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

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

Marks

1. Attempt any TEN of the following : **20**

(a) Define ripple factor and efficiency w.r.t. rectifiers.

(b) Write any two applications of transistor.

(c) Draw ladder diagram of NOR gate.

(d) List any two applications of DAC.

(e) Draw the labelled symbol of an Op-Amp.

(f) Give factors affecting the stability of Q point.

(g) Draw symbol of OR gate. Give its truth table.

(h) Write any two features of Real Time Mechatronics system.

(i) Explain the terms with respect to amplifier :

(i) Bandwidth

(ii) Half power points

(j) State different types of flip-flops.

(k) List any two applications of monostable multivibrator.

(l) List basic components of computer integrated manufacturing (CIM) system.

(m) What are the various methods of triggering flip-flop ?

(n) Write any two applications of crystal oscillators.

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

(a) Draw and explain transistor as an amplifier.

(b) Implement AND gate and OR gate using NOR gate only.

(c) Draw block diagram of CNC system and explain it.

(d) Draw and explain block diagram of Op-Amp.

(e) Draw and explain block diagram of instrumentation system.

(f) Draw characteristics of zener diode and explain it.

3. Attempt any FOUR of the following : 16

(a) Explain Barkhausen criteria.

(b) Draw and explain single channel DAS (Data Acquisition System).

(c) Describe the elements of Robot.

(d) With suitable block diagram describe the operation of multiplexer.

(e) Explain center tapped full wave rectifier with circuit diagram and waveform.

(f) Draw a neat circuit of single stage CE-amplifier using NPN transistor.

4. Attempt any FOUR of the following : 16

(a) Explain any four important characteristics of a transducer.

(b) Compare CB, CE & CC configuration of transistor (any four points).

(c) Draw the block diagram of IC555 and label it.

(d) Explain procedure to plot the DC load line.

(e) Describe Flexible Manufacturing System (FMS).

(f) Draw S-R flip flop using NOR gates and explain its operation.

5. Attempt any FOUR of the following : 16

(a) Draw and explain frequency response of single stage CE amplifier. Why gain falls at very low and very high frequencies ?

(b) Draw circuit diagram of three bit ripple counter and explain.

(c) Describe a block diagram of PLC with neat diagram.

(d) Draw and explain circuit of Op-Amp as adder.

(e) Explain the working principle of n-channel J-FET with suitable diagram.

(f) Explain the need of signal conditioning. Draw block diagram of AC signal conditioning system.

6. Attempt any FOUR of the following : 16

(a) Differentiate between microcontroller and microprocessor (any four points).

(b) Draw and explain instrumentation amplifier.

(c) Explain the selection criteria for a transducer.

(d) Describe the working principle of optocoupler.

(e) Draw the ladder diagram for following boolean expression :

$Y = (A + B) \cdot (C + D)$

(f) Draw and explain transformer-coupled amplifier.
