Roll No. $\qquad$ Total No. of Pages : 02
Total No. of Questions: 07

B.Tech. Ind. Engg. \& Mgt. (Spl. in TQM) (Sem.-1)<br>APPLIED MATHEMATICS<br>Subject Code : IEM-104<br>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 $\sin 30^{\circ}=\frac{1 / 2}{2}$.
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 $\left|\begin{array}{rrr}-1 & 4 & 2 \\ 2 & -2 & -3 \\ -1 & -6 & -2\end{array}\right|$.
e) Find the angle between the vectors $\boldsymbol{v}=\boldsymbol{i}-\boldsymbol{j}+\boldsymbol{k}$ and $\boldsymbol{w}=-\boldsymbol{i}+\mathbf{2 k}$.
f) Find $\frac{d y}{d x}$, if $y=\left(x^{2}+1\right) e^{2 x}$.
g) Evaluate the integral $\int e^{x^{2}} x d x$.
h) Solve the differential equation $\frac{d y}{d x}=x^{3} e^{y}$.
i) Expand $\left(x^{2}+2 a\right)^{4}$ using Binomial Theorem.
j) Write down the Polar equivalent of $1-i$.

## SECTION-B

2. Prove that: $\sin \theta \sin \left(60^{\circ}-\theta\right) \sin \left(60^{\circ}+\theta\right)=\frac{1}{4} \sin 3 \theta$.
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 : $y^{2}+36 x^{2}=36$.
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 $12 \pi \mathrm{~cm}^{2} / \mathrm{s}$. Find the rate at which radius is increasing.
6. Find the value of integral $\int \frac{2 x}{x^{2}+3 x+2} d x$.
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.

