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SESSION ENDING EXAMINATION 2018 - 19

CLASS - XI **MARKS : 100**

SUBJECT : MATHEMATICS **TIME : 3 HOURS**

General Instructions:

1) This question paper consists of three pages.

2) All questions are compulsory.

3) The question paper consists of 29 questions divided into four sections A, B, C and D. Section A comprises of 4 questions of one mark each, Section B comprises of 8 questions of two marks each, Section C comprises of 11 questions of four marks each and Section D comprises of 6 questions of six marks each.

4) All questions in Section A are to be answered in one word, one sentence or as per exact requirement of the question.

5) There is no overall choice. However internal choice has been provided in 1 question of 1 mark,3 questions of 2 marks each ,3 questions of four marks each and 3 questions of six marks each. You have to attempt only one of the alternatives in all such questions.

6) Use of calculator is not permitted. You may ask for logarithmic table, if required.

SECTION - A

1. If $\cos x = -\frac{3}{5}$, x lies in the third quadrant, find the value of sin x.

(OR)

Find $\sin\left(-\frac{11\pi}{3}\right)$

2. What is the relationship between AM and GM?

3. Name the octant in which the point (4,2, -5) lie.

4. Write the negation of the statement " Both the diagonals of a rectan have the same length".

SECTION - B

5. Let $A = \{1, 2\}, B = \{1, 2, 3, 4\}, C = \{5, 6\}$ and $D = \{5, 6, 7, 8\}$.

   i). Find $A \times (C \cap D)$

   ii). Verify that $A \times C$ is a subset of $B \times D$.

6. Convert 6 radians into degree measure.

7. Solve :

   $x^2 + 3x + 5 = 0$

(OR)

Express $(1 - i)^4$ in the form of a+ib.

8. Insert five numbers between 8 and 26 such that the resulting sequenc an AP.

9. Evaluate :

$$\lim_{x \to 0} \frac{\cos 2x - 1}{\cos x - 1}$$

(OR)

Evaluate :

$$\lim_{x \to 0} \frac{\sin ax + bx}{ax + \sin bx} \quad a, b, a + b \neq 0.$$

10. A bag contains 5 black and 6 red balls. Determine the number of ways in which 2 black and 3 red balls can be selected?

(OR)

Find the number of ways of selecting 9 balls from 6 red balls,5 white balls and 5 blue balls if each selection consists of 3 balls of each colour.

11. By using Contrapositive method Check whether the following statement is true or not.

If $x, y \in Z$ are such that x and y are odd, then xy is odd.

12. A letter is chosen at random from the word "ASSASSINATION". Find the probability that letter is

(i) a Vowel

(ii) a Consonant.

SECTION—C

13. In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apple as

20. In How many of the distinct permutations of the letters in MISSISSIPPI do the four I"s not come together.

21. If the first and the nth term of a G.P. are a and b, respectively, and if P is the product of n terms, prove that $(P)^2 = (ab)^n$

22. Find the derivative of tan x by using first principle method.

OR

Find the derivative of the following functions;

i) $f(x) = \frac{2x + 3}{x - 2}$

ii) $f(x) = x\sin x$

23. If E and F are events such that P(E) = ¼, P(F) = ½ and P(E and F) = $^1/_8$, Find

I). P(E or F)

ii). P(not E and not F)

SECTION - D

24. A class has 175 students. Following is the description showing the number of students studying one or more of the following subjects in this class. Mathematics 100, Physics 70, Chemistry 46, Mathematics and Physics 30, Mathematics and Chemistry 28, Physics and Chemistry 23, Mathematics, Physics and Chemistry 18.

a) How many students are enrolled in Mathematics alone, Physics

alone and Chemistry alone?

b) Are there students who have not offered any of these three subjects?

25. (i) Solve for θ if $2\sin^2\theta - \sin\theta = 0$

(ii) Prove that :

$$\tan 4\theta = \frac{4\tan\theta\,(1-\tan^2\theta)}{1-6\tan^2\theta-\tan^4\theta}$$

26. Solve the following system of inequalities graphically:

$3x+y-6\geq 0,\ 4x+9y-36\leq 0,\ 4x-3y-12\leq 0,\ x+3y-6\geq 0,\ y\geq 0,\ x\geq 0$

27. Calculate Mean, Variance and standard Deviation for the following distribution.

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

OR

Calculate the mean deviation about median for the following data

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	7	15	16	4	2

28. Prove by using the principle of mathematical induction:

$n(n+1)(n+5)$ is a multiple of 3

OR

Prove by using the principle of mathematical induction:

$41^n - 14^n$ is a multiple of 27.

29. Find n, if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6} : 1$.

OR

Find a, b and n in the expansion of $(a + b)^n$ if the first three terms of the expansion are 729, 7290 and 30375 respectively.