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

I B. Tech. II Semester Supplementary Examinations, January/February - 2023
MATHEMATICS-III

(Common 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. Answer **ALL** the question in **Part-A***
*3. Answer any **FOUR** Questions from **Part-B***

~~~~~~

PART –A (14 Marks)

1. a) Define Non- Homogenous system of linear equations. [2M]
   b) Define Rank of the quadratic form. [2M]
   c) Find the Eigen values of A^{-1} if the Eigen values of A are 3 &4. [2M]
   d) Write the symmetry of the curve $y = x^3$. [2M]
   e) Find $\beta(2,2,)$. [2M]
   f) Define the gradient of scalar function. [2M]
   g) Define surface integral. [2M]

PART –B (56 Marks)

2. a) Solve the system of equations [7M]
   $4x + 2y + z + 3w = 0, 6x + 3y + 4z + 7w = 0, 2x + y + w = 0$
   b) Solve the system of following equations using Gauss-seidal iteration method [7M]
   $10x + y + z = 9, 2x + 20y - 2z = -44, -2x + 3y + 10z = 22$

3. a) Reduce the quadratic form $3x^2-2y^2-z^2 +4xy +12yz+8xz$ to the canonical form using diagonalization method and find the rank index signature. [7M]
   b) Find the Eigen values and Eigenvectors of $\begin{bmatrix} 2 & 0 & 6 \\ 4 & 1 & 5 \\ 0 & 0 & 3 \end{bmatrix}$ [7M]

4. a) Trace the curve $r = tan\theta$ [7M]
   b) Evaluate $\int_0^2 \int_0^{\sqrt{2x-x^2}} (x^2+y^2)\, dx\, dy$ [7M]

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) Evaluate $\int_0^\infty x^6 e^{-2x} dx$ [7M]

6. a) Find $div\,\overline{f}$, If $\overline{f} = grad\left(x^3+y^3+z^3-3xyz\right)$ [7M]
   b) Show that $\nabla\phi$ is both solenoidal and irrotational if $\nabla^2\phi = 0$ [7M]

7. a) Find the work done in moving particle in the field $\overline{F} = 3x^2\,\overline{i} + (2xz - y)\,\overline{j} + z\overline{k}$ along the curve defined by $x^2 = 4y$, $3x^3 = 8z$ from $x = 0$ to $x = 2$. [7M]
   b) Apply Gauss Divergence theorem to compute $\iint_S \overline{F}.\overline{n}\, ds$ where $\overline{F} = x\overline{i} - y\overline{j} + z\overline{k}$ over the surface of the cylinder $x^2 + y^2 = a^2$ bounded by the planes. $z = 0$, $z = b$. [7M]

*****
~~~~~~