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Total Pages : 3

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January 2023

B.Sc. (Animations) Re-Appear 1st Semester

Mathematics-I (BSC-A18-102)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) Find the distance between the points whose coordinates are (5, 2) and (7, 3). (1.5)

(b) Identify the following operations as commutative or non-commutative: Matrix addition, matrix subtraction, matrix multiplication. (1.5)

(c) What is purpose of directrix in ellipse? (1.5)

(d) Find the equation of a circle that has radius r and its center at the point (h, k). (1.5)

(e) Find the equation of the line joining (2, 5) and (10, 20). (1.5)

(f) Find the ratio in which the line joining A(5, l, 6) and B(3, 4, l) is divided by yz plane. (1.5)

(g) Let **V1 = 21 – J + K** and **V2 = I + J – K**. Find the angle between **V1** and **V2**. (1.5)

(h) Find the components of the vector A whose tail is at P1(1, 2) and whose head is at P2(3, 5). (1.5)

(i) Write the matrix for the following transformation :

(i) Rotation in 2D.

(ii) Reflection in 2D both across X and Y axis.

(iii) Scaling in 2D. (1.5)

(j) Write the transformation matrices for creating the projection in X, Y and Z planes. (1.5)

PART–B

2. (a) The transformation, R, is a reflection in the line $y = -x$. Write down the matrix which represents R. (5)

(b) Write down the matrix for the transformation, L, an enlargement, centre O and scale factor 2. (5)

(c) The matrix, Q, represents a combination of the transformation R, followed by the transformation L. Write down the matrix, Q, as a product of the two matrices found in (a) and (b) above. (5)

3. (a) Define three types of Cartesian, spherical and cylindrical coordinate systems. How a point $p(x, y, z)$ in Cartesian coordinate system can be mapped (converted) in other two coordinate systems. (7)

(b) Find the equation of a circle with centre as (0, 0) and the straight line $3x + y - 10 = 0$ as tangent. (8)

4. (a) Perform the rotation of a unit cube about *yz* plane by 30° (7.5)

(b) Describe how isometric projection can be created in Z-plane. (7.5)

5. (a) Find the equation of the straight line perpendicular to $3x + 4y - 10 = 0$ and passing through the point (5, 6). (7.5)

(b) Find the coordinates of a point dividing the line joining (10, 20) and (30, 50) in the ratio 2 : 3. (7.5)

6. (a) Consider a triangle with vertices as A(4, 1), B(5, 2), C(4, 2). Rotate it by 90° about point A. (7.5)

(b) Use vector method to show that P, Q, R are Collinear – P(3, –5, 1), Q(–1, 0, 8) and C(7, –10, –6). (7.5)

7. (a) Write short notes on the following :

(i) Isometric Projection. (5)

(ii) Perspective Projection. (5)

(iii) Anti-aliasing. (5)