



UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE : BMT 2112

COURSE : INTRODUCTION TO MECHATRONICS

SEMESTER/SESSION : 1-2024/2025

DURATION : 2 HOURS

Instructions:

1. This booklet contains **4** questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise up your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO**THIS BOOKLET CONTAINS 5 PRINTED PAGES INCLUDING COVER PAGE**

QUESTION 1

- a) List the four (4) key elements of a mechatronic system. (2 marks)
- b) Explain three (3) advantages and three (3) disadvantages of a mechatronic system. (9 marks)
- c) State the two (2) types of sensor classification based on the working principle. (2 marks)

QUESTION 2

- a) Describe the internal sensors that are used in a mechatronic system application of a robot. (6 marks)
- b) List three (3) main external sensors in a robotic application of mechatronics system. (3 marks)
- c) Describe the function of each of the essential hardware components in a computer system as listed below:
- i. Processing devices (2 marks)
 - ii. Memory devices (2 marks)
 - iii. Input and output devices (2 marks)
 - iv. Storage devices (2 marks)

QUESTION 3

- a) Describe the use of a 555 timer as a monostable multivibrator. (3 marks)
- b) Describe the basic working principle of;
- i. Hydraulic actuator (2 marks)
 - ii. Pneumatic actuator (2 marks)
- c) A brushless DC motor is more suitable for use in environments where explosive gases might be present in comparison to a brushed DC motor. Explain the reason for this statement. (3 marks)
- d) Describe four (4) performance characteristics of a stepper motor. (4 marks)

QUESTION 4

- a) Explain how the torque in an electric motor is maintained as the rotor rotates. (5 marks)
- b) List five (5) basic components of a robotic system. (5 marks)
- c) Describe the application of robotic in the following area:
- i. Machine loading (2 marks)
 - ii. Pick-and-place operations (2 marks)
 - iii. Operating in hazardous or inaccessible locations (2 marks)

-----End of Question-----

