XII | EXAM NO: 9 | TIME: 2 hr 2 30 Min (150 Min) | Marks 80 | (1)

CHAPTERS : A·O·D & Relation Functions

SECTION: A (TWO MARKS EACH)

Qn. 1 Given examples so that the relation R defined on Real numbers $R = \{(a,b) : a \leq b^3\}$ is neither Symmetric, nor reflexive nor transitive.

Qn. 2 → Write the domain of function $f(x) = \sqrt{x^2-3x+2}$ and $f(x) = \frac{1}{\sqrt{x+2}}$

Qn. 3 → Find the range of $f(x) = x^2 - 4x + 5$

Qn. 4 Let $A = \{1,2,3,4 \ldots n\}$ and $B = \{a,b\}$ and f is a function $f: A \to B$. Find number of Injections and Number of Surjections.

Qn. 5 → Find the maximum number of equivalence relations on the set $A = \{1,2,3\}$

Qn. 6 → Find the Domain and Range of $f(x) = \frac{1}{2-\cos x}$

Qn. 7 The tangent to the curve given by $x = e^t \cos t$; $y = e^t \sin t$ at $t = \pi/4$ makes angle θ with x-axis Find angle θ

Qn. 8 → Find the equation of the normal to the curve $y = \sin x$ at $(0,0)$

Qn. 9 → Find the Stationary point of the function
$f(x) = x^x$

Qn. 10 → Find the Minimum value of $x^2 - 8x + 17$

SECTION: B (FOUR MARKS EACH)

Qn. 11) Let A and B are two sets. Show that $f: A \times B \to B \times A$ such that $f(a,b) = (b,a)$ is a bijective function

Qn. 12 → Consider $f: R_+ \to [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$ Show that f is a bijective function

Qn. 13 → If R_1 and R_2 are equivalence relations Show that $R_1 \cap R_2$ is also equivalence relation

Qn. 14 Find the condition for the curves $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $xy = c^2$ to intersect orthogonally

Qn. 15 → Show that the local Maximum value of function $f(x) = x + \frac{1}{x}$ is less than local minimum value

Qn. 16 → Find the difference between the greatest and least value of the function $f(x) = \sin(2x) - x$ where $x \in [-\frac{\pi}{2}, \frac{\pi}{2}]$

(3)

Qn 17 → Find the points on the curve $9y = x^3$, where the normal to the curve makes equal Intercepts with the axes

Qn 18 → Find the Intervals in which the function $f(x) = \frac{4\sin x - 2x - x\cos x}{2 + \cos x}$ is Strictly Increasing and Strictly decreasing.

Qn 19 Find the equation of tangent to the curve $y(1+x^2) = 2-x$ where it crosses the X-axis

SECTION: C (SIX MARKS EACH)

Qn. 20 → If the sum of the lengths of the hypotenuse and a side of a right angle triangle is given, Show that the area of the triangle is maximum when the angle between them is $\pi/3$

Qn. 21 An open box with Square base is to be made of a given quantity of cardboard of area c^2 Square units. Show that the maximum volume of the box is $\frac{c^3}{6\sqrt{3}}$ cubic units

Qn 22 Find the dimensions of the Rectangle of perimeter 36 cm which will sweep out a volume as large as possible, when revolved about one of its sides. Also find the maximum volume

Q.28 If $A = \{1, 2, 3, \ldots 9\}$ and R be a relation in $A \times A$ defined by $(\alpha, \beta)\, R\, (\gamma, \delta)$ if $\alpha + \delta = \beta + \gamma$. Prove that R is an equivalence relation.

Also find equivalence class $[(3, 6)]$

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