COURSE CODE: 18B11MA112 / 10B11MA112 (Backlog)   MAX. MARKS: 35

COURSE NAME: BASIC MATHEMATICS-I

COURSE CREDITS: 04   MAX. TIME: 2:00 Hrs.

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Quest (1) If $A = \begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$ and $B = [-2 \quad -1 \quad -4]$. Verify that $(AB)^T = B^T A^T$.   [CO-1] [4]

Quest (2) If $\vec{a} = 5\,\hat{\imath} - \hat{\jmath} - 3\,\hat{k}$ and $\vec{b} = \hat{\imath} + 3\,\hat{\jmath} - 5\,\hat{k}$, then show that the vectors $(\vec{a} + \vec{b})$ and $(\vec{a} - \vec{b})$ are perpendicular.   [CO-2] [3]

Quest (3) (i) Find the modulus of $\left(\frac{1+i}{1-i} + \frac{1-i}{1+i}\right)^3$.   [CO-3] [2.5+2.5]

   (ii) Find the real values of x and y, if
$$(1 + i)y^2 + (6 + i) = (2 + i)x$$

Quest (4) Evaluate **(i)** $\int \left(\frac{x}{e^{x^2}} - 3\,\sin 2x + 5\sqrt{x}\right) dx$ [CO-6] [3+4]

   (ii) $\int \frac{3x-1}{(x-1)(x-2)^2}\,dx$

Quest (5) Find the derivative of the following functions with respect to x [CO-5] [3+3]

   (I) $y = \cos^5(x^3) \cdot \sin^2(x^5) + e^{\cos x}$

   (II) $y = \frac{\sin x}{1 - \cos x}$

Quest (6) Find the area of the region bounded by the given curve $f(x) = x^2 - 3x + 2$, the x-axis and the lines $x = 0$, $x = 2$ [CO-6] [4]

Quest (7) Examine the continuity of the function   [CO-5] [3]

$$f(x) = \begin{cases} 3x + 5, & x \le 2 \\ x^3, & x > 2 \end{cases}$$

   at $x = 2$.

Quest (8) If $f(x) = \sqrt{x}$ and $g(x) = \sin x$, find **(i)** $(f o g)(x)$ **(ii)** $(g o g)(x)$ **(iii)** $(g o f)(x)$ [CO-4] [3]