PUNJAB BOARD CLASS 11 MATHS SAMPLE PAPER-SET 1

Class: XI   **Theory: 90 Marks**

Subject: Mathematics   **CCE: 10 Marks**

                                                                                             Total: 100 Marks

General Instructions:

1. All questions are compulsory

2. Q 1 will consist of 10 parts and each part will carry 1 Mark

3.Q 2 to Q 9 each will be of 2 Marks

4. Q 10 to Q 19 each will be of 4 Marks.

5. Q 20 to Q 23 each will of 6 Marks

6. There will be no overall choice. There will be an internal choice in any 3 questions of 4 marks each and all questions of 6 marks. (Total of 7 internal choices)

7. Use of Calculator is not allowed

<div align="center">

Section -A

</div>

Answer all the 10 parts below each part carries 1 mark: $10 \times 1 = 10$

1.

a) Consider P and Q as any sets, hence show that

$$(P \cap Q) \cup (P - Q) = P$$

b) Find x and y if given the ordered pairs (2x + 7, y + 3) and (9, x + 6) are equal.

c) Prove that

$$\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A.$$

d) Express $(1 - i)^6$ in the standard form of a + i b.

e) If given $(n + 1)! = 12 \times n \times (n - 1)!$ evaluate the value of n.

f) If given $k^2 + 4k + 8, 2k^2 + 3k + 6, \ 3k^2 + 4k + 4$, find the value of k if these three are in A.P.

g) If AB is parallel to y–axis find the distance between $A(x_1, y_1) \ and \ B(x_2, y_2)$ when given the ordinate is 3 and 5 respectively.

h) The equation of directrix and the length of lactus – rectum of the conic represented by the equation $x^2 = -16y$ find the coordinates of focus.

i) Evaluate: $\lim\limits_{x \to 1} \dfrac{x^2+2}{x+20}$

j) Describe the sample space of a random experiment when a coin and a die are tossed together.

Section – B

Answer all the questions each question carries 2 marks: $\hspace{2cm}$ **$8 \times 2 = 16$**

2. Prove that: $\sin(70° + \theta)\cos(10° + \theta) - \cos(70° + \theta)\sin(10° + \theta) = \dfrac{\sqrt{3}}{2}$

3. Evaluate using t – ratios of $30°\ and\ 45°$: $\tan 105°$

4. Find the value of $\dfrac{\alpha\beta}{\alpha+\beta}$ if the quadratic equation $5x^2 - 2x - 4 = 0$ has the roots $\alpha\ and\ \beta$

5. Expand the following with the help of binomial theorem: $(2x + 3y)^4$

6. Find the value of $(98)^4$ using binomial theorem.

7. Find the distance between the points $A(3, -7, -2)\ and\ B(-2, -4, 1)$.

8. Write the negation of the statement: $\sqrt{5}\ is\ rational$. Also check whether the resulting statement is true or false.

9. Write the component statement of the following compound statement $1 + 1 = 3, whereas\ 2 + 2 = 4$. And check whether the compound statement is true or false.

Section – C

Answer the questions according to the choice given each question carries 4 marks $\hspace{1cm}$ **$10 \times 4 = 40$**

10. Given P = { x : x is an odd integer}, Q = {x : x is an even integer} and R = { x : x is a number ≤ 7}. And let $\xi = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

Thus find;

    i. $(PUQ)'$
    ii. $P \cap (Q \cup R)$
    iii. $P - (Q \cap R)$
    iv. $P - R$

11. Given $(x) = \dfrac{1}{\sqrt{16-x^2}}$. Find its domain and range.

12. Prove that A + B = $\dfrac{\pi}{4}$. If given $\tan A = \dfrac{x}{x+1}$ and $\tan B = \dfrac{1}{2x+1}$

13. Prove that $\frac{\sin 2x + \sin 4x}{\cos 2x + \cos 4x} = \tan 3x$

14. Using principle of mathematical induction prove that "$2^{2n} - 1 \text{ is divisible by } 3$" .

15. Out of a deck of 52 cards determine the number of ways of choosing 5 cards which should be including (or includes) exactly one jack.

16. If the sum of the first 16 terms of an A.P. is 432. If its first term is 12, then find the 25th term

17. If the distance between the points (5, 2) and (a, -1) is 5 units. Find the value(s) of a.

Or

A triangle is formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of its lactus – rectum. Find its area.

18. Evaluate: $\lim\limits_{x \to 0} \frac{e^{7x} - 1}{x}$

Or

Find the derivative of the following function: $5x^6 - 3x^2 + 10$

19. What is the probability that your friend and foe are in the same group. If hundred candidates are divided into two equal halves and formed into a group and your friend and foe are in the 100 candidates list.

Or

A box contains 5 yellow and an unknown number a of white colour pencils. Find a if the probability of two balls drawn at random and both of them being yellow pencil is $\frac{5}{14}$.

Section-D

Answer the questions according to the choice given. Each question carries 6 marks $4 \times 6 = 24$

20. $(6x - 4iy)(2 + i)^2 = 20(1 + i)$. Find the real values of x and y.

Or

A Ferrari covers a distance of 90km at a uniform speed. Find the original speed of the Ferrari, if it would have taken 30 minutes less to reach the destination, if the speed had been $15km/h$ more.

21. Find all the pairs of consecutive odd positive integers, both of which are smaller than 18, such that there is more than 22.

Or

A carpenter wants to cut three lengths from a single piece of wood of length 105cm. The second length is to be 5 cm longer than the shortest and the third length is to be twice as long as the shortest. What are the possible lengths for the shortest wood if the third piece is to be atleast 10 cm longer than the second?

22. Evaluate the following limit:

$$\lim_{x \to 0} \frac{21^x - 3^x - 7^x + 1}{x \sin x}$$

Or

Differentiate the following function: $\frac{2 \sin x + 2 \cos x}{4 \sin x - 4 \cos x}$

23. Find the mean of the following

CLASS INTERVALS	80 – 90	90 – 100	100 – 110	110 – 120	120 – 130
FREQUENCY	8	12	15	10	5

Or

Find the mode and the median from the data given below:

x	10	15	20	25	30	35
f	6	8	4	5	7	3