

Time: 2 Hour

Total Marks: 60

Class : XI
Subject : Mathematics

MCQ SINGLE CORRECT

1. Let $S = \{x \mid x \text{ is a positive multiple of 3 less than 100}\}$; $P = \{x \mid x \text{ is a prime number less than 20}\}$. Then $n(S) + n(P)$ is
- (a) 34 (b) 31
(c) 33 (d) 30
2. In a class of 60 students, 25 students play cricket and 20 students play tennis, and 10 students play both the games. Then, the number of students who play neither is
- (a) 0 (b) 25
(c) 35 (d) 45
3. Two finite sets have m and n elements respectively. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The values of m and n respectively are.
- (a) 7, 6 (b) 5, 1
(c) 6, 3 (d) 8, 7
4. $f(x) = x^3 - \frac{1}{x^3}$ then $f(x) + f\left(\frac{1}{x}\right)$ is equal to
- (a) $2x^3$ (b) $2\frac{1}{x^3}$
(c) 0 (d) 1
5. In a town of 840 persons, 450 persons read Hindi, 300 read English and 200 read both. Then the number of persons who read neither is
- (a) 210 (b) 290
(c) 180 (d) 260

TRUE/FALSE

6. If $A = \{1, 2, 3\}$, $B = \{3, 4\}$ and $C = \{4, 5, 6\}$, then $(A \times B) \cup (A \times C)$
 $= \{(1, 3), (1, 4), (1, 5), (1, 6), (2, 3), (2, 4), (2, 5), (2, 6), (3, 3), (3, 4), (3, 5), (3, 6)\}$.
- (a) True (b) False

7. In the permutations of n things, r taken together, the number of permutations in which m particular things occur together is ${}^{n-m}P_{n-m} \cdot {}^5C_2$

(a) True

(b) False

FILL IN THE BLANKS

8. $x = a$ represent a plane parallel to _____.

9. If a, b, c are in A.P., then the straight lines $ax + by + c = 0$ will always pass through _____.

10. A line is parallel to xy -plane if all the points on the line have equal _____.

VERY SHORT DESC

11. A die is thrown two times.

12. Prove $\cos^2 2x - \cos^2 6x = \sin 4x \sin 8x$

13. An experiment consists of tossing a coin and, then throwing it second time if a head occurs. If a tail occurs on the first toss, then a die is rolled, once. Find the sample space.

14. Find the value of $\sin 75^\circ$

15. Find the 9th term in the following sequence whose n th term is $a_n = (-1)^{n-1} n^3$; a_9

SHORT DESC - 25 WORDS

16. If the set A has 3 elements and the set $B = \{3, 4, 5\}$ then find the number of elements in $(A \times B)$.

17. Find the equation of the circle whose radius is 5 and which touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at the point $(3, 7)$.

18. How many chords can be drawn through 21 points on a circle?

19. Find the derivative of the following functions: $\sec x$

20. Find the degree measures corresponding to the following radian measures $\left(\text{use } \pi = \frac{22}{7} \right) \frac{11}{16}$

MED DESC - 50 WORDS

21. Let A and B be sets. If $A \cap X = B \cap X = \phi$ and $A \cup X = B \cup X$ for some set X . Show that $A = B$.

22. Write the following statement in five different ways, conveying the same meaning.
p: If a triangle is equiangular, then it is an obtuse angled triangle.

23. In any ΔABC , prove that

$$\frac{a^2 \sin (B-C)}{\sin A} + \frac{b^2 \sin (C-A)}{\sin B} + \frac{c^2 \sin (A-B)}{\sin C} = 0$$

24. Two dice are thrown. The events A, B and C are as follows:
 A: getting an even number on the first die
 B: getting on odd number on the first die
 C: getting the sum of the numbers on the dice ≤ 5
 Describe the events
 (i) A' (ii) not B (iii) A or B (iv) A and B (v) A but not C (vi) B or C (vii) B and C (viii) $A \cap B' \cap C'$
25. Rewrite each of the following statements in the form "p if and only if q"
 (i) p : If you watch television, then your mind is free and. if your mind is free, then you watch television.
 (ii) q : For you to get an A grade, it is necessary and sufficient that you do all the homework regularly.
 (iii) r : If a quadrilateral is equiangular, then it is a rectangle and if a quadrilateral is a rectangle, then it is equiangular.

LONG DESC - 100 WORDS

26. A fair coin is tossed, four times, and, a person win Re 1 for each head, and lose Rs. 1.50 for each tail that turns up. Form the sample space, calculate how many different amounts of money you can have after four tosses and the probability of having each of these amounts.
27. From the prices of shares X and Y below, find out which is more stable in value:

X	35	54	52	53	56	58	52	50	51	49
Y	108	107	105	105	106	107	104	103	104	101

28. Three letters are written to three persons and an envelope is addressed to each of them, the letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the probability that at least one letter is in its proper envelope.
29. A and B are two events such that $P(A) = 0.54$, $P(B) = 0.69$ and $P(A \cap B) = 0.35$. Find
 (i) $P(A \cap B)$ (ii) $P(A' \cap B')$ (iii) $P(A \cup B)$ (iv) $P(B \cap A)$.
30. The marks obtained (out of 100) by two students in 10 qualifying tests are:
 A : 48, 53, 58, 41, 54, 52, 54, 49, 51, 50
 B : 11, 98, 60, 94, 48, 52, 17, 90, 20, 20
 Who is more consistent and who is more variable?