Tsi11M

Tenkasi District

Common Quarterly Examination - 2023

21-09-2023

Standard 11

Time Allowed: 3.00 Hours **MATHEMATICS** Maximum Marks: 90

PART - A

Answer all questions: **20×1=20**

1) If $A = \{(x, y) : y = e^x, x \in R\}$ and $B = \{(x, y): y = e^{-x}, x \in R\}$ then $n(A \cap B)$ is
   a) infinity b) 0 c) 1 d) 2

2) If two sets A and B have 17 elements in common, then the number of elements common to the set A×B and B×A is
   a) 2^{17} b) 17^2 c) 34 d) insufficiant data

3) Let $x = \{1, 2, 3, 4\}$, $y = \{a, b, c, d\}$ and $f = \{(1, a), (4, b), (2, c), (3, d), (2, d)\}$ then f is
   a) an one-to-one function b) an on to function
   c) a function which is not one-to-one d) not a function

4) The number of solutions of $x^2+|x-1| = 1$ is
   a) 1 b) 0 c) 2 d) 3

5) If a and b are the real roots of the equation $x^2-Kx+C = 0$, then the distance between the points (a, 0) and (b, 0) is
   a) $\sqrt{K^2 - 4C}$ b) $\sqrt{4K^2 - C}$ c) $\sqrt{4C - K^2}$ d) $\sqrt{K - 8C}$

6) The value of $\log_3 11 \cdot \log_{11} 13 \log_{13} 15 \cdot \log_{15} 27 \log_{27} 81$ is
   a) 1 b) 2 c) 3 d) 4

7) If $\tan 40^\circ = \lambda$ then $\frac{\tan 140^\circ - \tan 130^\circ}{1 + \tan 140^\circ \tan 130^\circ} =$
   a) $\frac{1-\lambda^2}{\lambda}$ b) $\frac{1+\lambda^2}{\lambda}$ c) $\frac{1+\lambda^2}{2\lambda}$ d) $\frac{1-\lambda^2}{2\lambda}$

8) A wheel is spinning at 2 radians / second. How many seconds will it take make 10 complete rotation
   a) 10π seconds b) 20π seconds c) 5π seconds d) 15π seconds

9) If $\sin\theta = \sin\alpha$ then $\theta =$
   a) $n\pi+(-1)^n\alpha$ b) $2n\pi\pm\alpha$ c) $n\pi+\alpha$ d) none of the above

10) Number of sides of a polygon having 44 diagonals is
   a) 45 b) 40 c) 10! d) 2^{10}

11) $nC_0+nC_1+nC_2+.....+nC_n =$
   a) 2^n b) 2^{n-1} c) 2^{n+1} d) 0

12) The number of rectangles that a chessboard has
   a) 81 b) 9^9 c) 1296 d) 6561

13) The number when 38^{15} is divisible by 13 is
   a) 12 b) 1 c) 11 d) 5

14) The co-efficient of x^5 in the series e^{-2x} is
   a) $\frac{2}{3}$ b) $\frac{3}{2}$ c) $\frac{-4}{15}$ d) $\frac{4}{15}$

15) The Coefficient of x^8y^{12} in the expansion of $(2x+3y)^{20}$
   a) 0 b) $2^8 3^{12}$ c) $2^8 3^{12}+2^{12} 3^8$ d) $20C_8\ 2^8 3^{12}$

16) The value of $1-\frac{1}{2}\left(\frac{2}{3}\right)+\frac{1}{3}\left(\frac{2}{3}\right)^2-\frac{1}{4}\left(\frac{2}{3}\right)^3+\ldots\ldots$ is

a) $\log\left(\frac{5}{3}\right)$ b) $\frac{3}{2}\log\left(\frac{5}{3}\right)$ c) $\frac{5}{3}\log\left(\frac{5}{3}\right)$ d) $\frac{2}{3}\log\left(\frac{2}{3}\right)$

17) If one of the line given by $6x^2-xy+4cy^2=0$ is $3x+4y=0$ then c equal to

a) -3 b) -1 c) 3 d) 1

18) If two straight lines $x+(2k-7)y+3=0$ and $3kx+9y-5=0$ are perpendicular then the value of k is

a) 3 b) $\frac{1}{3}$ c) $\frac{2}{3}$ d) $\frac{3}{2}$

19) Which of the following equation is the locus of $(at^2, 2at)$?

a) $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ b) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ c) $x^2+y^2=a^2$ d) $y^2=4ax$

20) If $a+b=0$ then the angle between the lines $ax^2+2hxy+by^2=0$ is

a) 0^o b) 45^o c) 60^o d) 90^o

PART - B

Answer any seven questions. Question number 30 is compulsory: **7×2=14**

21) If $n(A\cap B)=3$ and $n(A\cup B)=10$ then find $n[P(A\Delta B)]$.

