw logical diagram of 4 : 1 multiplexer and write its truth table.

**5. Attempt any four :****16**

- a) How Optocoupler Act as an isolator ?
- b) What is decoder ? Draw logical diagram of 3 : 8 decoder and its truth table.
- c) Describe the working of transistor (BJT) as an amplifier.
- d) State different selection criteria for transducers.
- e) Sketch circuit diagram of non-inverting op-amp. Calculate gain if  $R_f = 21k\Omega$ ,  $R_1 = 3k\Omega$ .
- f) Explain ladder diagram with the help of an example.

**6. Attempt any four :****16**

- a) What is filter ? List types of Filter. Draw circuit diagram of any one type.
  - b) What is PLC ? Sketch architecture of PLC and label all blocks.
  - c) Differentiate RC, LC oscillator on the basis of
    - i) Component used
    - ii) Frequency range
    - iii) Frequency stability
    - iv) Applications.
  - d) What is data logger ? State applications of data logger.
  - e) Write features of 8085 microprocessor.
  - f) Draw and explain the concept of CIM briefly.
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