

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****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 $\int_0^1 \int_0^y x dx dy$ (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 $x + 10y + z = 6, 10x + y = 6, x + y + 10z = 6$ (7M)
by Gauss-Seidel method.

- 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 (7M)
rank, index and signature.

- b) Diagonalize 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)

Code No: R161203

R16

SET - 1

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 $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ at $(1,1,2)$ (7M)
- b) Show that $\vec{f} = r^n (\vec{a} \times \vec{r})$ is solenoidal where $\vec{a} = a_1\vec{i} + a_2\vec{j} + a_3\vec{k}$ and $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ (7M)
7. a) Evaluate $\iint_S \vec{F} \cdot \vec{n} ds$ if $\vec{F} = 2xy\vec{i} + yz^2\vec{j} + xz\vec{k}$ over the parallelepiped $x = 0, y = 0, x = 2, y = 1, z = 3$. (7M)
- b) Using Divergence theorem, evaluate $\iint_S \vec{F} \cdot \vec{n} ds$ where S is the surface of the sphere $x^2 + y^2 + z^2 = b^2$ in the first octant where $\vec{F} = y\vec{i} + z\vec{j} + x\vec{k}$. (7M)

