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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - August 2024**

Semester : 4	Date :08.08.2024
Course Code : MEC 3060	Time :9.30 am to 12.30 pm
Course Name :Robotics	Max Marks :100
Program :B.Tech	Weightage :50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ANY 5 QUESTIONS

5Q X 4M=20M

- 1 What does robot locomotion mean? (CO 1) [Knowledge]
- 2 Describe various applications of robots. (CO 1) [Knowledge]
- 3 Define an end effector. (CO 1) [Knowledge]
- 4 Provide a brief explanation of legged locomotion. (CO 2) [Knowledge]
- 5 List the four primary commercial robot configurations. (CO 2) [Knowledge]
- 6 Define work volume. (CO 2) [Knowledge]
- 7 What is a robot? (CO 2) [Knowledge]

PART B

ANSWER ANY 4 QUESTIONS

4Q X 10M=40M

- 8 Discuss the concept of wheel geometry and its significance. (CO 1) [Comprehension]
- 9 Illustrate wheeled locomotion with a relevant example. (CO 1) [Comprehension]
- 10 Explain the difference between Holonomic and Non-Holonomic drive systems. (CO 1) [Comprehension]

- 11 Describe the components and structure of an industrial robot in detail. (CO 2) [Comprehension]
- 12 What are Direct and Inverse kinematics, and how do they function in robotics? (CO 2) [Comprehension]
- 13 Provide an example to explain legged locomotion in robotics. (CO 2) [Comprehension]

PART C

ANSWER ANY 2 QUESTIONS

2Q X 20M=40M

- 14 Using a detailed diagram, explain the Polar and jointed arm configurations of a robot. Discuss the specific applications where each configuration is most beneficial, including examples of tasks or industries where they are commonly used. Additionally, explore the advantages and limitations of each configuration in terms of reach, dexterity, and load capacity. (CO 1) [Application]
- 15 Describe the forward kinematics equations of a manipulator, focusing on a specific position of a robotic arm. Include a graph or diagram to illustrate the mathematical relationships involved. Discuss the practical applications of forward kinematics in programming robotic movements, emphasizing how accurate position calculations are critical in various industries such as manufacturing, medical robotics, and automation. Provide examples of how precise positioning is crucial for tasks like welding, assembly, and medical procedures. (CO 1) [Application]
- 16 Identify and explain the different types of end effectors used in robotics. For each type, provide a detailed example that illustrates its specific application and functionality. Discuss how different end effectors, such as grippers, welding torches, or suction cups, are selected based on the task requirements and the nature of the objects being manipulated. Explore the technological advancements in end effector design, such as adaptive grippers and multifunctional tools, and their impact on increasing the versatility and efficiency of robotic systems in various fields. (CO 2) [Application]