SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
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Siddharth Nagar, Narayavanam Road, PUTTUR-517 583
QUESTION BANK

Subject with Code: Mechatronics &Robotics (18ME0337)   **Course & Branch: B. Tech – ME**
Year/ Sem: IV-B. Tech & I-Sem   **Regulation: R18**

UNIT I (CO1)

1	(a)	Draw a neat diagram of Mechatronics system.	L1	CO1	2M
	(b)	What is real time operating system?	L1	CO1	2M
	(c)	What is pyrometer?	L1	CO1	2M
	(d)	What is sensor and transducer?	L1	CO1	2M
	(e)	List out Functions of thermocouple?	L1	CO1	2M
2.	(a)	Define Mechatronics with elaborate definition. And give examples of mechatronics system.	L1	CO1	5M
	(b)	Explain the various components in mechatronics system with neat sketch?	L3	CO1	5M
3.	(a)	What is evaluation of mechatronics?	L1	CO1	5M
	(b)	List the various benefits and applications of mechatronics?	L3	CO1	5M
4	(a)	Define control system. Explain about control systems.	L1	CO1	5M
	(b)	Explain the open loop control system with neat sketch in detail.	L3	CO1	5M
5	(a)	Describe the closed loop control system with neat sketch.	L3	CO1	5M
	(b)	Differentiate between GPOS and RTOS.	L1	CO1	5M
6.	(a)	How does a GUI work? And what are the benefits of GUI?	L2	CO1	5M
	(b)	List out components of real time operating system and explain them?	L1	CO1	5M
7.	(a)	List out the displacement transducers? Explain with neat sketch any one of displacement transducer	L3	CO1	10M
8.	(a)	Explain the functions of a strain gauge element with neat sketch.	L3	CO1	5M
	(b)	Describe pneumatic sensor with neat sketch.	L3	CO1	5M
9.	(a)	List out thermal expansion methods and describe electrical resistance sensor of RTD with neat sketch	L1	CO1	10M
10.	(a)	What are the basic methods of force measurement? Elaborate elastic force devices with neat sketch	L1	CO1	5M
	(b)	Discuss the selection criteria for sensor?	L3	CO1	5M

UNIT II (CO2)

1	(a)	List any two applications of hydraulic and pneumatic system.	L3	CO2	2M
	(b)	What is signal conditioning?	L1	CO2	2M
	(c)	Define circuit breakers.	L1	CO2	2M
	(d)	What is the importance of protection scheme?	L1	CO2	2M
	(e)	List any two types of actuators.	L2	CO2	2M
2.	(a)	Define actuator. Actuators plays a primary role in mechatronics system explains it.	L4	CO2	5M
	(b)	Illustrate the characteristics of actuator?	L4	CO2	5M
3.	(a)	How do you classify the actuation system? Draw actuation system functional diagram?	L3	CO2	6M
	(b)	Mention the limitations of actuators.	L5	CO2	4M
4.	(a)	Elaborate components of an hydraulic system with neat sketch	L3	CO2	5M
	(b)	Describe the basic components of pneumatic system with neat diagram?	L2	CO2	5M
5.	(a)	What are the mechanical actuation system functions?	L1	CO2	5M
	(b)	Describe working of timing belt? What happens if the timing belt breaks?	L3	CO2	5M
6.	(a)	Explain signal conditioning? Categorize the various processes occur in signal conditioning.	L3	CO2	5M
	(b)	Write about electrical actuation system?	L6	CO2	5M
7.	(a)	Write the function of resistors and draw symbol of fixed resistor with ANSI standard?	L6	CO2	5M
	(b)	Show protection circuit and explain it with few features?	L4	CO2	5M
8.	(a)	How does work capacitor? With capacitor basic configuration?	L2	CO2	5M
	(b)	What is filter? Classify the filters in detail.	L1	CO2	5M
9.	(a)	Explain analog to digital converter and digital to analog converter with neat diagrams.	L3	CO2	10M
10.	(a)	What is coupling? Classify the couplings in detail.	L2	CO2	5M
	(b)	What is the function of protection scheme? Describe working principle of circuit breaker with neat sketch	L3	CO2	5M

UNIT III (CO3)

1	(a)	How does a programmable logic controller work?	L2	CO3	2M
	(b)	What is shift register?	L1	CO3	2M
	(c)	Draw a ladder diagram and mention its appropriate elements	L1	CO3	2M
	(d)	What are the functions of robots?	L1	CO3	2M
	(e)	List out the types of grippers.	L1	CO3	2M

