BIG TEST XI Class

CHAPTER: SETS → Marks - 20 TIME: (40 MIN) ~~45~~ 40 MIN

Ans 1 (2M) Let S = set of points inside the square, T = set of points inside the triangle and C = set of points inside the circle. If the triangle and circle intersect each other and are contained in a square, then

(A) $S \cap T \cap C = \phi$ (B) $S \cup T \cup C = C$ (C) $S \cup T \cup C = S$

(D) $S \cup T = S \cap C$

Ans 2 → (4M) A survey shows that 63% of the people watch a News channel whereas 76% watch another channel. If x% of the people watch both the channel. Then find Range of x

Ans. 3 → (4M) Suppose $A_1, A_2, \ldots A_{30}$ are thirty sets each having 5 elements and $B_1, B_2 \ldots B_n$ are n sets each with 3 elements, let $\bigcup_{i=1}^{30} A_i = \bigcup_{j=1}^{n} B_j = S$ and each element of S belongs to exactly 10 of the A_i's and exactly 9 of the B_j's, then n is equal to ??

Ans. 4 → (2M) Two finite sets have m and n elements. The number of subsets of the first set is 112 more than that of the second set. Find value of m & n

Ans 5 → (4M) Let A & B are two sets, If $A \cap X = B \cap X = \phi$ and $A \cup X = B \cup X$ then prove that $A = B$

Ans. 6 → (4M) In a town of 10,000 families, it was found that 40% families buy newspaper A, 20% families buy newspaper B, 10% families buy newspaper C, 5% families buy A & B, 3% buy B and C and 4% buy A and C. If 2% families buy all the newspapers find

(i) The number of families which buy newspaper A only

(2) The number of families which buy none of A, B & C

CHAPTER: RELATION & FUNCTION → TIME: 40 MIN : 20 MARKS ←

Qn.1 (1M) If $A = \{2, 4, 6, 9\}$ and $B = \{4, 6, 18, 27, 54\}$ $a \in A$, $b \in B$ Find the set of ordered pairs such that a is a factor of b and $a < b$

Qn.2 → (2M) If $g = \{(1,1), (2,3), (3,5), (4,7)\}$ a function, described by $g(x) = \alpha x + \beta$. Then find value of $\alpha^2 + \beta^2$

Qn.3 → If $f(x) = x^3 - \frac{1}{x^3}$ then $f(x) + f\left(\frac{1}{x}\right)$ is equal to

(1M) (A) x (B) x^3 (C) 0 (D) $\frac{1}{x^3}$

Qn.4 → (2M) Find the domain of $f(x) = \dfrac{1}{\sqrt{[x]^2 - [x] - 6}}$

Qn.5 → (2M) Redefine the function $f(x) = |x-2| + |x-2|$; $-3 \leq x \leq 3$

Qn.6 → (2M) Find the domain of the function

$$f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$$

Qn.7 (4M) Draw graph of Signum function, Modulus function and greatest Integer function with its domain and Range

Q.N. 8 → (3M) Let R be a relation from Q to Q defined by
$R = \{(a,b) : a, b \in Q \text{ and } a-b \in Z\}$ show that
(i) $(a,a) \in R$ for all $a \in Q$
(ii) $(a,b) \in R$ implies that $(b,a) \in R$
(iii) $(a,b) \in R$ and $(b,c) \in R$ implies that $(a,c) \in R$

Q.N. 9 → (3M) Let $f = \left\{\left(x, \frac{x^2}{1+x^2}\right) ; x \in R\right\}$ be a function from R to R. Find the Range of $f(x)$, also find Domain when $f(x) = \frac{x^2}{1+x^2}$

TRIGONOMETRY ← 20 MARKS : 40 MIN →

Q.N. 1 (1M) Convert 4 Radians in to degree measure

Q.N. 2 → (2M) What is the angle b/w the needles ~~with~~ when the time is 8:20

Q.N. 3 → (1M) Show that $\cot x \cdot \cot(2x) - \cot(2x)\cot(3x) - \cot(3x)\cot x = 1$

Q.N. 4 → (1M) Find the principal solution of $\operatorname{cosec} x = -2$

Q.N. 5 → (2M) Show that $\frac{\sec(8\theta) - 1}{\sec(4\theta) - 1} = \frac{\tan(8\theta)}{\tan(2\theta)}$

Q.N. 6 → (2M) If $m\sin\theta = n\sin(\theta + 2\alpha)$, then prove that
$\tan(\theta+\alpha) \cdot \cot\alpha = \frac{m+n}{m-n}$

Q.N. 7 → (3M) ~~Draw~~ Draw the graph of $y = \sin x$, $y = \cos x$, $y = \tan x$ with domain & Range

Qn. 8 → Prove that (3M)

$$\cos(2x)\cdot\cos\left(\frac{x}{2}\right) - \cos(3x)\cos\left(\frac{9x}{2}\right) = \sin(5x)\cdot\sin\left(\frac{5x}{2}\right)$$

