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

Question Paper Code : 41029

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh 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. What are the factors that influence the speed of motion of robots in minimizing the lead time?

2. With neat sketches explain any two types of joints used in robots with their functions.

3. Explain with a neat sketch the “Gear and rack” actuation gripper,

4. Write the difference between internal and external grippers by their applications.

5. What type of touch sensors are used in mobiles?

6. Explain : Pixels in image capturing.

7. Explain : Inverse kinematics and its practical applications.

8. Explain with examples where Machine Vision System can be used in real time applications in robotic industries.

9. Explain the advantages and applications of AGV type robots.

10. Explain the standard safety considerations in implementing robots for various operations.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the configurations of robots with the joints making the configurations and the work volumes generated by the configurations of robots.

Or

(b) Explain with neat sketches the functional features that determine Precision of Movements of robots.

12. (a) Explain with diagram the working of stepper motor and its applications.

Or

(b) Explain with sketches any two types of tool end-effectors used in robots with their applications.

13. (a) Explain the working principle of Charge Coupled Device used in obtaining a digitized image for Machine Vision System.

Or

(b) Explain with a neat sketch the working principle of a liquid sensing proximity sensor and its other applications.

14. (a) Explain the robot language structure to coordinate all the robotic system without lag.

Or

(b) Explain Homogenous coordinates and Transformation matrix with the submatrices of homogenous transformation matrix.

15. (a) Explain with sketches the Automated Guided Vehicle type robots and explain the alternatives for AGV.

Or

(b) Explain the challenges in implementing robots in automobile industries producing electric and Autonomous vehicles with practical examples..

PART C — (1 × 15 = 15 marks)

16. (a) Explain the Image Processing and Analysis of a Vision System in identifying the symptoms of COVID 19 patients entering a shopping mall.

Or

(b) Explain with sketches the phases of Machine Vision System that can be implemented in protecting/avoiding ATM robbery.

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