11920

3 Hours / 100 Marks   Seat No. ☐☐☐☐☐☐☐☐

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) Use of Non-programmable Electronic Pocket Calculator is permissible.

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

Marks

1. **(A) Attempt any SIX :**   **12**

(a) Give the speciality of zener diode. State its 2-3 applications.

(b) Why NAND and NOR gates are called as universal gate ? Draw AND gate using NAND gates only.

(c) Draw symbol of NPN transistor and state three configurations of transistor. (BJT)

(d) Define counter. State four applications of counter.

(e) Draw pin diagram of Op-Amp IC-741.

(f) Give two examples of :

(i) Electrical Transducer

(ii) Mechanical Transducer

(g) State important specification parameters of ADC. (any two)

(h) List various types of CNC machines.

(B) Attempt any TWO :   8

(a) Define rectifier. Draw circuit diagram and input-output waveforms of bridge type full-wave rectifier.

(b) Describe how Op-Amp is used as adder using circuit diagram and output voltage equation.

(c) Draw simple block diagram of CNC machine and describe in short.

2. Attempt any FOUR :   16

(a) Name the circuit used in rectifier to minimize ripple. List the types of this circuit with simple circuit diagram.

(b) Compare LED and photo diode with four points.

(c) Draw circuit diagram of two stage RC coupled amplifier using BJT and state function of each component in short.

(d) Draw a labelled pin diagram of IC 555 and state function of each pin in short.

(e) Compare microprocessor and microcontroller with help of four points. Give two applications of each.

(f) Describe ADC and DAC w.r.t. their needs and list two applications of each.

3. Attempt any FOUR :   16

(a) Compare intrinsic and extrinsic semiconductors with the help of four important points.

(b) State the need of multi-stage amplifier. List the types of multistage amplifier and give two advantages of each type.

(c) State Barkhausen criteria for oscillations. List types of oscillator.

(d) Define multiplexer. Draw logical symbol of 4 : 1 multiplexer with truth table and output logical equation.

(e) Define transducer. State factors which are considered while selecting transducer for a particular application.

(f) List various elements of mechatronic system and state 4-5 applications.

4. **Attempt any FOUR :** 16

(a) Draw block diagram of regulated power supply and state function of each block in short.

(b) Draw circuit diagram of CE configuration for NPN transistor and its output characteristics.

(c) List the function of OR gate. Draw its logical symbol and write the truth table.

(d) Define Data Acquisition System (DAS). Draw simple block diagram of single channel DAS and state function of each block in short.

(e) List any four criteria for selection of PLC for an application and explain any one in short.

(f) Define bistable multivibrator. Draw its circuit diagram using timer IC555.

5. **Attempt any FOUR :** 16

(a) Draw block diagram of PLC and state which input/output devices are used in it.

(b) Explain with diagram how BJT acts as an amplifier.

(c) Draw circuit diagram of an inverting amplifier using Op-Amp. Calculate gain of R_f = 12 kΩ and R_i = 3 kΩ.

(d) Describe basic SR flip-flop using NAND gates and truth table.

(e) Compare BJT and FET with four key points.

(f) Explain active and passive transducer with example.

6. **Attempt any FOUR :** 16

   (a) Develop a ladder diagram for output Q to be ON when button A is ON or either button B or C are ON.

   (b) Define Shift Register. State its types with simple diagram.

   (c) State Piezo-electric effect used in crystal oscillator and write four features of crystal oscillator.

   (d) State the function of half adder. Draw its logic circuit and truth table.

   (e) Explain FMS in short with simple block diagram.

   (f) Compare three configurations of BJT with four points.

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