

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

(Summer Semester-Mid Term) - June-2018

COURSE CODE: 11B11MA112

MAX. MARKS: 50

COURSE NAME: Basic Mathematics I

COURSE CREDITS: 04

MAX. TIME: 2 Hrs

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

Q1. Find x, y, a and b if $\begin{bmatrix} 2x - 3y & a - b & 3 \\ 1 & x + 4y & 3a + 4b \end{bmatrix} = \begin{bmatrix} 1 & -2 & 3 \\ 1 & 6 & 29 \end{bmatrix}$ [4]

Q2. If $A = \begin{bmatrix} -1 & 1 & -1 \\ 3 & -3 & 3 \\ 5 & 5 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{bmatrix}$ compute $A^2 - B^2$ [7]

Q3. If $A = \begin{bmatrix} 2 & 3 & 1 \\ 3 & 4 & 1 \\ 3 & 7 & 2 \end{bmatrix}$ show that $A^{-1}A = I_3$ [7]

Q4. Solve the system of equations using Cramer's rule [7]

$$2x + 3y + 10z = 4, 4x - 6y + 5z = 1, 6x + 9y - 20z = 2$$

Q5. Find the angle between the vectors $5\hat{i} + 3\hat{j} + 4\hat{k}$ and $6\hat{i} - 8\hat{j} - \hat{k}$ [4]

Q6. If $\vec{a} = -\hat{i} + 3\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} + 2\hat{j} + 5\hat{k}$, prove that $\vec{a} \times \vec{b}$ represents a vector which is perpendicular to both \vec{a} and \vec{b} [4]

Q7. Find the volume of parallelepiped whose edges are represented by

$$2\hat{i} - 3\hat{j}, \hat{i} + \hat{j} + \hat{k} \text{ and } 3\hat{i} - \hat{k}$$
 [4]

Q8. Find the equation of line passing through points (1,1) and (2,3) [3]

Q9. Find the equation of circle whose centre is the point (1, -2) and which passes through the centre of the circle $x^2 + y^2 + 2y = 3$. [5]

Q10. Find the equation of the sphere concentric with $x^2 + y^2 + z^2 - 2x - 4y - 6z - 11 = 0$ but of double the radius. [5]