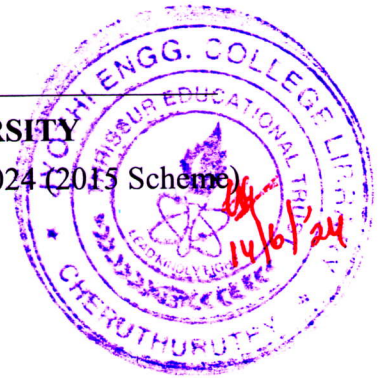


Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S7 (S, FE) / S7 (PT) (S,FE) Examination May/June 2024 (2015 Scheme)

**Course Code: ME407****Course Name: MECHATRONICS**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer any three full questions, each carries 10 marks.*

Marks

- |   |                                                                                                      |     |
|---|------------------------------------------------------------------------------------------------------|-----|
| 1 | a) Explain the difference between static and dynamic characteristics of transducers.                 | (4) |
|   | b) Compare the working of RTDs and thermocouples.                                                    | (6) |
| 2 | a) Explain the working of an absolute optical encoder with a neat sketch.                            | (6) |
|   | b) Draw the encoder disk lay out for an absolute grey coded encoder with a resolution of 45 degrees. | (4) |
| 3 | a) Explain the working of a synchro with neat diagram                                                | (6) |
|   | b) Differentiate between tandem center and float center DCVs                                         | (4) |
| 4 | a) Explain the working of a vane type hydraulic motor with a neat sketch.                            | (6) |
|   | b) Compare the pneumatic and hydraulic actuation systems                                             | (4) |

**PART B***Answer any three full questions, each carries 10 marks.*

- |   |                                                                                                                                   |      |
|---|-----------------------------------------------------------------------------------------------------------------------------------|------|
| 5 | a) Explain the LIGA process with an example.                                                                                      | (6)  |
|   | b) Differentiate between CVD and epitaxy in MEMs manufacture.                                                                     | (4)  |
| 6 | a) Explain the sequence of producing a deep channel using DRIE process.                                                           | (4)  |
|   | b) Explain the working of a parallel plate capacitive MEMS accelerometer.                                                         | (6)  |
| 7 | a) Explain the working of a recirculating ball screw mechanism with neat sketches.                                                | (6)  |
|   | b) Explain the different types of preloading with sketches                                                                        | (4)  |
| 8 | a) Design a PLC ladder logic to operate two cylinders A,B in the sequence A1B1B0A0. Use solenoid operated DCVs for the cylinders. | (10) |

**PART C***Answer any four full questions, each carries 10 marks.*

- |    |                                                                  |     |
|----|------------------------------------------------------------------|-----|
| 9  | a) Explain the mathematical model of a spring-mass-damper system | (5) |
|    | b) Explain the working of variable reluctance servo motor.       | (5) |
| 10 | a) Explain the working of a harmonic drive with a sketch.        | (5) |

- b) Explain the range sensing using triangulation method. (5)
- 11 a) Explain the working of a CCD camera sensor with neat sketches (5)
- b) Explain the difference between histogram sliding and histogram stretching. (5)
- 12 a) Explain the working of any two types of tactile sensors used in robotics. (4)
- b) Explain the working of a CID camera sensor. What are its advantages over CCD? (6)
- 13 a) Explain the engine management system of an automobile with a net block diagram (10)  
including sensors and actuator connections and control strategy.
- 14 a) Explain the scheme of a pick and place robot with a suitable control ladder logic (10)  
and schematic.

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