Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech (Civil) (Sem.–2)

ENGG. MATHEMATICS-II

Subject Code : AM-102

Paper ID : [A0119]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C. have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

1. Write short notes on :

a) Examine whether vectors (1,2,3), (3,4,5),(6,7,8) are linear independent or not.

b) Show that the eigen values of skew Hermitian matrix are zero or purely imaginary.

c) Obtain general solution of differential equation $y = xy' + (y')^2$

d) Find the solution of $yy' = 2x - y^2$

e) Find normal vector and equation of tangent plane to surface $Z = \sqrt{x^2 + y^2}$ at point (3,4,5).

f) State Stoke's theorem. Find curl of vector field $V = (x^2y^2 - z^3)\hat{i} + 2xyz\hat{j} + e^{xyz}\hat{k}$

g) A problem is given to three students in a class to be solved. The probabilities of their solving the problem are 0.5, 0.7 and 0.8 respectively. Find the probability that problem will be solved.

h) Give applications of Chi-square distribution.

i) Find homogenous linear differential equation whose particular solution is $xe^{-x} + e^{2x}$

j) Show that frequency of free vibrations in a closed electrical circuit with inductance L and capacity C in series is $\frac{30}{\pi\sqrt{LC}}$ per minute.

SECTION-B

2) Examine whether matrix $A=\begin{bmatrix}-2 & 2 & -3\\ 2 & 1 & -6\\ -1 & -2 & 0\end{bmatrix}$ is diagonalizable. Hence find P such that P^{-1} AP is diagonal matrix.

3) Solve the differential equation $(3x^2y^3e^y+y^3+y^2)dx+(x^3y^3e^y-xy)dy=0$

4) Solve $(3x+1)^2y''+(3x+1)y'+y=6x$

5) The equation of electromotive force in terms of current i for an electrical circuit having resistance R and a condenser of capacity C in series is $E=Ri+\int\frac{i}{c}dt$. Find the current i at any time t, when E= Eosinwt.

SECTION-C

6) Give physical interpretation of Divergence.

7) Find the work done by the force $F=(x^2-y^3)\hat{i}+(x+y)\hat{j}$ in moving a particle along closed path C containing the curves x + y = 0, $x^2+y^2=16$ and y = x in the first and fourth quadrants.

8) a) In a distribution which is exactly normal, 12% of the items are under 30 and 85% are under 60. Find the mean and standard deviation of distribution.

b) Two players A and B play tennis games. Their chances of winning a game are in ratio 3:2 respectively. Find A's chance of winning atleast two games out of four games played.

9) a) The sizes and means of two independent random samples are 400,225; 3.5 and 3 respectively. Can we conclude that the samples are drawn from the same population with standard deviation 1.5.

b) The heights of 8 males participating in an athletic championship are found to be 175cm, 168cm, 165cm, 170cm, 167cm, 160cm, 173cm and 168cm. Can we conclude that the average height is greater than 165cm.Test at 5% level of significance.