17660

16117

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

Marks

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

a) Draw a block diagram of 'Mechatronics System' and indicate the basic elements on it.

b) List velocity sensors and with diagram explain any one type.

c) State four advantages of CNC system. What are G codes and M codes?

d) State the characteristics of 'Quick opening control valve'.

e) State the function of manipulator and end effector.

f) Define the term 'MEMS'. List down the various engineering applications of MEMS.

g) Enlist the various mechanical actuating system and explain any one in brief.

Marks

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

a) What is 'Mechatronics'? State its importance in engineering with suitable examples.

b) State the function of 'Signal Conditioner' in measurement system.

c) Explain how a PLC can be used to handle an analog input.

d) State the working principle of 'Solenoid valve' with neat sketch.

e) Explain the basic elements of Robotic system with block diagram.

f) Describe the working of PLC based automatic car park barrier system with block diagram.

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

a) Explain the function of PLC. Draw a block diagram of basic PLC configuration.

b) State and explain working principle of 'Hall effect sensor' with sketch.

c) Draw block diagram of 'Fuzzy logic' controller and explain function of each block.

d) Explain the principle of process control valves.

e) Draw and explain the basic elements of 'MEMS'.

f) Explain with sketch, principle of working of 'Pick and place Robot'.

4. Attempt any TWO of the following: **16**

a) Explain with sketch, torque measurement using:

(i) Stroboscope method

(ii) Capacitive method

b) Explain with diagram how micro-controller is used for stepper motor control.

c) Describe with sketch, basic details of;

(i) Poppet valve

(ii) Shuttle valve

Marks

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

a) State and explain working principle of Tacho generators.

b) Give the significance of Transducer and sensor with suitable example.

c) State the characteristics of PD and PID controllers with their control action equations.

d) Draw a block diagram indicating the application of Fuzzy logic control in fully automatic washing machine.

e) Explain the concept of degree of freedom of Robot with sketch.

f) Enlist and explain the various components of Mechatronic system.

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

a) Describe the principle of operation of;

(i) Linear actuators

(ii) DC motors

b) Explain the constructional features of MEMS accelerometer used in airbag sensors for car safety.

c) Explain with block diagram, working of micro-controller based anti lock braking system.