

CBCS Scheme: 2015-16

MODEL QUESTION PAPER

15EI651

Sixth Semester B.E. Degree Examinations

Mechatronics

Time: 3 Hrs

Max. Marks: 80

Note: Answer FIVE FULL Questions, selecting ONE FULL Question from each Module

Question Number	Question	Marks Allotted
Module -1		
1	a) What do you understand by the term Mechatronics? With a neat diagram, show the basic elements of a Mechatronic system. Give examples of Mechatronic systems.	8
	b) Discuss in detail the operations involved in the sequential control of a microprocessor based washing machine.	8
OR		
2	a) List the important features of smart sensors. Describe the construction and uses of different proximity switches	8
	b) Explain the principle of working of a i) piezoelectric sensor and ii) pyroelectric sensor	8
Module -2		
3	a) What do you understand by the term Actuation system ? With a neat schematic diagram, describe the construction and working of a Hydraulic system.	8
	b) With a neat schematic diagram, describe the construction and explain the working of a process control valve.	8
OR		
4	a) Explain the concept of freedom and constraints in mechanics.	8
	b) Draw the schematic diagram of a cam and explain its functioning. Explain the types of rotations produced by cams of different shape.	8
Module -3		
5	a) What is the use of a mechanical switch? How does an electrical relay operate? Draw the relay drive circuit and explain its operation.	8
	b) Draw the equivalent circuit of a D C motor and illustrate with equations how the torque decreases with increasing speed.	8
OR		
6	a) Discuss the various techniques that can be used to detect faults.	8
	b) Explain how faults can be found in microprocessor based systems	8

	with the help of the following techniques and devices i) Visual inspection ii) Logic probe iii) Logic pulser , iv) Logic clip and v) Logic analyser.	
	Module -4	
7	a) With a neat block diagram, explain the interfacing of i) relays and ii) solenoids with a PIC microcontroller.	8
	b) With a circuit diagram, explain the interfacing of following sensors with a microcontroller. i) Diode/phototransistor pair iii) Distance measuring sensor ii) Photorelector sensor iv) Line tracing sensor	8
	OR	
8	a) Define Reliability. Draw the Reliability 'bath tub' life curve of a product and discuss its three phases of life.	8
	b) What is the reliability of a two element parallel system in which $\lambda_A = 0.001$, $\lambda_B = 0.002$ and the mission time, $t = 50$ hours ?	8
	Module -5	
9	a) Define the term component. Explain component based design view. Schematically show various components of the machine control systems.	8
	b) With a necessary diagram, explain Data fusion scheme in a typical semi-autonomous vehicle.	8
	OR	
10	a) What is the meaning of integration in mechatronics? What are the notable features of a pneumatic actuator?	8
	b) What is an industrial robot? With the help of a block diagram describe different components of a robotic system.	8