22) If α, β are the roots of the quadratic equation $x^2+\sqrt{2}x+3=0$. Form a quadratic polynomial with zeroes $\frac{1}{\alpha}, \frac{1}{\beta}$.

23) Solve $3|x-2|+7=19$ for x.

24) Prove that $\cos(60-\theta)\sin(30+\theta)-\sin(60-\theta)\cos(30+\theta)=0$.

25) If $\frac{1}{7!}+\frac{1}{8!}=\frac{A}{9!}$ then find the value of A.

26) Find the distinct permutations of the letters of the word MISSISSIPPI?

27) Compute: 99^4

28) Find seven numbers $A_1, A_2, \ldots\ldots A_7$ so that the sequence $4, A_1, A_2, \ldots\ldots A_7, 7$ is in an A.P.

29) If θ is a parameter, find the equation of the locus of a moving point whose coordinates are $x=a\cos^3\theta$, $y=a\sin^3\theta$.

30) Find the equation of the straight lines passing through (8, 3) and having intercepts whose sum is 1.

PART - C

Answer any seven questions. Question number 40 is compulsory: **7×3=21**

31) Find the range of the function $f(x)=\frac{1}{1-3\cos x}$.

32) If $\left(x^{1/2}+x^{-1/2}\right)^2=\frac{9}{2}$, then find the value of $\left(x^{1/2}-x^{-1/2}\right)$ for $x>1$.

33) Find the value of $\sin 18^o$.

34) If one root of $K(x-1)^2 = 5x-7$ is double the other root, solve that K = 2 or −25.

35) Let A = {a, b, c} and R = {(a, a), (b, b), (a, c)} write down the minimum number of ordered pairs to be included to R to make it.
(i) reflexive (ii) symmetric (iii) transitive (iv) equivalence.

36) If the letters of the word GARDEN are permuted in all possible ways and strings thus formed are arranged in the dictionary order, then find the ranks of the words (i) GARDEN (ii) DANGER.

37) Find the value of $\sqrt[3]{126}$ approximately (upto four decimal places).

38) Find the term independent of x in $\left(\frac{4x^2}{3} - \frac{3}{2x}\right)^9$.

39) The slope of one of the straight lines $ax^2+2hxy+by^2 = 0$ is twice that of the other, show that $8h^2 = 9ab$.

40) Prove that $\cos(A+B)\cos(A-B) = \cos^2A - \sin^2B = \cos^2B - \sin^2A$.

PART - D

Answer all questions: **7×5=35**

41) a) From the curve y = x draw (i) y = −x (ii) y = 2x (iii) y = x+1
(iv) $y = \frac{1}{2}x + 1$ (v) 2x+y+3 = 0

(OR)

b) i) If $a^2+b^2 = 7ab$ solve that $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}(\log a + \log b)$.

ii) Prove: $\log_{a^2} a \cdot \log_{b^2} b \cdot \log_{c^2} c = \frac{1}{8}$

42) a) Resolve the rational expression $\frac{7+x}{(1+x)(1+x^2)}$ into partial fraction.

(OR)

b) If A+B+C = π prove that sin2A+sin2B−sin2C = 4 cosA cosB sinC.

43) a) In a survey of 5000 persons in a town, it was found that 45% of the person know language A, 25% know language B, 10% know language C, 5% know languages A and B, 4% know languages B and C, and 4% know languages A and C. If 3% of the persons know all the three languages. Find the number of persons who knows only language A.

(OR)

b) Find the equation of lines passing through the point of intersection of lines 4x−y+3 = 0 and 5x+2y+7 = 0 and (i) through the point (−1, 2) (ii) parallel to x−y+5 = 0 (iii) perpendicular to x−2y+1 = 0.

44) a) In a ΔABC, prove that $\sin\left(\frac{B-C}{2}\right) = \frac{b-c}{a}\cos\frac{A}{2}$.

(OR)

b) By the principle of Mathematical Induction prove that, for all integer n≥1.

$1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$

45) a) If x is large prove that $\sqrt{x^2+1} - \sqrt{x^2-1} = \frac{1}{x}$ (approximately)

(OR)

b) The normal boiling point of water is 100°C (or) 212°F and the freezing point of water is 0°C (or) 32°F.
   i) Find the linear relationship between C and F.
   ii) The value of C for 98.6°F and
   iii) The value of F for 38°C

46) a) An exam paper contains 8 questions. 4 in Part A and 4 in Part B. Examiners are required to answer 5 questions. In how many ways can this be done if
   i) There are no restrictions of choosing a number of questions in either parts.
   ii) Atleast two questions from Part A must be answered.

(OR)

b) Compute the sum of first n terms of the series:
8+88+888+.....

47) a) Solve: $\sin\theta + \sqrt{3}\cos\theta = 1$

(OR)

b) Show that the lines $12x^2+7xy-12y^2-x+7y+1 = 0$ represent a pair of lines. Also find the equation of separate lines.

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