

MATHEMATICS & STATISTICS

Time : 3 hrs.]

MARCH - 2013

[Marks : 80

SECTION - I

Q. 1. (A) Select and write the most appropriate answer from the given alternatives in each of the following sub-questions: [6]

- (i) The principal solution of the equation $\cot x = -\sqrt{3}$ is _____.
(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{5\pi}{6}$ (d) $-\frac{5\pi}{6}$ (2)
- (ii) If the vectors $-3\hat{i} + 4\hat{j} - 2\hat{k}$, $\hat{i} + 2\hat{k}$, $\hat{i} - p\hat{j}$ are coplanar, then the value of p is _____.
(a) -2 (b) 1 (c) -1 (d) 2 (2)
- (iii) If the line $y = x + k$ touches the hyperbola $9x^2 - 16y^2 = 144$, then $k =$ _____.
(a) 7 (b) -7 (c) $\pm\sqrt{7}$ (d) $\pm\sqrt{19}$ (2)

Q. 1. (B) Attempt any THREE of the following: [6]

- (i) Write down the following statements in symbolic form :
(a) A triangle is equilateral if and only if it is equiangular.
(b) Price increases and demand falls. (2)
- (ii) If $A = \begin{bmatrix} 2 & -2 \\ 4 & 3 \end{bmatrix}$ then find A^{-1} by adjoint method. (2)
- (iii) Find the separate equations of the lines represented by the equation $3x^2 - 10xy - 8y^2 = 0$. (2)
- (iv) Find the equation of the director circle of a circle $x^2 + y^2 = 100$.
- (v) Find the general solution of the equation $4\cos^2 x = 1$.

Q. 2. (A) Attempt any TWO of the following: [6]

- (i) Without using truth table show that $p \leftrightarrow q = (p \wedge q) \vee (\sim p \wedge \sim q)$. (3)
- (ii) If θ is the measure of acute angle between the pair of lines given by $ax^2 + 2hxy + by^2 = 0$, then prove that, $\tan \theta = \left| \frac{2\sqrt{h^2 - ab}}{a + b} \right|$, $a + b \neq 0$. (3)

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