Qn 9 → If $\sin x = \frac{-1}{4}$; x is in 3^{rd} quadrant (3M)
find the value of $\sin\left(\frac{x}{2}\right)$, $\cos\frac{x}{2}$ & $\tan\frac{x}{2}$

Qn 10 Show that $\cos^2 x + \cos^2\left(x+\frac{\pi}{3}\right) + \cos^2\left(x-\frac{\pi}{3}\right) = \frac{3}{2}$ (2M)

Chapter: COMPLEX NUMBERS → 20 MARKS: 40 MIN

Qn 1 If $(x+iy)^{1/3} = a+ib$ show that $\frac{x}{a} - \frac{y}{b} = -2(a^2+b^2)$ (3M)

Qn. 2 → Solve the equation (4M)
$z^2 = \bar{z}$ where $z = x+iy$

Qn. 3 → If α and β are different complex numbers (2M)
with $|\beta| = 1$, then find $\left|\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$

Qn 4 → If $\left(\frac{1+i}{1-i}\right)^m = 1$, then find the least Integral value of m (1M)

Qn 5 → Find the value of θ for which the complex (2M)
number $z = \frac{1+i\cos\theta}{1-2i\cos\theta}$ is purely real

Qn. 6 → Show that the complex number z, which (3M)
satisfies the condition $\left|\frac{i+z}{i-z}\right| = 1$ lies on X-axis

Qn. 7 → If $|z_1| = |z_2| = |z_3| \cdots |z_n| = 1$, then show that (3M)
$|z_1+z_2+\cdots z_n| = \left|\frac{1}{z_1}+\frac{1}{z_2}+\cdots\frac{1}{z_n}\right|$

Qn 8 → (2M) If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = x+iy$ find (x, y)

Qn 9 → (2M) If $(1+2i)(1+3i)(1+4i) \cdots (1+ni) = A - iB$ then show that

$$5 \cdot 10 \cdot 17 \cdots (1+n^2) = A^2 + B^2$$

$\boxed{\text{LINEAR INEQUALITIES}}$ → 20 Marks 40 MIN ←

Qn 1 (4M) A solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting mixture is to be more than 4% but less than 6% boric acid. If we have 640 litres of the 8% solution, how many litres of the 2% solution will have to be added?

Qn 2 → (2M) Find all pairs of consecutive even positive integers both of which are larger than 5 such that their sum is less than 23

Qn 3 → (4M) Solve graphically

$x - 2y \leq 3$; $3x + 4y \geq 12$; $y \geq 1$; $x \geq y$ & $x, y \geq 0$

Qn 4 (4M) Solve graphically

$2x + 3y \geq 3$; $3x + 4y \leq 18$; $-7x + 4y \leq 14$; $x - 6y \leq 3$ and $x, y \geq 0$

Qn 5 → (2M) Solve system of Inequalities & find common solution

$5(2x-7) - 3(2x+3) \leq 0$; $2x + 19 \leq 6x + 47$

Qn 6 → (4M) Solve $|x-1| + |x-2| \geq 4$

PERMUTATION & COMBINATION → 20 Marks 40 MIN →

Qn 1 (2M) Find value of r, if ${}^4P_r = 6 \cdot {}^5P_{r-1}$

Qn. 2 → (4M) Word DAUGHTER. Find the number of words in which
(i) All the vowels occur do not together
(2) No two vowels are together

Qn 3 → (2M) How many numbers greater than 1000000 can be formed by using the digits 1, 2, 0, 2, 4, 2, 4 ?

Qn 4 → (3M) Find the Rank of the word RANDOM

Qn 5 → (3M) Find the sum of the numbers that can be formed with the digits 2, 3, 4, 5 taken all at a time

Qn. 6 → (4M). Word MATHEMATICS
How many four letter words can be formed ?

Qn. 7 → (2M) A student has to answer 10 Questions, choosing atleast 4 from each of part A and part B. If there are 6 questions in part A and 7 in part B In how many ways can the student choose the 10 Questions ?

SEQUENCE & SERIES ← 20 MARKS TIME: 40 MIN

Qn. 1 (3M) Between 1 and 31, m numbers have been inserted in such a way that the resulting sequence is an A.P and the ratio of 7th and $(m-1)^{th}$ numbers is 5:9. Find the value of m

Qn. 2 → (3M) Find the sum of the series to n terms

$$0.6 + 0.66 + 0.666 + \cdots n \text{ term}$$

Qn. 3 → (3M) Find the value of 'n' so that $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be the G.M between a & b

Qn. 4 → (4M) The sum of two numbers is 6 times their geometric means, show that numbers are in the ratio $(3+2\sqrt{2}) : (3-2\sqrt{2})$

Qn. 5 → (3M) If a, b, c, d are in GP then show that (a^n+b^n), (b^n+c^n), (c^n+d^n) are in GP

~~Qn. 6 → If the product of~~

Qn. 6 → (4M) If the first and n^{th} term of a GP are a & b respectively and if P is the product of n terms show that $P^2 = (ab)^n$

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