Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Regular and Supplementary Examination December 2021 (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 main components of a Mechatronic Measurement system using block diagram (5)

   b) Describe the terms (i) Non Linearity Error (ii) Response time (iii) Output impedance (5)

2 a) Explain the principle of (i) Eddy current proximity sensors (ii) Pyroelectric sensors (6)

   b) Explain the basic principle of an Accelerometer (4)

3 a) Explain the working of a process control valve using suitable figure. Also list down different plug shapes and type of valve seats used in process control valve. (8)

   b) Draw the symbol for a Direction control valve (i) 4/2 valve (ii) 4/3 valve (2)

4 A conveyor belt carries the finished product. A double acting cylinder is used for a transfer station to remove the products from the conveyor belt, when a push button is operated. At the point where the push button is released the double acting cylinder returns to its original position. Design a pneumatic system circuit for the given application. (10)

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

5 a) Explain the procedure of photolithography using suitable figures (7)

   b) Differentiate between isotropic and anisotropic wet etching (3)

6 Write the different steps involved in the fabrication of a MEMS pressure sensor use suitable figures to represent each step (10)

7 Compare the working of gain-scheduled control and self-tuning control in adaptive control systems. (10)

8	a)	Draw ladder diagram for following logic functions – XOR, NAND, NOR, AND	(4)
	b)	Explain Internal Relays and Shift Registers	(4)
	c)	Explain latching in PLC logic	(2)

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

9	a)	Explain the different methods for braking DC motor	(5)
	b)	Explain on Light based range finder	(5)
10	a)	Explain the working of a Harmonic Drive	(6)
	b)	What are the applications and advantages of stepper motor	(4)
11	a)	Using a block diagram, explain DC Servomotor system	(6)
	b)	Write down the describing equations of Hydraulic system & Thermal system	(4)
12	a)	Explain the working of a Vidicon Camera	(5)
	b)	Explain the Histogram image processing technique	(5)
13	a)	Define the terms 'Region growing' and 'Edge detection' in image processing techniques	(6)
	b)	Write on the Robotic vision system applications	(4)
14		Design PLC based pick and place robot. Draw the gripper movement and the arm control diagram.	(10)

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