Assignment(matrix theory)

ee24btech11056 - S.Kavya Anvitha

I. A Fill in the blanks

1) The larger of $\cos(\ln\theta)$ and $\ln(\cos\theta)$ if $e^{\frac{-\pi}{2}} < \theta < \frac{\pi}{2}$ is ..... $(1983 - 1Mark)$

2) The function
$$y = 2x^2 - \ln|x|$$
is monotonically increasing for values of $x(\neq 0)$ satisfying the inequalities ..... and monotonically decreasing for values of x satisfying the inequalities ..... $(1983 - 2Marks)$

3) The set of all x for which
$$\ln(1+x) \leq x$$
is equal to ..... $(1987 - 2Marks)$

4) Let P be a variable point on the ellipse
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$
with foci F_1 and F_2. If A is the area of the triangle PF_1F_2 then the maximum value of A is ..... $(1994 - 2Marks)$

5) Let C be the curve
$$y^3 - 3xy + 2 = 0$$
If H is the set of points on the curve C where the tangent is horizontal and V is the set of the point on the curve C where the tangent is vertical then H = ... and V = ... $(1994 - 2Marks)$

II. B True / False

1) If $x - r$ is a factor of the polynomial
$$f(x) = a_n x^4 + ... + a_0$$
, repeated m times $(1 < m \leq n)$, then r is a root of $f'(x) = 0$ repeated m times. $(1983 - 1Mark)$

2) For $0 < a < x$, the minimum value of the function $log_a x + log_x a$ is 2. $(1984 - 1Mark)$

III. C MCQs with One Correct Answer

1) If $a + b + c = 0$, then the quadratic equation
$$3ax^2 + 2bx + c = 0$$
has $(1983 - 1Mark)$
   a) at least one root in [0,1]
   b) one root in [2,3] and other in [-2,-1]
   c) imaginary roots
   d) none of these

2) AB is a diameter of a circle and C is any point on the circumference of the circle. Then $(1983 - 1Mark)$
   a) the area ofΔABC is maximum when it is isosceles
   b) the area of ΔABC is minimum when it is isosceles
   c) the perimeter of ΔABC is minimumwhen it is isosceles
   d) none of these

3) The normal to the curve
$$x = a(\cos\theta + \theta\sin\theta)$$
$$y = a(\sin\theta - \theta\cos\theta)$$
at any point 'θ' is such that $(1983 - 1Mark)$
   a) it makes constant angle with the x - axis
   b) it passes through the origin
   c) it is at a constant distance from the origin
   d) none of these

4) If
$$y = a\ln x + bx^2 + x$$
has its extremum values at $x = -1$ and $x = 2$, then $(1983 - 1Mark)$

a) $a = 2,\ b = -1$ c) $a = -2,\ \text{b} = \frac{1}{2}$
b) $a = 2,\ \text{b} = \frac{-1}{2}$ d) none of these

5) Which one of the following curves cut the parabola $y^2 = 4ax$ at right angles? (1994)

a) $x^2 + y^2 = a^2$ c) $y = ax$
b) $e^{\frac{-x}{2a}}$ d) $x^2 = 4ay$

6) The function defined by

$$f(x) = (x + 2)\, e^{-x}$$

is

(1994)

a) decreasing for all x
b) decreasing in $(-\infty, -1)$ and increasing in $(-1, \infty)$
c) increasing for all x
d) decreasing in $(-1, \infty)$ and increasing in $(-\infty, -1)$

7) The function

$$f(x) = \frac{\ln(\pi + x)}{\ln(e + x)}$$

is (1995*S*)

a) increasing on $(0, \infty)$
b) decreasing on $(0, \infty)$
c) increasing on $\left(0, \frac{\pi}{e}\right)$, decreasing on $\left(\frac{\pi}{e}, \infty\right)$
d) decreasing on $\left(0, \frac{\pi}{e}\right)$, increasing on $\left(\frac{\pi}{e}, \infty\right)$

8) On the interval [0, 1] the function

$$x^{25}\,(1 - x)^{25}$$

takes its maximum value at the point (1995*S*)

1) 0 2) $\frac{1}{4}$ 3) $\frac{1}{2}$ 4) $\frac{1}{3}$