

Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

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

APPLIED MATHEMATICS

Subject Code : IEM-104

M.Code : 61004

Time : 3 Hrs.

Max. Marks : 40

INSTRUCTIONS TO CANDIDATES :

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

SECTION-A**1. Answer briefly :**

- a) If $10^x = 3$ find the value of x .
- b) Find $\sin 75^\circ$, if $\sin 45^\circ = \frac{1}{\sqrt{2}}$, and $\sin 30^\circ = \frac{1}{2}$.
- c) Find the coordinates of the point which divides the join of points (1, 2) and (3, 5) in ratio 1:2 internally.
- d) Find the value of the determinant $\begin{vmatrix} -1 & 4 & 2 \\ 2 & -2 & -3 \\ -1 & -6 & -2 \end{vmatrix}$.
- e) Find the angle between the vectors $\mathbf{v} = \mathbf{i} - \mathbf{j} + \mathbf{k}$ and $\mathbf{w} = -\mathbf{i} + 2\mathbf{k}$.
- f) Find $\frac{dy}{dx}$, if $y = (x^2 + 1)e^{2x}$.
- g) Evaluate the integral $\int e^{x^2} x dx$.
- h) Solve the differential equation $\frac{dy}{dx} = x^3 e^y$.

- i) Expand $(x^2+2a)^4$ using Binomial Theorem.
- j) Write down the Polar equivalent of $1-i$.

SECTION-B

2. Prove that : $\sin\theta \sin(60^\circ - \theta) \sin(60^\circ + \theta) = \frac{1}{4} \sin 3\theta$.
3. Find the length of major and minor axis, coordinate of the vertices and the foci, eccentricity and length of latus rectum of the ellipse : $y^2 + 36x^2 = 36$.
4. The cost of 4 kg onion, 3 kg wheat and 2 kg rice is Rs. 60. The cost of 2 kg onion, 4 kg wheat and 6 kg rice is Rs. 90. The cost 6 kg onion, 2 kg wheat and 3 kg rice is Rs. 70. Find the cost of each item by matrix or determinant method.
5. A circular disc of radius 4 cm is being heated. Due to thermal expansion, its area increases at a rate of $12\pi cm^2/s$. Find the rate at which radius is increasing.
6. Find the value of integral $\int \frac{2x}{x^2+3x+2} dx$.
7. Find the area of the region bounded by the curve $y = x^2$ and the lines $x = 1$, $x = 4$ and $x - axis$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.