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02BTC102

B.TECH/M.TECH(INT)

II-SEM, (Main/back) Examination, May/June-2016

SUB: ENGG. MATHEMATICS-II

Time : 3 Hours] [Total Marks 60

Use of following supporting material is permitted during examination.

1._____Nil_____ 2. _____Nil_____

Note: 1. *Attempt any five questions selecting one question from each unit*

2. *Each question carry equal marks.*

UNIT-I

1. A sphere of constant radius k passes through the origin O and meets the axes A, B, C; prove that the Locus of centroid of the :

a) Triangle ABC is sphere $x^2 + y^2 + z^2 = \left(\frac{2}{3}k\right)^2$

b) Tetrahedron OABC is sphere $x^2+y^2+z^2=\left(\frac{1}{2}k\right)^2$

OR

1. a) Find the equation to right circular cone with vertex at origin, axis the line $\frac{x}{z}=\frac{y}{-4}=\frac{z}{3}$ and which passes through the point (1, 1, 2).

b) Find the equation of right circular cylinder $\frac{x-2}{z}=\frac{y-1}{1}=\frac{z}{3}$ and which passes through (0, 0, 1)

UNIT-II

2. a) Find the rank of matrix:

$$A=\begin{bmatrix}1 & 2 & -1 & 2\\ 2 & 5 & -2 & 3\\ 1 & 2 & 1 & 2\end{bmatrix}$$

b) Find inverse of given matrix :

$$A=\begin{bmatrix}0 & 1 & 2\\ 1 & 2 & 3\\ 3 & 1 & 1\end{bmatrix}$$

OR

2. a) Find the solution of following equation.

$$x-y+2z=4$$
$$3x+y+4z=6$$
$$x+y+z=1$$

b) Show that the matrix

$$A=\begin{bmatrix}0 & 1 & 2\\ 2 & -3 & 0\\ 1 & 1 & -1\end{bmatrix}$$

Satisfy cayley Hamlton theorem.

UNIT-III

3. a) If $\bar{r} = x\hat{i} + y\hat{j} + z\hat{k}$ and $r = |\bar{r}|$; prove that

div $r^n\bar{r} = (n+3)r^n$ hence show that $r^n r$ will be solenoidal of n= -3.

b) Evaluate $\int_c F.dr$ where $f = xy\hat{i} + yz\hat{j} + zx\hat{k}$ and c is the curve $r = t\hat{i} + t^2\hat{j} + t^3\hat{k}$, t varying from -1 to +1.

OR

3. a) Find the value of $\nabla^2 r^n$ and show that $\nabla^2\left(\frac{1}{r}\right) = 0$

b) If $f = e^{xyz}(\hat{i} + \hat{j} + \hat{k})$; find curl f.

UNIT-IV

4. Evaluate $\int_c [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$ where C is the region bounded by parabola $y = \sqrt{x}$ and $y = x^2$ using Green's theorem.

OR

4. Find Fourier series for the function.

$f(x) = x\cos x \quad -\pi < x < \pi$

UNIT-V

5. Solve the Charpits method.

$p = (qy + z)^2$

OR

5. Solve

a) $z - xp - yq = a\sqrt{x^2 + y^2 + z^2}$

b) $p(1+q^2) = q(z-a)$