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

Total No. of Questions : 09

B.Tech Ind. Engg. & Mgt. (Spl. in TQM) (Sem.–1)

APPLIED MATHEMATICS

Subject Code : IEM-104

Paper ID : [61004]

Time : 3 Hrs. Max. Marks : 40

INSTRUCTIONS TO CANDIDATES :

1. **Attempt All EIGHT questions from SECTION-A carrying TWO marks each.**
2. **Attempt any SIX questions out of EIGHT from SECTION-B carrying FOUR marks each.**

SECTION-A

1. Answer briefly :

a) Expand $(2x - 3y)^4$ by binomial theorem.

b) Prove that cos510° cos330° + sin390° cosl20° = –1.

c) Sketch the graph of $y = 3\sin 2x$.

d) if A(–2,l), B(2,3) and C(–2, –4) are three points, find the angle between BA and BC.

e) Find the equation of hyperbola whose directrix is $2x + y = 1$, focus (1,2) and eccentricity $\sqrt{3}$.

f) Differentiate $x^3 e^x \sin x$ w.r.t. x.

g) Find the gradient of a curve.

h) Integrate $\int \cos^3 x e^{\log \sin x} dx$.

SECTION-B

Q2 If $A=\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and $B=\begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}$ Find the product AB and use this result to solve the system of linear equations :

$$2x - y + z = -1$$

$$-x + 2y - z = 4$$

$$x - y + 2z = -3$$

Q3 The 3^{rd}, 4^{th}, 5^{th} terms in expansion of $(x + a)^n$ are respectively 84, 280, 560. Find the values of x, a, n.

Q4 Prove that $\sin 18° = \frac{\sqrt{5}-1}{4}$.

Q5 Find the sides and angles of triangle whose vertices are :

$$\hat{i} - 2\hat{j} + 2\hat{k}, \quad 2\hat{i} + \hat{j} - \hat{k}, \text{ and } 3\hat{i} - \hat{j} + 2\hat{k}$$

Q6 If $y^x + x^y + x^x = a^b$, find $\frac{dy}{dx}$.

Q7 Evaluate $\int \frac{1}{x^3+1}\,dx$.

Q8. By factor property prove that $\begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{bmatrix} = (a-b)(b-c)(c-a)$.

Q9. If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$, $\vec{c} = 3\hat{i} + \hat{j}$. Find t such that $\vec{a} + t\vec{b}$ is $\perp$ to $\vec{c}$.