

Total No. of Questions : 4]

SEAT No. :

PF254

[Total No. of Pages : 2

APR-26/SE/Insem-313

S.E. (Robotics & Automation Engineering) (Insem)

COMPUTER GRAPHICS FOR ROBOTICS

(2019 Pattern) (Semester - IV) (211512)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Solve Q.No.1 or Q.No.2 and Q.No.3 or Q.No.4.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of calculator is allowed.*

Q1) a) Calculate the angle between two vectors **[8]**

$$\hat{i} - 2\hat{j} + 3\hat{k}$$
$$3\hat{i} - 2\hat{j} + \hat{k}$$

b) What is Computer graphics? State the applications of computer graphics. **[7]**

OR

Q2) a) Calculate the points between the starting coordinates (9, 18) and ending coordinates (14, 22) by using Bresenham Line Drawing Algorithm. **[7]**

b) Explain the following terms: **[8]**

- i) Pixels
- ii) Frame Buffer
- iii) Aspect Ratio
- iv) Resolution

P.T.O.

Q3) a) In 2d transformation given a Triangle with points (1, 1), (0, 0) and (1, 0). Apply shear parameter 2 on X axis and 2 on Y axis and find out the new coordinates of the object. [8]

b) Explain perspective projection with its types. [7]

OR

Q4) a) Given a 3D triangle with coordinate points A (3, 4, 1), B (6, 4, 2), C (5, 6, 3). Apply the reflection on the XZ plane and find out the new coordinates of the object. [8]

b) Obtain the 3D transformation matrix for forward kinematic analysis of a spherical robot. [7]

