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GA—99—2023

FACULTY OF SCIENCE

B.Sc. (Second Semester) EXAMINATION

APRIL/MAY, 2023

(New Course)

MATHEMATICS

Paper – IV

(Geometry)

(Tuesday, 9-5-2023)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

N.B. :— (i) All questions are compulsory.

(ii) Figures to the right indicate full marks.

1. Prove that, the projection of a segment AB on a line CD is $AB \cos \theta$, where θ is the angle between the lines AB and CD.

And solve, the projection of a line on the axes are 2, 3, 6. What is the length of the line ? 15

Or

(a) To find the equation of a plane in terms of the intercepts a, b, c which it makes on the axes. 8

(b) Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6) and perpendicular to the plane $2x + 6y + 6z = 9$. 7

2. To show that the shortest distance between two lines lies along the line meeting them both at right angles. And find the magnitude and the equation of the line of shortest distance between the lines : 15

$$\frac{x-8}{3} = \frac{x+9}{-16} = \frac{z-10}{7}$$

and

$$\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$$

Or

- (a) To find the equation of the cylinder whose generators intersect the conic

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0, z = 0$$

and are parallel to the line

$$\frac{x}{l} = \frac{y}{m} = \frac{z}{n}. \quad 8$$

- (b) Find the equation to the sphere through the points (0, 0, 0), (0, 1, -1), (-1, 2, 0), (1, 2, 3). 7

3. Attempt any *two* of the following : 10

- (a) Find the direction cosines of the line which is perpendicular to the lines with direction cosines proportional to (1, -2, -2), (0, 2, 1). 10

- (b) Find the angle between the planes :

$$2x - y + 2z = 3$$

$$3x + 6y + 2z = 4.$$

- (c) Show that the line :

$$\frac{1}{3}(x - 2) = \frac{1}{4}(y - 3) = \frac{1}{5}(z - 4)$$

is parallel to the plane

$$2x + y - 2z = 3.$$

- (d) Find the radius and centre of the sphere :

$$x^2 + y^2 + z^2 - 6x + 8y - 10z + 1 = 0.$$