Subject Code: R13202/R13 **Set No - 1**

I B.Tech II Semester Supplementary Examinations Dec./Jan. – 2015/2016

MATHEMATICS-III

(Common to All Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

****

PART-A

1. (a) Find the Rank of the matrix $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$ using Echelon form

   (b) Prove that the matrix A and A^T have same Eigen values

   (c) Find the volume of loop of the curve $2ay^2 = x(x-a)^2$ revolves about x-axis

   (d) Evaluate $\int_0^1 x^5 (1-x^3)^{10} dx$

   (e) Prove that $div(r \times a) = 0$ where a is a constant vector

   (f) Evaluate $\int f.dr$ where $f = (2y+3)i + xzj + (yz-x)k$ along the straight line joining (0,0,0) and (2,1,1)

[3+3+4+4+4+4]

PART-B

2. (a) Test for consistency and solve $5x+3y+7z=4, 3x+26y+2z=9, 7x+2y+10z=5$.

   (b) Solve the equations
   $xy+z-w=2, 7x+y+3z+w=12, 8x-y+z-3w=5, 10x+5y+3z+2w=20.$ by Gauss-Jordan method

[8+8]

3. (a) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$, hence compute A^4 and A^{-1}

   (b) Reduce the quadratic form $3x^2+5y^2+3z^2-2yz+2zx-2xy$ in to canonical form by orthogonal reduction hence find rank, index and signature .

[8+8]

4. (a) Trace the curve $x = a\cos^3\theta, y = b\sin^3\theta$

   (b) Evaluate the $\int_0^a \int_{x/a}^{\sqrt{x/a}} (x^2+y^2)dxdy$ by change of order of integration [8+8]

5. (a) Prove that $\nabla.(\overline{f}\times\overline{g})=\overline{g}.(\nabla\times\overline{f})-\overline{f}.(\nabla\times\overline{g})$
   (b) Find the angle between the surfaces $x^2+y^2-z^2=12$ & $x^2+y^2-z=5$ at (2, 2, 1)

[8+8]

6. (a) Evaluate $\iint_s x^3dydz+x^2ydzdx+x^2zdxdy$ over the surface bounded by the planes z = 0, z = b and the cylinder $x^2+y^2=a^2$.
   (b) Evaluate $\iiint_v 45x^2ydxdydz$ and v is the region bounded by x = y = z = 0 and 4x+2y+z = 8

[8+8]

7. (a) Evaluate $\int_0^\infty 3^{-4x^2}dx$
   (b) Prove that $\Gamma(n)\Gamma(1-n)=\pi/\sin n\pi$

[8+8]

****