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

I B. Tech. II Semester Supplementary Examinations, Nov/Dec - 2018
MATHEMATICS-III
(Com. to CE,CSE,IT,AE,AME,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. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Define Echelon form. (2M)

b) Find the Eigen values of A^{-1} if $A=\begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$ (2M)

c) Write the matrix corresponding to the Quadratic form. (2M)
$x^2+y^2+z^2+4xy-2yz+6xz$

d) Evaluate $\int_0^1\int_0^x ydydx$ (2M)

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

f) Write the two properties of gradient. (2M)

g) State Gauss Divergence theorem. (2M)

PART -B

2. a) Solve the system of equations $2x+y+2z+w=6, 6x-6y+6z+12w=36, 4x+3y+3z-3w=-1, 2x+2y-z+w=10$ by Gauss Elimination method. (7M)

b) Find the Rank of the matrix $A=\begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$ by reduce into Normal form. (7M)

3. a) Reduce the quadratic form $10x^2+2y^2+5z^2-4xy-10xz+6yz$ into canonical form and find its rank , index and signature. (7M)

b) Diagnolize the matrix $A=\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ (7M)

4. a) Trace the curve $r^2 = a^2 \sin 2\theta$. (7M)

b) Find by double Integration, the volume of solid bounded by $z = 0$, $x^2 + y^2 = 1$, and $x + y + z = 3$. (7M)
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5. a) Evaluate $\int_0^\infty xe^{-ax}\sin bx dx$ (7M)

b) Evaluate $\int_0^1 x^5(1-x)^3 dx$ (7M)

6. a) Find the directional derivative of the function $\phi = xy^2 + yz^3$ at the point $(2,-1,1)$ in the direction of the normal to the surface $x\log z - y^2 + 4 = 0$ at $(-1,2,1)$ (7M)

b) Show that $\overline{f} = \overline{a}\times\overline{r}$ is solenoidal where $\bar{a} = a_1\bar{\imath} + a_2\bar{\jmath} + a_3\bar{k}$ and $\bar{r} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ (7M)

7. a) Evaluate $\int_s \phi\,\bar{n}\,ds$ where s is the surface $x^2 + y^2 = 16$ included in the first octant between $z = 0$ $z = 5$ where $\varphi = \frac{3}{8}xyz.$ (7M)

b) Evaluate $\oint_c (x^2 + y^2)\,dx + 3xy^2\,dy$ where c is the circle $x^2 + y^2 = 4$ in xy plane using Green's theorem. (7M)