Enrollment ID:____

NAVRACHANA UNIVERSITY
SLSE-B.Sc PROGRAMME
END SEMESTER EXAMINATION NOV-17
S.Y B.Sc Semester – 3
SUB: VECTOR CALCULUS(MAJOR/MINOR MATHEMATICS)
COURSE CODE: MA 219/220
Date:23/11/17 Total Marks = 40 Time: 3.30PM TO 5.30PM

Instructions:

- Write each answer on a new page.
- Use of calculator is permitted

Q1:Following are the MCQ'S. (10 M)

1. Unlike vectors have _____

(a) parallel direction (b) perpendicular direction (c) opposite direction

2. Dot product of two vectors gives _____ as a result

(a) vector (b) scalar (c) zero

3. Work done = _____

(a) Fd (b)FD (c) Fd

4.Vector area of Parallelogram with sides $i - 2j + 3k$ *and* $2i + j - 4k$ *is* _____

(a)$5\sqrt{6}$ (b) $5\sqrt{5}$ (c)$6\sqrt{5}$

5. Angular velocity is _____ quantity.

(a) scalar (b) physical (c) vector

Q2: Do as directed. (ALL ARE COMPULSORY) (20 M)

1 . *The temperature at any point in space is given by* $T = xy + yz + zx$.Determine the derivative of T in the direction of the vector $3i - 4k$ at the point (1,1,1).

2. Find the divergence and curl of the vector field V=$(x^2 - y^2)i + 2xyj + (y^2 - xy)k$.

3. Show that the vector field given by
$A = 3x^2yi + (x^3 - 2yz^2)j + (3z^2 - 2y^2z)k$ *is irrotational but not solenoidal.*

4. If F=$2zi - xj + yk$ *then evaluate* $\iiint_v Fdv$ where
v *is the region bounded by surfaces* $x = 0, y = 0, x = 2, y = 4, z = x^2, z = 2.$

5 .Using Green's theorem evaluate $\int_c (x^2 + xy)dx + (x^2 + y^2)dy$ where
c *is the square formed by the lines* $x = \pm 1, y = \pm 1.$

Q3: State the following. (10 M)

1. Distinguish between scalar and vector quantities with its examples.
2. State Green's theorem
3. State Stoke's theorem

4. Calculate the modulus and the unit vector along the sum of vectors $i + j + 3k, 2i - 2j + 6k$ and $4i + 2j - 4k$.
5. Find the projection of the vector $i - 2j + k$ on $4i - 4j + 7k$.