Q. Code:150600

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Sixth-Semester

OE18706 – ROBOTICS SYSTEMS

(common to All Branches except ECE)

(Regulation 2018/2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Classify robotics system, automation and control technologies.	**4**
CO 2	Select appropriate sensors for certain applications.	**4**
CO 3	Sketch various stages involved in computer vision for robotics.	**4**
CO 4	Select required actuators, end effectors, robot programming languages for any given Applications.	**4**
CO 5	Illustrate recent industrial robotics and their applications.	**3**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Define industrial robot.	**1**	**1**
2.	Suggest the best combination of P, I or D controllers for any industrial application and justify your answer.	**1**	**4**
3.	What is absolute encoder? Which number system is used in absolute encoder?	**2**	**2**
4.	Define tactile and non-tactile sensor?	**2**	**1**
5.	An image of size 8 x 8 has 4 gray scale levels. Identify the total number of bits required to represent the given image.	**3**	**2**
6.	Draw a general architecture of a robotic vision system for an industrial application.	**3**	**4**
7.	Distinguish electric and hydraulic actuators that are applied for robot movements.	**4**	**4**
8.	You are asked to select a suitable gripper for a specific application. List out four important design considerations for its selection.	**4**	**2**
9.	Draw on-line, off-line, in-process for automated inspection.	**5**	**4**

10.	What do you mean by palletizing and depalletizing actions, carried out by automated robots?	**5**	**2**	

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Analyze the precision of robotic movements like resolution, accuracy and repeatability for building industrial robots with the suitable diagrams.	**(14)**	**1**	**4**
	(OR)			
(b)	Classify the four basic robot configurations that are suitable for industrial applications with neat sketch. Also justify that SCARA is a hybrid configuration which is most suitable for industrial automation.	**(14)**	**1**	**4**
12. (a)	Distinguish proximity sensors from position sensors. Also, choose any one sensor from each category which suits an application in your engineering discipline and justify its principle of operation.	**(14)**	**2**	**4**
	(OR)			
(b)	Analyze the role of strain gauge in force sensors. Justify that the principle of operation of force sensors can be applied to torque sensor and interpret them.	**(14)**	**2**	**4**
13. (a)	Show that region growing and edge detecting algorithms are suitable for segmentation of image in robotic vision with appropriate examples.	**(14)**	**3**	**3**
	(OR)			
(b)	Elaborate the process of object description by applying geometrical and statistical features.	**(14)**	**3**	**3**
14. (a)	Identify various mechanisms of mechanical grippers and support your answer with neat diagram to actuate robot finger movement.	**(14)**	**4**	**4**
	(OR)			
(b)	Explore the structure of robot language in detail.	**(14)**	**4**	**4**

		Marks	CO	RBT LEVEL
15. (a)	Explain the significant components required for building a flexible manufacturing system and demonstrate the system for generic industrial applications.	**(14)**	**5**	**1**

(OR)

(b)	Discuss the types of automated assembly systems to perform the various functions in an assembly line or cell.	**(14)**	**5**	**1**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	How does the image histogram support simple image segmentation operations? Construct histogram plot for the following 6x6 image pixel and find the required threshold for segmentation.	**(10)**	**3**	**5**

7	10	5	4	12
6	11	2	7	14
3	12	4	3	13
4	14	14	15	15
2	12	6	3	14
2	13	5	2	12

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