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

I B. Tech II Semester Supplementary Examinations, December - 2020
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**

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PART –A

1. a) If $A = \begin{bmatrix} 135 \\ 234 \\ 112 \end{bmatrix}$ then find rank of A. (2M)

b) If 1,2,3 are the Eigen values of matrix A , then Eigen values of Adj A are (2M)

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

d) Define curve tracing. (2M)

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

f) Find $curl\,\overline{f}$ for $\overline{f} = xy^2\overline{i} + 2x^2yz\overline{j} - 3yz^2\overline{k}$ at the point $(1,-1,1)$ (2M)

g) State Green's theorem. (2M)

PART -B

2. a) Find the Nature, Rank, index, signature of the quadratic form. $2x^2 + y^2 - 3z^2 + 12xy - 4xz - 8yz$ by orthogonal reduction. (7M)

b) Verify Cayley -Hamilton theorem for the matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ also find A^{-1} (7M)

3. a) Solve the system of equations 4x+2y+z+w =0,6x+3y+4z+7w = 0,2x+y+w = 0 (7M)

b) Find the Rank of the Matrix A = $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$ by reducing into Normal form (7M)

4. a) Trace the curve $r = 3 + 2\cos\theta$ (7M)

b) Find by double integral, the volume of ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ (7M)
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5. a) Show that $\int_a^b (x-a)^{m-1}(b-x)^{n-1}dx = (b-a)^{m+n-1}\beta(m,n) m>0, n>0$ (7M)

b) Show that $\int_0^2 x^3\sqrt{1-4x^2}\,dx = \frac{1}{120}$ (7M)

6. a) Show that $curl\ curl\ \overline{f} = \nabla\times(\nabla\times\overline{f}) = \nabla(\nabla.\overline{f}) - (\nabla.\nabla)\overline{f}$ if $\overline{f}(x,y,z)$ is vector point function. (7M)

b) Find the directional derivative of the function $xy^2+yz^2+zx^2$ along the tangent to the curve $x=t, y=t^2, z=t^3$ at the point $(1,1,1)$ (7M)

7. a) If $\varphi = 40x^2y$, then evaluate $\iiint_V \varphi dV$ where V is the volume bounded by the coordinate planes and the plane $4x+2y+z=4$. (7M)

b) Use Divergence theorem to evaluate $\iint_S (x\vec{i}+y\vec{j}+z^2\vec{k})\cdot\hat{n}\,ds$ where S is the surface bounded by the cone $x^2+y^2=z^2$ in the plane $z=4$. (7M)