

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: ME407
Course Name: MECHATRONICS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks.

Marks

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| 1 | Explain the working of incremental and absolute optical rotary encoders. Why gray code is used in coding absolute encoders. | (10) |
| 2 | a) Describe the working of LVDT with a neat sketch.
b) Explain the working of any <i>one</i> type each of flow and pressure sensors. | (6)
(4) |
| 3 | Develop a pneumatic circuit with standard symbols, to operate two cylinders in sequence. Explain its working. | (10) |
| 4 | a) Mention any <i>two</i> differences between finite position and infinite position valves.
b) Illustrate the working of spool valve and poppet valve with a neat sketch. | (2)
(8) |

PART B

Answer any three full questions, each carries 10 marks.

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| 5 | Explain the principle, fabrication and working of MEMS based capacitive type pressure sensor. | (10) |
| 6 | a) Describe the DRIE process with a neat sketch.
b) Prepare a comparative report of each <i>one</i> technique in CVD and PVD. | (5)
(5) |
| 7 | a) Compare the salient features of hydrostatic and hydrodynamic bearing.
b) Explain the working of a mechanical device using closed loop control system with the help of a suitable example. | (5)
(5) |
| 8 | Two motors are to be controlled in a sequence. The second motor starts 30 seconds after the starting of first motor by a push switch. Develop a PLC ladder diagram for the following cases and describe the circuit.
Case (A): Only one motor operates at a time.
Case (B): Both the motor gets off together after 50 seconds. | (10) |

PART C

Answer any four full questions, each carries 10 marks.

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| 9 | Develop a mathematical model for the chassis of a car as a result of a wheel moving along a road. | (10) |
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- 10 Compare the working of permanent magnet stepper motor, variable reluctance stepper motor and hybrid stepper motor with a neat sketch. Mention the step angle achieved in each case. (10)
- 11 Illustrate the working of any *one* type of (i) Force sensor (ii) Tactile sensor. (10)
- 12 Comment on the thresholding technique used in image processing and analysis. (10)
Explain how thresholding is employed in edge detection.
- 13 a) Explain the histogram processing technique in image processing. (5)
b) Illustrate the working of Charge Coupled Device for machine vision applications. (5)
- 14 Explain the working of Barcode reader with reference to the coding schemes. (10)
Mention the steps to process the digits in a barcode for a particular product.
Develop the steps in a program for reading the barcode.
