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**University Examinations 2015/2016**

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF TECHNOLOGY IN ELECTRICAL, CIVIL AND MECHANICAL ENGINEERING

**SME 3200: ENGINEERING MATHEMATICS III**

**DATE: November, 2015 TIME: HOURS**

**INSTRUCTIONS:** *Answer questions* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE - (30 MARKS)**

1. Find equation of perpendicular bisector of line segment from A(3,9) to B(-1,4).

(4 Marks)

1. Determine the vector having the initial point p(2,7,-5) and the terminal point Q(0,-3,2) and find the unit vector having the same direction. (4 Marks)
2. Find the centre and the radius of circle whose equation is given by

hence sketch the circle. (4 Marks)

1. For the parabola whose equation is given by 4x + Find the vertex, focus and directrix. (5 Marks)
2. A particle moves along a curve whose parametric equations are

where t is the time.

1. Find its velocity and acceleration at time t. (3 Marks)
2. Find the magnitude of velocity and acceleration at t = 0 (2 Marks)
3. Find the equation of ellipse with Foci (1,0) and (0.5) and vertices (0 ,-1) and (0,7)

(4 Marks)

1. Three forces A B and C are acting on object. If = 2i – j+k, B = i+j+2k c = 3i +2j+4k, Find the magnitude of the resultant force. (4 Marks)

**QUESTION TWO (20 MARKS)**

1. Sketch the graph of and (5 Marks)
2. Prove the following hyperbolic formulas.
3. cos (5 Marks)
4. Cos h 2x = Cos (5 Marks)
5. Tan hx = (5 Marks)

**QUESTION THREE ( 20 MARKS)**

1. Find a parametric equation of a straight line passing through.
2. A (2,3) and (1,7) (4 Marks)
3. P(1 3 -2) and Q (4,2,6) (4 Marks)
4. Find equation of tangent to the circle given by equation at a point on the first quadrant when x= 2 (6 Marks)
5. Find the distance of the point (3, -5) and the line 4x – 3y = 24 (6 Marks)

**QUESTION FOUR ( 20 MARKS)**

1. Find the area of triangle ABC if = 2i – j-6k and = i+ 3j –k (6 Marks)
2. A particle travels so that its acceleration is given by .If the particle is at (1 -3, 2) at time t=0 and is moving with velocity given by 4i-3j+2k.Find
3. the velocity at any time t (3 Marks)
4. the displacement of the particle (5 Marks)
5. a particle of unit mass moves in force field given by F= ( where t is time.

Find the change in momentum of the particle from time t=1 to t = 2. (5 Marks)

**QUESTION FIVE (15 MARKS)**

1. For the hyperbola whose equation is given by – = 1, find vertices, foci, centre and the asymptotes, hence sketch the hyperbola. (10 Marks)
2. Write the equation of plane described by the following;
3. Through the points P1(3 -2,4) P2(3 2 -6) and P3 (1, 5, -3) (5 Marks)
4. perpendicular to n = 2,3,5 and through P (1, -3,7) (5 Marks)