Code No: R161203 **R16** SET - 1

I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2019
MATHEMATICS-III
(Com to AE.AME,CE,CSE,IT,EIE,EEE,ME,ECE,Metal E, Min E, E Com E, Agri E, Chem E, PCE,PE)

Time: 3 hours Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

~~~~~~

PART –A

1\. a) If $A = \begin{bmatrix} 123 \\ 246 \\ 4812 \end{bmatrix}$ then find rank of A. (2M)

b) If 1,2,3 are the Eigen values of matrix A , then Eigen values of A^{-1} . (2M)

c) What is the Nature of the quadratic form If 1 0,-1 are Eigen values of form the quadratic form. (2M)

d) What is an asymptote of the curve? (2M)

e) Find $\beta(1,1)$ (2M)

f) Prove that $3y^4z^2\bar{i}+z^3x^2\bar{j}-3x^2y^2\bar{k}$ is a solenoidal vector. (2M)

g) State Gauss divergence theorem. (2M)

PART -B

2\. a) Solve the equations $x+y-2z+3w=0, x-2y+z-w=0, 4x+y-5z+8w=0, 5x-7y+2z-w=0$. (7M)

b) Solve the system of equations x + y + z = 6, x-y+2z = 5, 3x+y+z = 8, 2x-2y+3z = 7 by Gauss Jordan method. (7M)

3\. a) Verify Cayley -Hamilton theorem for $A=\begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$ also find A^{-1} (7M)

b) Find Rank index and signature of quadratic form $10x^2+2y^2+5z^2-4xy-10xz+6yz$ by orthogonal reduction. (7M)

4\. a) Trace the curve $ay^2=x^2(a-x)$ (7M)

b) Find the volume of the sphere $x^2+y^2+z^2=a^2$ using triple integration. (7M)

|''|''||''||''''''|
~~~~~~

5\. a) Evaluate $\int_0^\infty x^6 e^{-2x} dx$ (7M)

b) Show that $\int_0^\infty \frac{x^a}{a^x} dx = \frac{\Gamma(a+1)}{(\log a)^{a+1}} (a>1)$ (7M)

6\. a) if $\overline{f}$, ϕ be differentiable vector and scalar functions respectively, then prove that $\nabla.\left(\phi\overline{f}\right) = (\nabla\phi).\overline{f} + \phi\left(\nabla.\overline{f}\right)$ (7M)

b) Prove that $\nabla\left(r\nabla\left(\frac{1}{r^3}\right)\right) = \frac{3}{r^4}$ (7M)

7\. a) Apply Green's theorem to evaluate $\oint_C (2xy - x^2)dx + (x^2 + y^2)dy$ where C is bounded by $y = x^2$ and $x = y^2$. (7M)

b) If $\vec{F} = 6z\,\vec{\imath} + (2x+y)\vec{\jmath} - x\,\overrightarrow{k}$, then Evaluate $\iint_S \vec{F}\cdot\hat{n}\,ds$ where S is the region bounded by the cylinder $x^2 + y^2 = 9,\ x = 0, y = 0, z = 0\ and\ y = 8$. (7M)