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Question Paper Code : 41576

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

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/Materials 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 × 2 = 20 marks)

1. What are the basic constituent elements of a measurement system?
2. How does Eddy current proximity sensors work?
3. Write an assembly Language program (ALP) to find out Two's complement of an 8 - bit number.
4. Indicate the number of machine cycles in STA 4800 instruction and state what are they?
5. Distinguish between Peripheral I/O and memory mapped I/O.
6. Define resolution and full scale output of DAC.
7. Draw the ladder rungs to represent either of two, normally open switches have to closed for a coil to be energized and operate an actuator.
8. How to select the PLC for your particular applications?
9. Write the working principle of servo motors.

10. Differentiate between Traditional design approach and mechatronics design approach.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the Design consideration and steps involved in Mechatronics system Development.

Or

- (b) Explain the principle, construction and applications of Hall effect Sensor with suitable diagram.

12. (a) Draw and explain the architecture of 8085 Microprocessor and explain each block.

Or

- (b) Draw and explain the Timing diagram of RET instruction. The opcode for RET instruction is 'C9'.

13. (a) A stepper motor of 200 steps / rev is to be interfaced with 8255 PPI and 8085 Microprocessor to make 90 degree angular rotation clockwise. Write an ALP for the same.

Or

- (b) Design a hardware to interface 7 segment LED with 8051 Microcontroller. Write software to display a Number '9'.

14. (a) Sketch and explain with Ladder diagram for the following

(i) Latch circuit.

(3)

(ii) Cylinder sequencing circuit.

(10)

Or

- (b) Design a circuit that can be used to start a motor and then delay of 100 s start a pump. When the motor is switched off there should be a delay of 10 s before the pump is switch off.

15. (a) Draw and explain the construction, working principle, applications and advantages of servo motors with neat sketch.

Or

- (b) Explain the mechatronics involved in a Engine management system with suitable diagram.

PART C — (1 × 15 = 15 marks)

16. (a) Discuss a case study about how mechatronics used in automatic Camera with suitable diagram and also mention various components involved in this.

Or

- (b) Describe the design and implementation of Mechatronics case study for coin operated Automatic car park barriers.