

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**

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 $\int_0^1 \int_0^x y dy dx$ (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) Diagonalize 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)

5. a) Evaluate $\int_0^{\infty} x e^{-ax} \sin bxdx$ (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 $\vec{f} = \vec{a} \times \vec{r}$ 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 $\int_s \phi \vec{n} ds$ where s is the surface $x^2 + y^2 = 16$ included in the first octant between $z = 0$ $z = 5$ where $\phi = \frac{3}{8}xyz$. (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)

