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 $sin75°$, if $sin\ 45° = \frac{1}{\sqrt{2}}$, and $\sin 30° = ½$.

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 $\boldsymbol{v} = \boldsymbol{i} - \boldsymbol{j} + \boldsymbol{k}$ **and** $\boldsymbol{w} = -\boldsymbol{i} + 2\boldsymbol{k}$.

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 : $\sin\theta \sin(60° - \theta) \sin(60° + \theta) = \frac{1}{4}\sin 3\theta$.

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.