17302

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 <u>SIX</u> of the following:**   12

(i) Sketch symbol and label the terminals of:

1) Zener diode

2) UJT.

(ii) What is rectifier? List types of rectifier.

(iii) State input and output terminals in CB and CE configurations of BJT.

(iv) Draw the circuit diagram of an inverting amplifier using IC 741 op-amp.

(v) Draw logical symbol of 1:4 demultiplexer.

(vi) Identify passive transducers from following:

    1)   stain gauge

    2)   thermocouple

    3)   thermistor

    4)   photo voltaic cell.

(vii) List advantages of Mechatronics.

(viii) State the types of real time Mechatronic systems.

b) **Attempt any <u>TWO</u> of the following:**   **08**

    (i)   Sketch circuit diagram and input and output waveforms of CLC filter.

    (ii)   Draw the block diagram of CNC system and state function of each block.

    (iii)   Draw neat circuit diagram of op-amp as summing amplifier and derive expression for 3 inputs applied.

2.   **Attempt any <u>FOUR</u> of the following:**   **16**

a) List the different coupling methods of multistage amplifier. Draw the circuit diagram of RC coupled amplifier.

b) What is oscillator? Which type of feedback is used in oscillator? State types of oscillator.

c) What is half adder? Sketch logical circuit of half adder along with truth table.

d) List different biasing methods of BJT. Sketch circuit diagram of voltage divider biasing method.

e) Draw the block diagram of IC 555 and label it.

f) Draw the circuit diagram of non-inverting amplifier using op-amp. Derive the expression for gain.

Marks

3. **Attempt any <u>FOUR</u> of the following:** **16**

   a) What is encoder? Draw logic diagram of priority encoder. Write its truth table.

   b) Why mechatronic systems are getting popular? Explain. State its any four applications.

   c) Explain with the help of circuit diagram, how BJT acts as a switch?

   d) Draw symbol and write truth table of NAND and XOR gate.

   e) Sketch 4-bit ring counter circuit.

   f) State different selection criteria for tranducers.

4. **Attempt any <u>FOUR</u> of the following:** **16**

   a) State working principle of LED. Give two applications of LED.

   b) Calculate the gain of multistage amplifier if gain of 1st stage is 30 dB and gain of 2nd stage is 6 dB.

   c) Draw architecture of PLC and label all blocks. List two advantages of PLC.

   d) Explain with the help of an example, ladder diagram.

   e) State the types of DAS. State its applications.

   f) What is data logger? State applications of data logger.

Marks

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

   a) Sketch the symbol of phototransistor. State the applications of phototransistor.

   b) List the types of ADC. State the applications of DAC.

   c) Compare active and passive transducers on the basis of any four points.

   d) Draw the construction of N-channel FET. Why it is called voltage controlled device?

   e) State applications of photodiode and 7 segment display (any four applications each).

   f) Draw decade counter and write truth table.

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

   a) Explain Barkhausen criteria for oscillation. State applications of LC oscillators.

   b) Draw the block diagram of regulated DC power supply and give function of each block.

   c) How JK flip-flop is converted into D flip-flop and T flip-flop?

   d) Define line regulation and load regulation.

   e) List the features of microcontroller (any eight).

   f) Draw ladder diagram that will cause output Q to be ON when Push button A is ON, or either B or C are ON.

————