17302

11718

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) Sketch symbol and label terminals of
   i) PNP transistor ii) Photodiode.
b) State input and output terminals in CB and CE configuration of BJT.
c) Draw the circuit diagram of an op-amp as inverting amplifier.
d) Draw the symbol of NOR gate. Give its truth table.
e) What are the advantages of Flexible Manufacturing System (FMS) ? (any four)
f) List different types of flip-flops.
g) List the different types of oscillators.
h) Define intrinsic and extrinsic semiconductor.

B) Attempt **any two** : **8**

a) Define line regulation and load regulation.
b) What is thermal runaway ? How it is avoided ?
c) State selection criteria for transducer. (any 4)

2. Attempt **any four** : **16**

a) Describe the working of center tapped full wave rectifier with circuit diagram and waveform.
b) List different biasing methods of BJT. Draw the circuit diagram of fixed bias circuit method.
c) Draw and explain block diagram of op-amp.
d) Explain half adder with its logical circuit diagram and truth table.
e) Draw and explain single channel Data Acquisition System (DAS).
f) Explain briefly Advance Vehicle Control System (AVCS).

P.T.O.

Marks

3. Attempt **any four** : **16**

a) Draw and explain the characteristics of zener diode with circuit diagram.

b) Compare astable and bistable multivibrator. (any 4 points)

c) Draw 4-bit ring counter circuit.

d) State any four applications of Digital to Analog Converter (DAC).

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

f) What is multiplexer ? Draw logical symbol of 8 : 1 multiplexer.

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

a) State the advantages and disadvantages of mechatronic system. (any 2)

b) Compare electrical and mechanical transducers. (any 4 points)

c) Implement AND gate and OR gate using NAND gate only.

d) Sketch and explain block diagram of PLC.

e) Draw the equivalent circuit of UJT. Explain its I-V characteristics.

f) Explain single stage RC coupled amplifier with frequency response.

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

a) Compare full wave rectifier and half wave rectifier. (any 4 points)

b) Explain how transistor is used as a switch with neat diagram.

c) Draw the block diagram of IC 555 and label it. List its two features.

d) Explain master slave JK flip-flop. What is Race around condition ?

e) What is data logger ? State applications of data logger. (any 2 applications)

f) State functions and applications of robotic system. (each two)

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

a) Draw LC filter with full wave rectifier. Also draw its waveform.

b) Draw the circuit diagram of Instrumentation amplifier using op-amp and label it.

c) Compare microprocessor and microcontroller. (any four points)

d) Develop ladder diagram to verify following Boolean equation :

1) $A + B + C = Y$

2) $A.B.C = X$

3) $A + (B \oplus C) = Z$

e) Calculate the gain of inverting and non inverting amplifier if $R_F = 10\,k\Omega$, $R_i = 2\,k\Omega$.

f) Draw the circuit of op-amp as a summing amplifier and obtain an expression for its output.
