Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91586

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025

Seventh Semester

Civil Engineering

OMR 351 – MECHATRONICS

(Common to: Aeronautical Engineering/ Aerospace Engineering/ Automobile Engineering/ Biomedical Engineering/ Computer Science and Design/ Computer Science and Engineering/ Computer Science and Engineering (Artificial Intelligence and Machine Learning)/ Computer Science and Engineering (Cyber Security)/ Computer and Communication Engineering/ Electrical and Electronics Engineering/ Electronics and Communication Engineering/ Electronics and Instrumentation Engineering/ Electronics and Telecommunication Engineering/ Environmental Engineering/ Geoinformatics Engineering/Industrial Engineering and Management/Instrumentation and Control Engineering/Manufacturing Engineering/ Marine Engineering/ Material Science and Engineering/Mechanical Engineering/ Mechanical and Automation Engineering/ Medical Electronics/ Petrochemical Engineering/ Production Engineering/ Robotics and Automation/ Safety and Fire Engineering/Agricultural Engineering/ Artificial Intelligence and Data Science/ Bio Technology/ Biotechnology and Biochemical Engineering/Chemical Engineering/ Chemical and Electrochemical Engineering/ Computer Science and Business Systems/ Fashion Technology/ Food Technology/ Handloom and Textile Technology/ Information Technology/ Petrochemical Technology/ Petroleum Engineering/ Pharmaceutical Technology/ Plastic Technology/ Textile Chemistry/Textile Technology)

(Regulations 2021)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Write the significance of mechatronics.

2. Mention the need for capacitance sensors.

3. Define microprocessor.

4. List the elements of timing diagram of 8085.

5. State the features of 8255.

6. Write the functions of LED display.

7. Compare T_{ON} and T_{OFF} used in PLC programming.

8. State the factors required for the selection of PLC.

9. Compare stepper motor and servo motor.

10. Write the principle of a actuator with an example.

PART B — ($5 \times 13 = 65$ marks)

11. (a) Explain the static and dynamic characteristics of transducers with an example.

Or

(b) Explain the construction and working principle of eddy current sensor and light sensor with neat sketches.

12. (a) Explain the types of addressing modes of 8085 microprocessor with an example.

Or

(b) Explain the architecture of 8085 microprocessor with a neat sketch. Also, list its features.

13. (a) Explain any one type of ADC and DAC circuits with neat sketches.

Or

(b) Draw and explain the block diagram of microprocessor interfacing with keypad.

14. (a) Explain the architecture of PLC with a neat sketch.

Or

(b) Analyze the PLC ladder logic program for an automatic car-wash system as shown in the figure.1 based on the following sequences.

Figure.1

Car arrives → Switch ON

Switch ON → Washer ON

Washer ON:

- Soap water SPARY ON (50 secs)
- Rinse: Clean Water SPARY ON (50 sec)
- Automatic Scrubber BRUSHES the car (25 sec)
- After washing 50 cars the scrubber brush AUTO-CHANGE

15. (a) Describe the mechatronics based approach for engine management system with neat sketches.

Or

(b) Explain the construction and working principles of types of servo motors with neat sketches. Also, discuss their characteristics.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the construction and working principle of different types of pressure sensors and temperature sensors with neat sketches. Also, identify the application for at least four types of sensors.

Or

(b) Analyze the block diagram of automatic car parking barrier system with traditional and modern based mechatronics design process with a neat sketches.