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

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.	(6)
	b)	Explain the working of any *one* type each of flow and pressure sensors.	(4)
3		Develop a pneumatic circuit with standard symbols, to operate two cylinders in sequence. Explain its working.	(10)
4	a)	Mention any *two* differences between finite position and infinite position valves.	(2)
	b)	Illustrate the working of spool valve and poppet valve with a neat sketch.	(8)

PART B

Answer any three full questions, each carries 10 marks.

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.	(5)
	b)	Prepare a comparative report of each *one* technique in CVD and PVD.	(5)
7	a)	Compare the salient features of hydrostatic and hydrodynamic bearing.	(5)
	b)	Explain the working of a mechanical device using closed loop control system with the help of a suitable example.	(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.

9		Develop a mathematical model for the chassis of a car as a result of a wheel moving along a road.	(10)

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. Explain how thresholding is employed in edge detection.	(10)
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. Mention the steps to process the digits in a barcode for a particular product. Develop the steps in a program for reading the barcode.	(10)

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