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B.Tech. Ind. Engg. & Mgt. (Spl. in TQM) (Sem.-1) APPLIED MATHEMATICS Subject Code : IEM-104

M.Code: 61004

### **INSTRUCTIONS TO CANDIDATES :**

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

### **SECTION-A**

- 1. **Answer briefly :** 
  - a) If  $10^x = 3$  find the value of x.
  - b) Find *sin*75°, if *sin* 45° =  $\frac{1}{\sqrt{2}}$ , and *sin*30° =  $\frac{1}{\sqrt{2}}$ .
  - 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 v = i j + k and w = -i + 2k.
  - 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  $\frac{dy}{dr} = x^3 e^y$ .

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Time: 3 Hrs.

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Max. Marks: 40



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- 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.