A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 57703

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Seventh Semester

Mechanical Engineering

15UME703- MECHATRONICS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Mechatronics is an interdisciplinary field of CO1- R

   (a) Mechanical and Electrical

   (b) Mechanical and Information technology

   (c) Electronics and Information technology

   (d) Mechanical, Electronics and Information technology

2. Inductive pressure transducers are used to measure CO1- R

   (a) Temperature (b) Flow (c) Pressure (d) Level

3. In a clock mechanism, the gear train used to connect minute hand to hour hand is CO2- U

   (a) Epicyclic gear train (b) Reverted gear train

   (c) Compound gear train (d) Simple gear train

4. Identify the belt drive that doesn't undergo slip while transmitting power CO3- U

   (a) Timing (b) Round (c) V- Belt (d) Cross

5. Which of the following is not an element of a mechanical building block? CO3- R

(a) Capacitor (b) Dashpot (c) Mass (d) Spring

6. If the hydraulic resistance of a fluid system building block is more, then the pressure difference across the pipe will be CO3- U

(a) Less (b) More (c) Zero (d) Equal

7. PLC stands for CO4- R

(a) Preventive Logic Controller (b) Programmable Logic Controller

(c) Programmable Logic Computer (d) Personal Laser Controller

8. A counter that starts from a specified number and increments down to zero is known as the CO4- R

(a) Up counter (b) Down counter

(c) Reset counter (d) Synchronizing counter

9. In general, design process starts with _____ of the product CO5- R

(a) Analysis (b) Solution (c) Resale value (d) Need

10. The oxygen sensor in engine management system is made up of CO5- R

(a) Aluminium oxide with porous platinum electrodes

(b) Zirconium oxide with porous platinum electrodes

(c) Titanium oxide with porous platinum electrodes

(d) Sodium oxide with porous platinum electrodes

PART – B (5 x 2= 10Marks)

11. Define sensor CO1- R

12. List the three types of control valves CO2- R

13. Interpret thermal capacitance in thermal system building block CO3- U

14. Recall the function of counter CO4- R

15. List four sensors used in Engine Management System CO5- R

PART – C (5 x 16= 80Marks)

16.	(a)	(i) Compare sensors and transducers with examples.	CO1- U	(4)
		(ii) Explain the elements of closed loop control system	CO1- U	(12)
		Or		
	(b)	(i) Interpret how does LVDT measure displacement.	CO1- U	(4)
		(ii) Explain the working of following sensors: • Pressure sensor • Temperature sensor • Light sensor	CO1- U	(12)
17.	(a)	Illustrate the working principle of direction control valve based on actuating methods. Give examples for each method of actuation.	CO2- U	(16)
		Or		
	(b)	Explain the principles of operation of belt and chain drive systems with suitable schematics.	CO2- U	(16)
18.	(a)	Design building blocks for translational and rotational system. Also, derive the relationship between their input and output.	CO3- App	(16)
		Or		
	(b)	Construct a PID controller and derive equations for its controller output and transfer function.	CO3- App	(16)
19.	(a)	Exemplify the architecture of PLC and describe its I/O processing.	CO4- U	(16)
		Or		
	(b)	Summarize how data are handled in PLC with necessary illustrations.	CO4- U	(16)
20.	(a)	Design a mechatronic circuit for pick and place robot application. Also, explain how solenoid valves controls the movements of robot unit.	CO5- App	(16)
		Or		
	(b)	Design an automatic car park barrier system with necessary mechatronics elements and explain its Robot control.	CO5- App	(16)