2.	(a)	How does micro controller work?	L2	CO3	5M
	(b)	What are the elements of a microcontroller	L1	CO3	5M
3.	(a)	What are the supporting elements include in microcontrollers with block diagram.	L3	CO3	5M
	(b)	Describe the different types of memory commonly available on a Microcontroller.	L2	CO3	5M
4.		How does a programmable logic controller work? Draw basic structure of PLC and explain it.	L3	CO3	5M
5.	(a)	Which type microcontroller is most commonly used? Discuss architecture of 8051 Microcontroller.	L4	CO3	5M
	(b)	What are the applications of 8051 microcontroller? List out the various functional blocks of 8051 micro-controller	L3	CO3	5M
6.	(a)	What aspects should be considered for the selection of a PLC for the application?	L3	CO3	5M
	(b)	Draw flip flop shift register and explain it?	L3	CO3	5M
7.	(a)	Classify robots based on the configurations with neat diagrams.	L3	CO3	5M
	(b)	What is the role of robots in loading and unloading, discuss in detail?	L6	CO3	5M
8.	(a)	Define robot. With neat sketch explain the robot anatomy.	L3	CO3	5M
	(a)	List the different types of joints used in robots with neat sketch.	L3	CO3	5M
9	(a)	What is degree of freedom? Briefly explain it.	L1	CO3	5M
	(b)	Describe the factors to be considered in the design of grippers.	L6	CO3	5M
10.	(a)	Elucidate the role of robots in material transfer and handling.	L6	CO3	5M
	(b)	Explain the robot application in assembly and Inspection.	L3	CO3	5M

UNIT IV (CO4)

1	(a)	What is arm kinematics?	L1	CO4	2M
	(b)	What is manipulator?	L1	CO4	2M
	(c)	State the reason for homogeneous transformation.	L1	CO4	2M
	(d)	Define joint coordinates.	L1	CO4	2M
	(e)	Write about jacobians?	L1	CO4	2M
2.		With help of a suitable example, explain the operators: (a) Translation (b) Rotation (c) Transformation	L2	CO4	10M
3.		Clearly explain with neat sketches the manipulator kinematics.	L3	CO4	10M
4.		Briefly explain the D-H notation joint coordinates with diagram	L3	CO4	10M
5.		Write short notes on following: (a) Forward transformation (b) Reverse transformation	L6	CO4	10M
6.		Derive forward and reverse transformation of 2-Degree of freedom arm.	L4	CO4	10M
7.		Describe the lagrange-Euler and Newton- Euler formulations.	L3	CO4	10M

8.		Develop the forward and backward transmission for a robot with 3-degree of freedom arm.	L6	CO4	10M
9.	(a)	Explain the various functions of an inverse kinematics.	L2	CO4	5M
	(b)	Distinguish between Kinematics and dynamics of robotics.	L2	CO4	5M
10.		Differentiate between newton-Euler and Euler –Lagrangian formulations in find the dynamic equations of motion	L1	CO4	10M

UNIT V (CO5)

1	(a)	What is path planning?	L1	CO5	2M
	(b)	Define trajectory planning	L1	CO5	2M
	(c)	List the programming languages in robotics	L1	CO5	2M
	(d)	Define joint interpolation motion.	L1	CO5	2M
	(e)	What is robot program language?	L1	CO5	2M
2.		Write an elaborate note on motion commands of robots	L6	CO5	10M
3.		Explain detail manual lead through programming method in robot application	L3	CO5	10M
4.		Classify various programming languages used computer controlled robots	L2	CO5	10M
5.		Define the following terms of trajectory planning (i) Trajectory (ii)Spline (iii) Joint space scheme (iv) Cartesian space scheme.	L6	CO5	10M
6.		Explain the steps involved in trajectory planning.	L3	CO5	10M
7.		What is path planning? Explain the need for path planning.	L1	CO5	10M
8.	a)	Write about robot software packages?	L6	CO5	05M
	b)	Define Robot program. What is the purpose of it and what are the various methods used for programming robots?	L1	CO6	05M
9.		Explain path planning and avoidance of obstacles in robotics.	L1	CO6	10M
10.		Illuminate straight line motion with neat sketch.	L3	CO6	10M

Prepared By D.KRISHNAIAH & Dr. P. RAMESH