

# 17302

**13141**

**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.  
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. a) Attempt any SIX of the following: **12**
- i) Draw the symbols and label the terminals of
    - 1) Photo diode
    - 2) UJT
  - ii) Define rectifier.
  - iii) Draw the symbols and label the terminals of
    - 1) NPN Transistor
    - 2) PNP Transistor
  - iv) Sketch pin diagram of IC 741 and label all its pins.
  - v) Write any two applications of Multiplexer and Demultiplexer.
  - vi) What is transducer? How are they classified.
  - vii) What is mechatronics? Write its applications.
  - viii) What are the advantages of FMS. (Any four)

P.T.O.

b) **Attempt any TWO of the following:****08**

- i) Draw the circuit diagram along with the necessary waveforms for fullwave bridge rectifier.
- ii) Calculate the gain of inverting and noninverting amplifier if  $R_f = 21k\Omega$  and  $R_i = 3k\Omega$ .
- iii) List any four advantages and applications of CNC system.

**2. Attempt any FOUR of the following:****16**

- a) What is thermal runaway? How it is avoided?
- b) How transistor works as a switch also draw a necessary circuit and waveform for it.
- c) Sketch circuit diagram for integrator using opamp also draw output waveforms for square wave and sine wave input.
- d) Sketch circuit diagram for AMV using IC555 also draw necessary waveforms and write the equation for output frequency.
- e) Compare RC and LC oscillator w.r.t. following points :
  - i) Voltage gain
  - ii) Oscillating frequency
  - iii) Components used for oscillation
  - iv) Application.
- f) What is full adder? Sketch logical circuit for it along with its truth table.

**3. Attempt any FOUR of the following:****16**

- a) Compare RC coupling and transformer coupling w.r.t. following points
  - i) Coupling element
  - ii) Distortion
  - iii) Voltage gain
  - iv) Applications

- b) Draw the logical symbol and truth table for 2 input NAND and EXOR gate.
- c) Draw JK flip flop using NAND gate and what is the race around condition?
- d) Draw the logical circuit for 4:1 multiplexer along with its truth table.
- e) Compare electrical and mechanical transducers w.r.t.
  - i) power supply requirement
  - ii) reliability
  - iii) life time
  - iv) example
- f) State functions and applications of robotic system.

**4. Attempt any FOUR of the following:**

**16**

- a) What is advance vehicle condition system. Explain briefly.
- b) Draw the circuit for single stage transistor amplifier also write the requirements of multistage amplifier.
- c) Sketch block diagram for PLC and state function's of each block.
- d) What is data logger? Write its applications. (Any four)
- e) Draw the block diagram of multichannel DAS.
- f) Compare PN junction diode and Zener diode w.r.t.
  - i) direction of conduction
  - ii) application
  - iii) reverse breakdown
  - iv) symbol

**5. Attempt any FOUR of the following:****16**

- a) What is AC signal conditioning? State types of circuit used for ac signal conditioning.
- b) State selection criteria for transducers.
- c) Compare BJT and FET w.r.t.
  - i) terminals
  - ii) type's
  - iii) input impedance
  - iv) controlling factor
- d) What is optocoupler? Write its type also write its advantages.
- e) Compare microprocessor and microcontroller w.r.t.
  - i) components
  - ii) access time
  - iii) number of opcodes
  - iv) hardware required
- f) Define doping? Which type of impurity is added to form Ptype and Ntype semiconductor.

**6. Attempt any FOUR of the following:****16**

- a) Draw block diagram of regulated power supply also draw necessary waveforms at various points.
  - b) Define load regulation and line regulation.
  - c) What is Barkhausen criteria? Which type of feedback is used in an oscillator? State types of oscillator.
  - d) State different triggering methods also draw neat waveform for each triggering method.
  - e) Write the selection factors for PLC.
  - f) Draw decade counter also write its truth table.
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