

Vidya Vikas Mandal's

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

Date : 21/03/2024

Margao – Goa

Marks : 80

Final Examination 2024

Subject : MATHEMATICS AND STATISTICS

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1. All questions are compulsory.
  2. The question paper consists of 30 questions.
  3. Question number 1 to 7 is a multiple choice/VSA type question of one mark each
  4. Question numbers 8 to 14 are short answer type -I question of two marks each.
  5. Question numbers 15 to 21 are short answer type -II question of three marks each.
  6. Question numbers 22 to 28 are long answer type-1 question of four marks each.
  7. Question numbers 29 to 30 are long answer type-2 question of four marks each.
  8. 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.
  9. Use of calculators is not permitted.
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1. The derivative of  $\tan x$  w.r.t  $x$  is -----.

- $\sec x$
- $\sec^2 x$
- $\operatorname{cosec} x$
- $\operatorname{cosec}^2 x$

2.  $\sin 2x =$  -----.

- $2\sin x \cos x$
- $\sin x \cos x$
- $\cos x$
- $\sin x$

3. The length of the latus rectum of  $x^2 = -9y$  is -----.

- - 3 units
- - 9 units
- 3 units
- 9 units

4. The x-axis and y-axis taken together determine a plane known as -----.

- XY- plane
- YZ- plane
- ZX - plane
- None of the above

5. Is the sentence " A natural number is greater than zero", a statement?  
Give reason for your answer.

6. Define an 'Ellipse'.

7. Find the equation of a line with slope 3 and y intercept 2 .

8. Evaluate  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$ .

9. If two dice are rolled once, what is the probability of obtaining a 'sum of 9'.

10. Find the radian measure of  $25^\circ 20'$ .

11. Find the centre and radius of the circle  $x^2 + y^2 - 6x - 2y + 1 = 0$ .

12. Find the coefficient of  $x^5$  in  $(x + 3)^8$ .

13. If E and F are events such that  $P(E) = \frac{1}{4}$ ,  $P(F) = \frac{1}{2}$  and  $P(E \cup F) = \frac{5}{8}$   
Find (i)  $P(\text{not } E)$  (ii)  $P(\text{not } E \text{ and not } F)$ .

14. Evaluate  $\lim_{x \rightarrow 4} \left[ \frac{1}{x-4} - \frac{3}{(x-1)(x-4)} \right]$ .

15. Reduce the equation  $3x + 6y - 12 = 0$  into (i) slope – intercept form  
(ii) Intercept form

16. Evaluate  $\lim_{x \rightarrow 1} \frac{x^3 - x^2 - x + 1}{x^3 + 3x^2 - 3x - 1}$

OR

$$\lim_{x \rightarrow 8} \frac{\sqrt{x^2 + 17} - 9}{x^2 + x - 72}$$

17. (i) Write the negation of the statement " All triangles are squares".  
(ii) write the contrapositive and converse of the statement  
" If a number is divisible by 18, then it is divisible by 9".
18. Find the co-ordinates of the points which divides the line joining the points ( 2, -4, 3) and ( -4, 5, -6) , internally in the ratios 2 :1.
19. Find the focus, equation of the directrix and equation of axis the parabola  $x^2 = 5y$

OR

Find the focus, length of latus rectum and equation of the directrix of the parabola  $y^2 = - 10x$ .

20. Find the multiplicative inverse of  $z = 7+5i$ .
21. The probability that a patient visiting a dentist , will have a tooth extracted is 0.06 , the probability that he will have a cavity filled is 0.2 and the probability that he will have a tooth extracted as well as cavity filled is 0.03. What is the probability that a patient has either a tooth extracted or cavity filled .
22. If A (10,4) ,B(-4,9) and C(-2,-1) are the vertices of a triangle ABC. Find the equation of (i) altitude through B  
(ii) median through A.

OR

The slope of a line is double of the slope of another line . If tangent of the angle between them is  $\frac{1}{3}$  , find the slope of the lines.

23. Using binomial theorem , write the expansion of  $( 2x - \frac{1}{x} )^4$  .

24. Show that the points A(3,3,3), B(0,6,3), C(1,7,7) and D(4,4,7) are the vertices of a square.

25. If  $\sec x = \frac{13}{5}$ ,  $x$  lies in fourth quadrant. Find the values of  $\cos x$ ,  $\sin x$  and  $\operatorname{cosec} x$ .

26. Find the eccentricity, foci, length of latus rectum and conjugate axis of the hyperbola  $\frac{x^2}{4} - \frac{y^2}{5} = 1$ .

27. Differentiate the following w.r.t.  $x$

(i)  $y = (1 + \sin x) \cos x$

(ii)  $y = \frac{x^2+1}{2x+3}$

OR

Differentiate the following w.r.t.  $x$

(i)  $y = (x^3+3)(2x^2-5)$

(ii)  $y = \frac{\cot x - 1}{\cot x + 1}$

28. The sum of the intercepts made by a line on the coordinate axes is 2. If it passes through (4, -3). Find its equation.

29. 6 boys and 2 girls are to be seated on chairs in a row for photograph. Find the number of arrangements possible if

(i) 2 girls always sit next to each other.

(ii) 2 girls are never together

(iii) 2 girls occupy seats at the two ends of the row.

OR

How many words, with or without meaning can be made from letters of the word 'STRANGLE', assuming that no letter is repeated,

if (i) all letters are used at a time

(ii) all the vowels are all together

30. Find the middle terms in the expansion of  $\left(2x - \frac{x^2}{4}\right)^9$ .

OR

Find the middle terms in the expansion of  $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^7$ .

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