17875

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – B.Tech.(RA)-2022
Course Name – Mechatronics
Course Code - OEC-ECR702A
(Semester VII)

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) Define, which of the following can be cause for non-zero output when zero input.
a) Bias b) Slew
c) Offset d) Offset or bias

(iv) Recall, thermocouple generate output voltage according to _____
a) Circuit parameters b) Humidity
c) Temperature d) Voltage

(v) Tell, which sensor should one prefer for accurate measurement of distance upto 1 meter.
a) Ultrasonic sensor b) Infrared sensor
c) PIR sensor d) Photoresistor sensor

(vi) Tell, which IC (integrated circuit) is present on NodeMCU.
a) ESP8266 b) Atmega326
c) Atmega328P d) ESPN8266

(vii) Discuss, where and when was the word Mechatronics invented.
a) Japan(1960) b) Japan(1980)
c) Europe(1960) d) Europe(1980)

(viii) Indicate, which among the following is a false statement regarding "Mechatronic system".
a) Its initial cost of setup is high b) Does not require highly skilled labours for operating it

c) More output in less time
d) It provides flexibility in production

(ix) Recall: fluid power circuits use schematic drawings to

a) Simplify component function details
b) Make it so only trained persons can understand the functions
c) Make the drawing look impressive
d) Make untrained person to understand

(x) Indicate, Pneumatic systems usually do not exceed:

a) 1 hp
b) 1 to 2 hp
c) 2 to 3 hp
d) 4 to 5 hp

(xi) Describe the first aspect which needs to be considered in the Mechatronics design process.

a) Hardware design and simulation
b) Conceptual design
c) Mathematical modelling
d) Modelling and simulation

(xii) Illustrate: In the level of integration of Mechatronics system, an example of the first level is _____

a) fluid valves
b) automatic machine tools
c) industrial robots
d) microprocessors

(xiii) Describe the function of "analysis" in the modelling and simulation phase.

a) Database for maintaining project information
b) Sub models for eventual reuse
c) Contains Numerical methods
d) To produce high-level source code

(xiv) Illustrate the function of the GUI (Graphical user interface)

a) To control motion and speed
b) Converts program into the action of the driver
c) To record the data from the sensor
d) To understand the position of the tool according to the input program

(xv) State whether sensor is a type of transducer.

a) It is a sensor
b) It is not a sensor
c) Not defined
d) Others

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Illustrate the factors to be considered for selecting compressors. Describe the types of compressor. (3)

3. Construct the basic function of control system and then write about the requirements of control system. (3)
4. Illustrate the definition of transducer. (3)
5. Illustrate briefly about Photodiode. (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 is improved by mechatronic design. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Illustrate, how has the integration of Mechatronics technology impacted the manufacturing industry in terms of efficiency and productivity. (5)
8. Write about the differential-algebraic equations for the component in translational system. (5)

9. Explain the difference between zeroth, first, and second-order systems. (5)

10. Explain Transfer Function of an Operational Amplifier. (5)

11. Explain the components of a mechatronics system with block diagram. (5)

12. Write the key modeling paradigms used in Mechatronic system design ? (5)

OR

Write about tye block diagrams, and how can they be used to represent the interrelationships between different components in a Mechatronic system. (5)

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