Code No: RT32034 **R13** **SET - 1**

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

ROBOTICS

(Mechanical Engineering)

Time: 3 hours Maximum Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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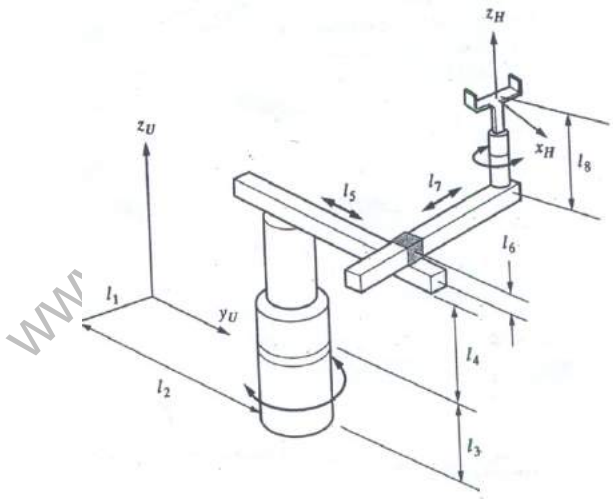
PART –A

1	a)	What is Automation in robotics?	[4M]
	b)	What are degrees of freedom?	[4M]
	c)	What is Forward Kinematics Explain?	[4M]
	d)	What is meant by Jacobian?	[4M]
	e)	Illustrate and explain Skew motion.	[3M]
	f)	Explain in brief about spray painting application in robots.	[3M]

PART -B

2	a)	Explain about Robot anatomy in detail with neat sketch.	[8M]
	b)	What are the future applications of robots?	[8M]
3		For the four degree of freedom robot depicted in figure: i) Assign appropriate frames for D-H representation. ii) Fill out the parameter table containing θ,d,a,α iii) write an equation in terms of A matrices that show how ${}^{U}T_{H}$ can be calculated	16M]



4		Explain about Newton – Euler formulations by considering an example.	[16M]
5	a)	Explain about programmable logic controller.	[8M]
	b)	Write a brief notes on PLC programming terminals.	[8M]
6	a)	What are the uses of sensor in robotics? What are the types of sensors used in robotics?	[8M]
	b)	Explain about Force sensors with neat sketch.	[8M]
7		Explain about welding operations of robot with neat sketch.	[16M]

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Code No: RT32034 **R13** **SET - 2**

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

ROBOTICS

(Mechanical Engineering)

Time: 3 hours Maximum Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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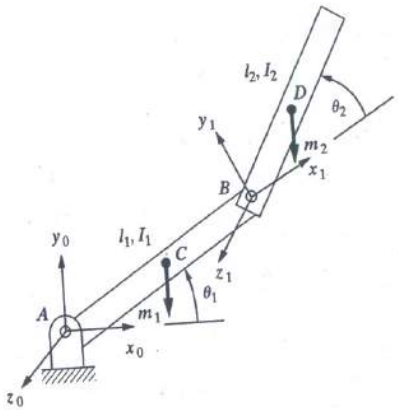
PART –A

1	a)	How do you classify robots by coordinate system?	[4M]
	b)	What are common types of arms?	[4M]
	c)	What is D-H notation explain in brief?	[4M]
	d)	What is the purpose of Differential transformation?	[4M]
	e)	Illustrate and explain joint integrated motion.	[3M]
	f)	What is potentiometer?	[3M]

PART -B

2	a)	Explain the importance of Robotics in Automation.	[8M]
	b)	Explain about the controllers in detail.	[8M]
3	a)	Explain about homogeneous Transformations in Robotics kinematics.	[8M]
	b)	Discuss briefly about path control and path generation.	[8M]
4		Using Lagrangian method , derive the equations of motion for the two degree of freedom robot arm, shown in figure, the center of mass for each link is at the center of link. The moments of inertia are I_1 and I_2	[16M]



5	a)	Explain about importance of Robot Programming lead through programming.	[8M]
	b)	Write about Textual Robot languages programming as a path in space.	[8M]
6		What are the types of actuators explain with neat sketch?	16M
7	a)	What are general considerations in Robot material handling?	[8M]
	b)	Explain in detail about safety sensors and safety Monitoring.	[8M]

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Code No: RT32034 **R13** **SET - 3**

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017

ROBOTICS

(Mechanical Engineering)

Time: 3 hours Maximum Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Mention some future applications of robots.	[4M]
	b)	What are Requirements and challenges of end effectors?	[4M]
	c)	Differentiate between joint coordinates and world coordinates?	[4M]
	d)	What is Newton – Euler formulations? What are its applications?	[4M]
	e)	Illustrate and explain straight line motion.	[3M]
	f)	Explain about Hydraulic actuators.	[3M]

