BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – M.Tech.(RA)-2023
Course Name – Mechatronics System Design
Course Code - OEC-MIRA201A
(Semester II)

Full Marks : 60   **Time : 2:30 Hours**
[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question)   1 x 15=15

1. *Choose the correct alternative from the following :*

(i)   Define, which of the following is correct for tactile sensors.

   a) Touch sensitive   b) Pressure sensitive
   c) Input voltage sensitive   d) Humidity sensitive

(ii) State: Change in output of sensor with change in input is _____

   a) Threashold   b) Slew rate
   c) Sensitivity   d) None of the mentioned

(iii) Indicate, which sensor should be used for calculating humidity.

   a) DHT11   b) LM335Z/NOPB
   c) HC-SR04   d) MPX10DP

(iv) Indicate, which sensor should be used for calculating distance.

   a) DHT11   b) LM335Z/NOPB
   c) HC-SR04   d) MPX10DP

(v)   Illustrate, which of the following represent permalloy.

   a) Nickel iron alloy   b) Nickel platinum alloy
   c) Nickel gold alloy   d) Nickel bronze alloy

(vi) Write, which of the following act as magneto-resistive material.

   a) Bismuth   b) Antimonide
   c) Both bismuth and antimonide   d) None of the mentioned

(vii) Discuss, where and when was the word Mechatronics invented.

   a) Japan(1960)   b) Japan(1980)
   c) Europe(1960)   d) Europe(1980)

(viii) Describe, a servo motor is a typical example of _____

a) Electronics system
b) Mechanical system
c) Computer system
d) Mechatronics system

(ix) Indicate, where is the feedback generated by sensors in a mechatronics system given.

a) Input sensors
b) Comparators
c) Mechanical actuators
d) Output sensors

(x) Write, how many principle axes do a Cartesian robot has.

a) 2
b) 3
c) 4
d) 5

(xi) Choose the correct answer:Transient response analysis is done for_____ systems.

a) Unstable
b) Stable
c) Conditionally stable
d) Marginally stable

(xii) Select the name from the followingwhich is a home robot.

a) Vyommitra
b) Zenbo
c) Athlete
d) Valkyrie

(xiii) Select among the following which is an Indian robot, made by ISRO (Indian space research organisation) for space exploration purpose.

a) Valkyrie
b) Sita
c) Athlete
d) Vyommitra

(xiv) Illustrate whether a thermocouple is a transducer.

a) Thermocouple is a transducer
b) Thermocouple is a transducer
c) undefined
d) None of the mentioned

(xv) Illustrate whether accuracy is the difference between a true value and the measured value.

a) The statement is correct
b) The statement is incorrect
c) undefined
d) None of the mentioned

Group-B
(Short Answer Type Questions)   3 x 5=15

2. compare the characteristics of proportional controller and proportional plus integral controller. (3)
3. Illustrate the definition of transducer. (3)
4. Explain the working principle of Velocity sensor. (3)
5. Write the Components of Pneumatic Cylinders. (3)
6. Write the difference between traditional design approach and Mechatronics approach. (3)

OR

Write, how can a traditional design of temperature control of a domestic central heating system (3) is improved by mechatronic design.

Group-C
(Long Answer Type Questions)   5 x 6=30

7. Illustrate about criteria should be considered when selecting a transducer for a mechatronic (5) system, such as accuracy, sensitivity, and resolution, and how can these be optimized for different applications?

8. What are some common challenges associated with the design and implementation of (5) transducers in mechatronic systems, and how can these be addressed through careful engineering and testing?

9. Explain, the Challenges and Future Trends in Mechatronics and Automation. (5)

10. Justify, how can structured analysis be used to model Mechatronic systems ?   (5)
11. Explain the static characteristics of transducers.   (5)
12. Decide, how do sensors and actuators differ in terms of their function and application, and   (5)
what are some common examples of each?

OR

Decide, how can different types of sensors be used to measure various physical quantities,   (5)
such as temperature, pressure, and position, and what are some factors to consider when
selecting the appropriate sensor for a given application?

****