B.Tech. Semester-II
Engineering Mathematics –II (AM-102)

A0119

(i) Show that vectors $(1,-1,0)(0,1,-1),(0,2,1)(1,0,3)$ are linearly dependent.

(ii) Prove that if π is Eigen value of A than $\frac{1}{\pi}$ is an Eigen value of $\bar{A}^1$

(iii) Define exact differential Equation. For hat values of 'a' and 'b' the differential Eq^n $(y + x^3)dr + (ax + by^3)dy = 0$ is Exact?

(iv) Solve two differential equation $\frac{dy}{dx} + uxy + xy^3 = 0$

(v) A particle is Executive simple harmonic motion with amplitude 20 cm and time period 2 seconds. Find the Equation of motion of the particle.

(vi) A particle moves along the curve $x = 2t^2,\ y = t^2 - 4t,\ z = 3t - 5$ where + is two time. Find the Components of its velocity at time t = 1 in the direction of $\hat{c} - 3\hat{7} + 2\hat{k}$

(vii) Find the work done by a force $\hat{F} = 2x^2y\hat{c} + 3xy\hat{7}$ if it displaces a particle in xy plane from $(0,0)$ to (L, 4) along the curve $y = 4x^2$

(viii) If $\hat{E}$ & $\hat{H}$ are irrotational vector prove that $\hat{E} \times \hat{H}$ is solenoidal vector.

(ix) Out of 800 families with 4 children each how many families would be expected to have (i) no girl (ii) at most two girls? Assure equal probabilities for boys and girls.

(x) State any two applications of t-dest.

PART A:

Q. 2: a) Solve the following system of Equation

$$4\,x - 3y - 9z + 6w = 0$$

$$2\,x + 3y + 3\,z + 6w = 6$$

$$4x - 21y - 39z - 6w = -24$$

b) Find Eigen Values and Eigen Vectors for the matrix.

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

Q. 3: a) Find an integrating factor and solve the differential Equation.

$$(e^{x+y} + ye^{y})dx + (xe^{y} - 1)dy = 0$$

b) Solve the differential Eq^{n},

$$y = x^4p^2 - px, \qquad where\ p = \frac{dy}{dx}$$

Q. 4: a) Find the general solution of $16y^{11} + 8y^{1} + y = 48\, xe^{\frac{-x}{4}}\ \ where\ \ y^{1} = \frac{dy}{dx}$

b) Solve by variation of parameter method.

$$\frac{d^2y}{dx^2} + 16\, y = 32\, sec2x$$

Q. 5: a) A particle is moving in a straight line with S. H. M. has velocities v_1, and v_2 hen its distances from two contre are x_1 and x_2 respectively. Show that period of motion is

$$2\pi \sqrt{\frac{x_1^2 - x_2^2}{v_2^2 - v_1^2}}$$

b) An e. m. f. Esiript is applied at t=0 a circuit containing a capacitance C and inductance L. The current I satisfies the Equation $L\frac{di}{dt} + \frac{1}{C}\int idt = Esinpt$. If $p^2 = \frac{1}{LC}$ and initially the current 'i' and charge 'q' all zero, show that the current at time t is $\frac{Et}{2L}\ Sinpt,\ \ where\ i = \frac{dq}{dt}$

Q. 6: a) If $\hat{r} = x\hat{c} + y\hat{7} + z\hat{k},\ r = |\hat{r}| = \sqrt{x^2 + y^2 + z^2}$, prove that

$$\nabla\left\{r\,\nabla\left(\frac{1}{r^3}\right)\right\} = \frac{3}{r^4}$$

b) Find the directional derivative of $\emptyset = e^{2x}\ Cosyz$ at the origin in the direction of tangent to the curve $x = a\ sint,\ y = a\ cost,\ \ z = at\ \ at\ t = \frac{II}{4}$

Q. 7: a) Apply Green's Theorem to Evaluate $\int_C (x^2ydx + x^2dy)$ here C is the boundary describing counter clockwise of the triangle with the vertices (0, 0) (1,0) (1)

b) Using divergence theorem Evaluate to $\iint \hat{F}.ds$ where $\hat{F} = 4x\hat{c} - 2y^2\hat{7} + z^2\hat{k}$ and S is the surface bounders the rerion $x^2 + y^2 = 4;\ c = 0\ and\ c = 3$

Q. 8: a) In a normal distribution, 12% of the items are under 30 and 85% are under 60. Find the moon and standard calculation of the distribution.

b) Fit a parabola $y = a + bx + cx^2$ to the following data

x :	1	2	3	4
y :	1.7	1.8	2.3	3.2

Q. 9: a) A random sample of size 16 has 53 as moon. The sum of squares of the deviations from mean 153. Contuis sample be regarded as taken from the population having 56 as mean.

b) Test for goodness to fit of a uniform distribution to the followings data obtained when a die is tossed 120 times.

Face :	1	2	3	4	5	6
Abscrued:	20	22	17	18	19	24
Expected :	20	20	20	20	20	20

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