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Roll No. :

337831(37)

APR-MAY 2022

B. E. (Eighth Semester) Examination, 2020

(New Scheme)

(Mechanical Engg. Branch)

ROBOTICS

Time Allowed ; Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d). Give neat and clean diagrams wherever needed.

Unit-I

1. (a) Explain laws of Robotics?

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- (b) Describe three basic configuration of arm in Robotic Manipulators? 7
- (c) Define the following in detail : 7
- (i) Load carrying capacity
 - (ii) Work volume
 - (iii) End effector
- (d) Explain "Robot anatomy" & Design and control issue in Robotics? 7

Unit-II

2. (a) Define Mapping? 2
- (b) Explain D-H notation in detail? 7
- (c) Describe Coordinate frames? Explain global & local coordinate? 7
- (d) Define degree of freedom? Explain the various Robotic components? Describe how to calculate the DOF of Robotic Manipulator? 7

Unit-III

3. (a) Define Inverse Kinematics. 2

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- (b) Explain Kinematics model of Robotic manipulators with neat sketch? 7
- (c) Draw a five degree of freedom Industrial Manipulator and obtain the transformation matrices for its different components and overall transformation matrix for the manipulator. 7
- (d) Explain Jacobian matrix for velocity analysis. Unit-IV 7

4. (a) What are the functions of sensor in Robotics? 2
- (b) Describe Image Acquisition in detail? 7
- (c) How Robotic sensors are classified? Give brief description of their working and use? 7
- (d) What do you understand by the term "Architecture of Robotic vision system"? 7

Unit-V

5. (a) Why robots are considered as a 24x7 worker? 2
- (b) What are the various material handling tasks performed by a robot. 7

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- (c) Explain in details : 7
- (i) Robot safety
 - (ii) Justification of Robots
- (d) Explain industrial & non industrial application of Robots with suitable diagram? 7