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

**I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2017**
**MATHEMATICS-III**
(Com. to CE, CSE, IT, AE, AME, EIE, EEE, ME, ECE, Min. E, E Com. E, Agri. E, Chem. E, 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 Rank and write two properties of rank. (2M)

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

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

d) Evaluate $\int_0^1\int_0^y xdxdy$ (2M)

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

f) Write physical interpretation of curl of vector. (2M)

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

**PART -B**

2. a) Solve the system of equations $x+10y+z=6, 10x+y=6, x+y+10z=6$ by Gauss-Seidel method. (7M)

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

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

b) Diagnolize the matrix $A=\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ (7M)

4. a) Trace the curve $y=\frac{x^2+1}{x^2-1}$ (7M)

b) Using double integration, find the volume of the sphere $x^2+y^2+z^2=a^2$. (7M)
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5. a) Evaluate $\int_0^1 (x\log x)^4 dx$ using beta –gamma function. (7M)

b) Evaluate $\int_0^1 x^3\sqrt{1-x}\,dx$ (7M)

6. a) Find the directional derivative of $\frac{1}{r}$ in the direction of $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$ at . $(1,1,2)$ (7M)

b) Show that $\bar{f} = r^n(\bar{a}\times\bar{r})$ 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 $\iint_S \bar{F}.\bar{n}\,ds$ if $\bar{F} = 2xy\,\bar{i} + y\,z^2\,\bar{j} + xz\,\bar{k}$ over the parallelepiped $x = 0,\ y = 0,$ $x = 2,\ y = 1,\ z = 3.$ (7M)

b) Using Divergence theorem, evaluate $\iint_S \bar{F}.\bar{n}ds$ where s is the surface of the sphere $x^2 + y^2 + z^2 = b^2$ in the first octant where $\bar{F} = y\bar{i} + z\bar{j} + x\bar{k}$. (7M)