PART -B

2	a)	How do you specify a robot? Is robotics automation? Discuss the different classification systems of robots.	[8M]
	b)	Define the terms 'Robot' and 'Robotics'. Discuss the role of robots in engineering	[8M]
3		3 Describe about D-H Transformation for a forward Kinematics problems of planar 3 dot manipulator.	16M
4		Draw the block diagram that corresponds to the spring-mass-damper system represented by equations	16M

$$M\frac{d^2y}{dt^2}+K_d\frac{dy}{dt}+K_d=K_sx$$

$$Ms^2Y(s)+K_dSY(S)+K_SY(s)=K_SX(s)$$

5	a)	Discuss the textural robot language structure with the help of block diagram.	[8M]
	b)	Discuss the relative merits and demerits of different textual robot languages.	[8M]
6		How do you classify Tactile sensor? Explain them briefly with neat sketch.	16M
7	a)	Define material transfer application? Explain about simple pick and operation with neat sketch.	[8M]
	b)	List out some applications of robot?	[8M]

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Code No: RT32034 **R13** **SET - 4**

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

ROBOTICS

(Mechanical Engineering)

Time: 3 hours Maximum Marks:70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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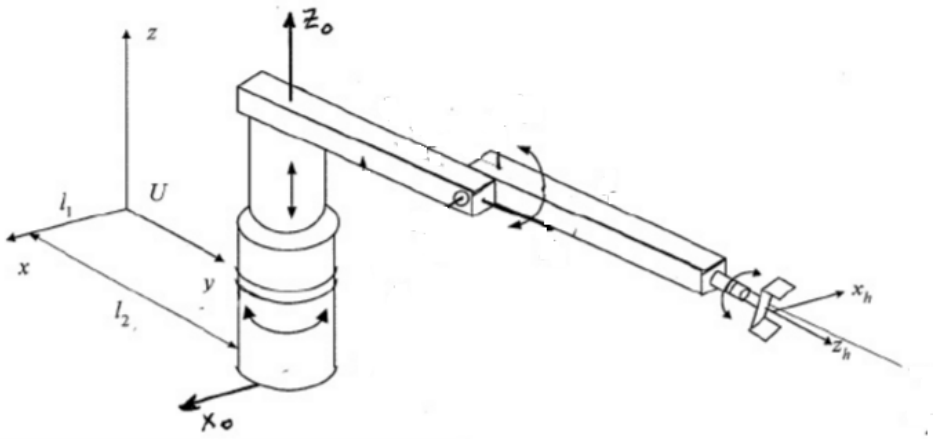
PART –A

1	a)	What are different types of control system?	[4M]
	b)	What are the types of locomotive devices?	[4M]
	c)	What is inverse kinematics explain?	[4M]
	d)	What is Lagrange – Euler formulations? What are its applications?	[4M]
	e)	What are different robot programming languages?	[3M]
	f)	Explain about electric & stepper motors.	[3M]

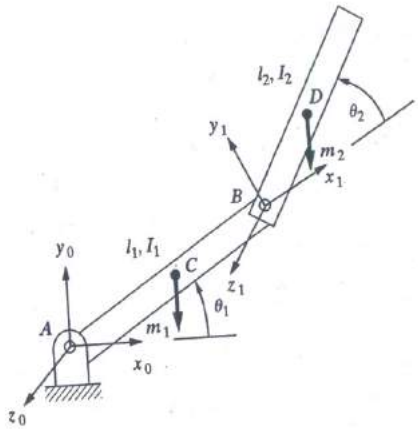
PART -B

2	a)	On what criteria Robots are selected for performing tasks assigned?	[8M]
	b)	What are the basic components of Robot? Explain them briefly with sketch	[8M]
3	a)	For the four degree of freedom robot depicted in figure: i) Assign appropriate frames for D-H representation. ii)Fill out the parameter table containing θ,d,a,α iii) write an equation in terms of A matrices that show how ${}^{U}T_{H}$ can be calculated	[16M]



Code No: RT32034 **R13** **SET - 4**

4 a) Using Lagrangian method, derive the equations of motion for the two degree of freedom robot arm, shown in figure, the center of mass for each link is at the center of link. The moments of inertia are I_1 and I_2 [8M]



5 Explain with neat sketch about Trajectory planning and avoidance of obstacles and path planning. [16M]

6 a) What are the types of gripper mechanism explain them in detail? [8M]

b) Explain about Proximity and Range sensors in detail. [8M]

7 a) What are future manufacturing applications of robot? [8M]

b) What is the role played by control systems in the functioning of Robots? [8M]

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