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**Question Paper Code : 51075**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Seventh/Ninth Semester

Aeronautical Engineering

OIE 751 – ROBOTICS

(Common to: Aerospace Engineering/Agriculture Engineering/Automobile Engineering/Civil Engineering/Computer Science and Engineering/Computer and Communication Engineering/Electronics and Communication Engineering/Electronics and Telecommunication Engineering/Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/Material Science and Engineering/Mechanical Engineering/Mechanical Engineering (Sandwich)/Mechatronics Engineering/Production Engineering/Robotics and Automation/Bio Technology/Food Technology/Information Technology/Pharmaceutical Technology)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define work envelope.
2. How can you express the orientation of the spherical wrist in robots?
3. What are the salient features of a stepper motor?
4. When will you prefer a mechanical gripper?
5. Identify two applications of optical encoders.
6. How are images segmented in Machine Vision?
7. Distinguish forward and inverse kinematics.
8. Write the limitations of manual programming in robotics.
9. List four advantages of AGVs.
10. State payback method.

PART B — (5 × 13 = 65 marks)

11. (a) Explain how robots are classified and discuss their envelopes with suitable sketches. (13)

Or

- (b) Discuss the parameters associated with the calculation of the payload of a Gantry Robot. (13)

12. (a) Sketch and explain the working of pneumatic drives used in robotics and compare them to electric drives with its applications. (13)

Or

- (b) Discuss any how internal and external grippers are selected with the help of four applications each. (13)

13. (a) Using a suitable diagram, explain the working of an LVDT and comment on your views when compared to an optical encoder. (13)

Or

- (b) Describe any three common algorithms used in image processing and identify their-salient features. (13)

14. (a) Derive the direct kinematics equation of SCARA robot using Denavit-Hartenberg transformation matrix. (13)

Or

- (b) Consider an example of a tool as a robot end effector, discuss six commands used in VAL and explain their structure. (13)

15. (a) Describe in detail how you would implement a new robot at your workplace and state the difficulty involved. (13)

Or

- (b) Discuss the various cost components considered in the economic analysis of industrial robots used in the automotive industry. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Discuss how an AGV is guided in the warehouse of a manufacturing factory and recommend your views for further improvement. (15)

Or

- (b) Discuss a case study of Appliats of Robots in medical field with neat sketch. (15)