PVP 19

Code: 19BS1101

I B.Tech - I Semester – Regular Examinations - December - 2019

ENGINEERING MATHEMATICS - I

(Common for CIVIL, EEE, ME, ECE, CSE, IT)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.
4. All parts of Question paper must be answered in one place

PART – A

1. a) Define diagnolization.

b) Write down the Schlomilch – Roche's form of remainder of Taylors theorem.

c) If $u = x \sin y$; $v = y \sin x$ then find $\frac{\partial(u,v)}{\partial(x,y)}$

d) Evaluate $\int_0^3 \int_{-x}^{x} xy\,dy\,dx$

e) Evaluate $\int_0^1 \int_0^1 \int_0^1 xyz\,dx\,dy\,dz$

PART – B

UNIT – I

2. a) Find the rank of the matrix by reducing to Echelon form — 6 M

$$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \\ 4 & 3 & 1 & 2 \end{pmatrix}$$

b) Find the value of k such that the system of equations — 6 M

$$x + ky + 3z = 0; \quad 4x + 3y + kz = 0; \quad 2x + y + 2z = 0$$

has non trivial solution.

OR

3. a) Reduce the quadratic form

$6x^2 + 3y^2 + 3z^2 - 4xy - 2yz + 4zx$ to canonical form. — 6 M

b) Verify Caley-Hamilton theorem and hence find A^{-1}. — 6 M

$$A = \begin{pmatrix} 1 & 2 & 2 \\ 0 & 2 & 1 \\ -1 & 2 & 2 \end{pmatrix}$$

UNIT – II

4. a) For $x>0$, show that $1+x < e^x < 1+ xe^x$. — 6 M

b) Verify Rolle's Theorem for f(x)=$\frac{Sinx}{e^x}$, x in [0,π]. — 6 M

OR

5. a) Expand e^x by maclaurin's series. — 6 M

b) Obtain the Taylor's series expansion for

$f(x) = \log(\cos x)$ about the point $x = \pi/3$ upto the 4th degree term. 6 M

UNIT-III

6. a) If u=x log xy, where $x^3+y^3+3xy=1$. Find du/dx. 6 M

   b) Verify the following functions are functionally dependent and also find the relation between them 6 M

   $u = \frac{x^2 - y^2}{x^2 + y^2}$ and $v = \frac{2xy}{x^2 + y^2}$

OR

7. a) Find the minimum value of $x^2+y^2+z^2$ given that $xyz=a^3$. 6 M

   b) If $x + y + z = u$, $y + z = uv$, $z = uvw$ then find $J\left(\frac{x, y, z}{u, v, w}\right)$ 6 M

UNIT – IV

8. a) Evaluate by change of order of integration 6 M

   $\int_0^\infty \int_0^x x e^{\frac{-x^2}{y}} dydx$

   b) Evaluate $\iint r^2 dr d\theta$ over the area bounded between the circles $r = a\sin\theta$ and $r = 2a\sin\theta$ 6 M

OR

9. a) Evaluate $\iint (x^2 + y^2) dxdy$ over the ellipse $2x^2 + y^2 = 1$ 6 M

   b) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dxdy$ by change to polar coordinates. 6 M

UNIT – V

10. a) Evaluate $\iiint_v \frac{dxdydz}{(x^2+y^2+z^2)^{3/2}}$ where v is the region bounded between the sphere $x^2+y^2+z^2=a^2$ and $x^2+y^2+z^2=b^2$, (a>b) — 6 M

b) Determine the volume bounded by the cylinder $x^2+y^2=4$ and the planes y+z=4 and z=0 — 6 M

OR

11. a) Evaluate $\iiint_v dxdydz$, where v is the volume bounded by the planes x=0, y=0, z=0, z=1 and the cylinder $x^2+y^2=1$ by changing into cylindrical polar coordinates. — 6 M

b) Evaluate $\iiint_v dxdydz$ where v is the finite region of sphere formed by the planes x=0, y=0, z=0 and $2x+3y+4z=12$ — 6 M