**B.Sc. DEGREE EXAMINATION, APRIL 2016**

**II YEAR — IV SEMESTER**

**VECTOR CALCULUS, FOURIER TRANSFORMS AND Z-TRANSFORMS**

**Time : 3 hours Max. Marks : 75**

**SECTION A — (10 × 2 = 20 marks)**

**Answer any *TEN* questions**

1. Find grad if at (1, 1, 1).
2. If prove that div =3 and curl
3. If , evaluate from (0,0) to (1,1) along the line y = x.
4. State Green’s theorem.
5. Evaluate , where and V is the volume enclosed by the cube x = 0, x = 1, y = 0, y = 1, z = 0, z = 1.
6. State Stoke’s theorem.
7. State shifting property and Modulation property of Fourier transform.
8. State Parseval’s identity of Fourier transform.
9. Write any two properties of Z-transform.
10. Find Z.
11. If is a constant vector, prove that div is zero.
12. Define Fourier cosine transform of f(x).

**SECTION B — (5 × 5 = 25 marks)**

**Answer any *FIVE* questions**

1. Find div and curl of the vector point function point at the point( 1, -1, 1).
2. Evaluate where C is the straight line joining (0,0,0) to (1,1,1) .
3. Use Stoke’s theorem to evaluate where C is the curve x2+y2 = 4 , z =2.
4. Find the Fourier sine transform of f(x) = 1/x.
5. Find
6. If find div(
7. Using divergence theorem evaluate where and S is the surface of the cube bounded by the planes x = 0, x = 2, y = 0, y = 2, z = 0, z = 2.

[P.T.O.]

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions**

1. (a) Find the unit vector normal to the surface x2+3y2+2z2 = 6 at the point (2, 0, 1).

(b) A field of the form Show that is conservative field and find a function such that .

1. Find the area between the parabolas y2 =4x and x2 =4y.
2. Evaluate where S is the part of the sphere x2+y2+z2=1 above the *xy* plane and bounded by the plane.
3. Find the Fourier transform of e-a|x| , a>0. Deduce that if a > 0.
4. Find the Z-transform of

*(i) Sin a t*

*(ii) e1  Cos a t .*