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

Total No. of Questions : 07

B.Tech. (Ind. Engg. & Mgt. (Spl. in TQM)) PT (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. Attempt the following :**

a) Solve the quadratic equation $x^2 - \sqrt{2}ix + 12 = 0$.

b) Prove that $2\sin^2\frac{\pi}{6} + \cos ec^2\frac{7\pi}{6}\cos^2\frac{\pi}{3} = \frac{3}{2}$.

c) Two lines passing through point (2, 3) intersect each other at an angle of 60°. If the slope of one line is 2, find the equation of other line.

d) Find the equation of ellipse whose directrix is $x - y + 3 = 0$, focus (–1, 1) and eccentricity is 1/2.

e) Define scalar matrix.

f) If $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = 6\hat{i} - 3\hat{j} + 2\hat{k}$ find $\vec{a} \times \vec{b}$ and a vector $\perp$ to both $\vec{a}$ and $\vec{b}$. Also determine sine of angle between $\vec{a}$ and $\vec{b}$.

g) Differentiate $\left(\frac{1+\tan x}{1-\tan x}\right)$ *w.r.t. x.*

h) Find gradient of a curve.

i) Evaluate $\int_0^2 (2x^2+3x+1)$ by second fundamental theorem.

j) Find the maximum and minimum value of the function $f(x) = \sin 2x + 5$

## SECTION-B

2. Prove that $\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha = \cot\alpha$.

3. Using matrices solve the system of equations for $x$, $y$ and $z$

$$x + 2y - 3z = 6$$

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

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

4. In binomial expansion of $(1 + x)^n$, coefficients of fifth, sixth and seventh terms are in A.P. Find all possible values of $n$.

5. Differentiate $(x^{\tan x} + (\sin x)^{\cos x})$ *w.r.t.* $x$.

6. Evaluate $\int_0^{\pi} \cos 2x \log \sin x dx$ .

7. Solve $y' - 2y = \cos 3x$.



**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.**