

Vidya Vikas Mandal's

Std : XI Ramacrisna Madeva Salgaocar Higher Secondary School Dur: 3hr

Date : 23/10/2024

Margao – Goa

Marks : 80

First Term Exam

Subject : MATHEMATICS AND STATISTICS

1. The question paper consists of 30 questions.
 2. Question number 1 to 7 is a multiple choice/VSA type question of one mark each
 3. Question numbers 8 to 14 are short answer type -I question of two marks each.
 4. Question numbers 15 to 21 are short answer type -II question of three marks each.
 5. Question numbers 22 to 28 are long answer type-1 question of four marks each.
 6. Question numbers 29 to 30 are long answer type-2 question of five marks each.
 7. There is no overall choice in the paper. However internal choice is provided in 2 question of 3 marks ,in 2 question of 4 marks and in 2 questions of 5 marks.
 8. Use of calculators is not permitted.
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1. The sum of arithmetic progression 2,5,8,... up to 50 terms is is. -----.

- 3557
- 3575
- 3757
- 3775

2. $\sin (2\pi - x) =$ -----.

- $-\cos x$
- $-\sin x$
- $\cos x$
- $\sin x$

3. The modulus of a complex number $z = a+ib$ is -----.

- $|z| = \sqrt{a^2 + b^2}$
- $|z| = \sqrt{a^2 - b^2}$
- $|z| = a^2 + b^2$
- $|z| = a^2 - b^2$

4. $1+\cos 2x =$ -----.

- $2\tan^2 x$
- $2\cot^2 x$
- $2\sin^2 x$
- $2\cos^2 x$

5. Define a complex number.

6. State the fundamental principle of counting.

7. State the De' Morgans Laws .

8. Find the mean deviation about the mean for the following data
12,18,21,26,17,20.

9. In how many ways can a team of 4 boys and 4 girls be selected from 6 boys and 5 girls.

10. Define (i) Function
(ii) Domain of the relation R.

11. Solve the quadratic equation $x^2 + 6x + 10 = 0$.

12. How many 3 letter words with or without meaning can be formed out of the letters of the word ' LOGARITHMS' if repetition of letters is not allowed

13. In a G.P., if the third term is 63 and the sixth term is 1701, find its common ratio.

14. Solve the quadratic equation $2x^2 + 4x + 3 = 0$.

15. Solve the inequalities for $\frac{x}{2} \leq \frac{5x-2}{3} - \frac{7x-1}{5}$ for real x.

16. Find the sum of all numbers between 100 and 400 which are exactly divisible by 3 .

OR

If the sum of the first 20 terms of an A.P. is 610 and the first term is 2, Find the common difference . Also find the 15th term of the A.P.

17. Find the degree measure corresponding to 4 radians. (Use $\pi = \frac{22}{7}$).

18. If $f(x) = x^2 + x + 1$, $0 \leq x \leq 2$.
 $= 3x - 4$, $2 < x \leq 4$
 $= x^2 + 1$, $4 < x \leq 6$

Find $f(1)$, $f(4)$ and $f(5)$.

19. There are 10 students and 5 teachers, out of whom a committee of 3 students and 2 teachers is to be formed . Find the number of ways in which this can be done if (i) a particular teacher is included
(ii) a particular student is excluded

OR

From 7 lawyers and 4 doctors a committee of 6 is to be formed. In how many ways can this be done , when the committee contains at least 3 doctors.

20. Find $5 + 55 + 555 + \dots$ n terms.

21. Prove that $\sec 2x - \tan 2x = \frac{\cot x - 1}{\cot x + 1}$

22. Using Principle of Mathematical Induction, prove that

$$1 + 3 + 3^2 + 3^3 + \dots + 3^{n-1} = \frac{3^n - 1}{2}.$$

OR

Using Principle of Mathematical Induction, prove that

$$1^3 + 2^3 + 3^3 + 4^3 + \dots + n^3 = \left[\frac{n(n+1)}{2} \right]^2 .$$

23. Find three numbers in A.P, such that their sum is 27 and the third number is double the first number.

24. Solve the following system of inequalities graphically

$$3x + 2y \leq 18$$

$$x + 4y \geq 8$$

$$x + y \geq 4$$

25. If $\cot x = \frac{3}{2}$, x lies in third quadrant. Find the values of $\tan x$, $\sec x$ and $\cos x$.

26. Express each of the complex number given below in the form $a+ib$.

(i) $z = \frac{4i-6}{1-i}$

(ii) $z = (4i-5)+(2-3i)+(1-2i)(1+2i)$

27. In a school, 100 students were surveyed about their participation in three clubs : Drama club , science club and art club. The results of the survey are as follows; 30 students are in the drama club, 35 students are in the science club , 32 students are in the art club. 10 students are both in the drama and science clubs. 12 students are in both the drama an art club. 8 students are in both science and art club. 5 students are in all three clubs. Find the number of students in (i) atleast one club

- (ii) art and drama clubs ,but not in science club
(iii) only science club

OR

In a school there are 30 teachers who teach economics or business studies. Of these 15 teach economics and 5 teach both economics and business studies. How many teach (i) business studies (ii) only business studies (iii) only economics

28. Using Principle of Mathematical Induction, prove that

$$1 \cdot 2 + 2 \cdot 3 + 3 \cdot 4 + \dots + n \cdot (n+1) = \frac{n(n+1)(n+2)}{3}$$

29. A family of 4 brothers and 2 sisters is to be arranged for a photograph in one row. In how many ways can they be seated if

- (i) All sisters sit together and all brothers sit together.
(ii) the two sisters occupy seats at the two ends of the row
(iii) None of the sisters sit together

OR

Find the number of arrangements of the letters of the word 'EXAMINATION'. In how many of these arrangements,

- (i) do the words start with T
- (ii) do the vowels always occur together

30. Find the mean deviation about mean for the following data

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No of students	2	3	8	14	8	3	2

OR

Find the mean deviation about median for the following data

Weekly wages	200-300	300-400	400-500	500-600	600-700	700-800
frequency	5	8	12	15	7	3

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