17302

21314

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

MARKS

1. Attempt **any five** : **20**
   a) Draw the energy band diagram for various type of material and compare them (two points).
   b) Draw the circuit diagram and explain the working of half wave rectifier.
   c) Draw the symbol of PNP transistor and explain its working.
   d) Compare RC and LC oscillator.
   e) Develop the truth table for XOR and XNOR gate. Also draw their symbols.
   f) With a suitable example explain the concept of primary and secondary transducer.
   g) List the advantages and disadvantages of mechatronic system.

2. Attempt **any four** : **16**
   a) What is semiconductor ? Explain intrinsic and extrinsic type of semiconductors.
   b) Develop a circuit for Op-Amp as
      a) Adder b) Subtractor.
   c) What is multiplexer ? Draw logical symbol of 4 : 1 multiplexer.
   d) Explain the selection criteria for the transducer for any application.
   e) What is PLC ? Draw the block diagram and state the applications of PLC.
   f) Draw the block diagram of CNC machine and explain its operation.

3. Attempt **any four** : **16**
   a) Explain the following terms :
      a) Load regulation b) Line regulation.
   b) Explain RC coupled amplifier with the help of neat diagram.

P.T.O.

MARKS

c) What is instrumentation amplifier ? What are its advantages ?

d) Explain the operation of astable multivibrator using IC 555.

e) Compare microprocessor and microcontroller (4 points).

f) Develop a ladder diagram to verify following Bollean equation.

i) A + B + C = Y

ii) A.B.C = X

iii) A.B + C = Z.

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

a) Draw the symbol of LDR. Write its working principle and state any two applications.

b) Explain the need of biasing circuit. List the types of biasing circuits for BJT.

c) List and explain any four specification of IC 741.

d) What is flip-flop ? List the types of flip-flop and state its applications (two).

e) Explain the operation of analog to digital convertor.

f) State the features of real time mechatronics.

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

a) List any four criteria for the selection of PLC for an application.

b) Draw and explain single channel data acquisition system.

c) What is Half adder ? Draw the logical circuit of half adder along with its truth table.

d) Draw the circuit diagram of inverting amplifier. Calculate the gain if

$R_f = 12k\Omega$ and $R_I = 1k\Omega$

e) Calculate the gain of multistage amplifier if the gain of first stage is 12 dB and gain of second stage is 4 dB.

f) Compare full wave and half wave rectifier (for any four points).

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

a) Draw the symbol and list four applications of

a) FET b) UJT

b) Compare CB and CE configuration for BJT (4 points).

c) Draw a labelled pin diagram of IC 555. List its two specifications.

d) Sketch 4-bit asynchronous counter.

e) Identify active and passive transducers from the list below.

a) Thermocouple b) RTD

c) Strain gauge d) Piezoelectric crystal

f) With the help of neat labelled diagram explain FMS.
