Tsi11M

Tenkasi District

Common Quarterly Examination - 2024

23-09-2024

Standard 11

MATHEMATICS

Time Allowed: 3.00 Hours Maximum Marks: 90

I. Choose the best: **20×1=20**

1) If $n(A) = 2$ and $n(B \cup C) = 3$ then $n[(A \times B) \cup (A \times C)]$ is
   a) 2^3 b) 3^2 c) 6 d) 5

2) If the function $f : [0, 2\pi] \to [-1, 1]$ defined by $f(x) = \sin x$ is
   a) one-to-one b) on-to
   c) bijection d) cann't be defined

3) Let $f: R \to R$ be defined by $f(x) = 1 - |x|$, then the range of f is
   a) R b) $(1, \infty)$ c) $(-1, \infty)$ d) $(-\infty, 1]$

4) If $\frac{|x-2|}{x-2} \geq 0$, then x belongs to
   a) $[2, \infty)$ b) $(2, \infty)$
   c) $(-\infty, 2)$ d) $(-2, \infty)$

5) If $\log_{\sqrt{x}} 0.25 = 4$, then the value of x is
   a) 0.5 b) 2.5 c) 1.5 d) 1.25

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

7) The max value of $4\sin^2 x + 3\cos^2 x + \sin\frac{x}{2} + \cos\frac{x}{2}$ is
   a) $4 + \sqrt{2}$ b) $3 + \sqrt{2}$ c) 9 d) 4

8) $\cos 2\theta \cos 2\phi + \sin^2(\theta - \phi) - \sin^2(\theta + \phi)$ is equal to
   a) $\sin 2(\theta + \phi)$ b) $\cos 2(\theta + \phi)$
   c) $\sin 2(\theta - \phi)$ d) $\cos 2(\theta - \phi)$

9) In a ΔABC $\sin^2 A + \sin^2 B + \sin^2 C = 2$, then the triangle is
   a) equilateral triangle b) isoceles triangle
   c) right triangle d) scalene triangle

10) In 3 fingers, the number of ways 4 rings can be worn is _____ ways.
   a) $4^3 - 1$ b) 3^4 c) 68 d) 64

11) There are 10 points in a plane and 4 of them are collinear. The number of straight lines joining any two points is
   a) 45 b) 40 c) 39 d) 38

12) In $2nC_3 : nC_3 = 11:1$ then n is
   a) 5 b) 6 c) 11 d) 7

13) If a, 8, b are in A.P. a, 4, b are in G.P and if a, x, b in H.P then x is
   a) 2 b) 1 c) 4 d) 16

14) The co-efficient of x^6 in $(2+2x)^{10}$ is
   a) $10C_6$ b) 2^6 c) $10C_6\ 2^6$ d) $10C_6\ 2^{10}$

15) 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) $\frac{2}{3}\log\left(\frac{2}{3}\right)$

16) If the points (8, −5) lies on the locus $\frac{x^2}{16}-\frac{y^2}{25}=K$ then the value of K is

a) 0 b) 1 c) 2 d) 3

17) The image of the point (2, 3) in the line $y = -x$ is

a) (−3, −2) b) (−3, 2) c) (−2, −3) d) (3, 2)

18) θ is acute angle between the lines $x^2-xy-6y^2 = 0$ the $\frac{2\cos\theta+3\sin\theta}{4\sin\theta+5\cos\theta}$ is

a) 1 b) $\frac{-1}{9}$ c) $\frac{5}{9}$ d) $\frac{1}{9}$

19) e^{-1} =

a) $1-\frac{1}{1!}+\frac{1}{2!}-\frac{1}{3!}+\ldots\ldots$ b) $1+\frac{1}{1!}+\frac{1}{2!}+\frac{1}{3!}+\ldots\ldots$

c) $1-\frac{1}{1!}+\frac{2}{2!}-\frac{3}{3!}+\ldots\ldots$ d) $1+\frac{1}{1!}+\frac{2}{2!}+\frac{3}{3!}+\ldots\ldots$

20) $y = a^x$ equal to

a) $\log_a y = x$ b) $\log_a x = y$ c) $\log_y x = a$ d) $\log_x y = a$

II. Answer 7 questions. Q.No. 30 is compulsory: 7×2=14

21) If n[P(A)] = 1024, n(A∪B) = 15 and n[P(A)] = 32 then find n(A∩B).

22) Solve: $|5x-12| < -2$

23) Solve $x = \sqrt{x+20}$ for $x \in R$.

24) Prove that $\tan5A-\tan3A-\tan2A = \tan5A.\tan3A\tan2A$.

25) If $A+B = 45^\circ$ show that $(1+\tan A)(1+\tan B) = 2$.

26) If $^{15}C_{2r-1} = {}^{15}C_{2r+4}$ find r.

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

28) Find seven numbers $A_1, A_2, \ldots A_7$ so that the sequence $4, A_1, A_2, \ldots\ldots A_7, 7$ is in A.P and also four numbers G_1, G_2, G_3, G_4 so that the sequence $12, G_1, G_2, G_3, G_4, \frac{3}{8}$ is in G.P.

29) Find the equation of the straight line passing through (−1, 1) and cutting of equal intercepts, but opposite in signs with the two co-ordinate axes.

30) Find the distance between the lines $3x-4y+5 = 0$ and $6x-8y-15 = 0$.

III. Answer 7 questions. Q.No. 40 is compulsory: 7×3=21

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

32) If one root of $K(x-1)^2 = 5x-7$ is double the other root straight line $K = 2$ or -25.

33) If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$, then prove that $xyz = 1$.

34) If $\theta+\phi = \alpha$ and $\tan\theta = K\tan\phi$, then prove that $\sin(\theta-\phi) = \frac{K-1}{K+1}\sin\alpha$.

35) Solve: $2\sin^2 x+\sin^2 2x = 2$

36) If the letters of the word GARDEN are permuted in all possible ways and the strings thus formed are arranged in the dictionary order, then find the rank of the ward DANGER.

37) 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 question from Part A must be answered.

38) Find the constant term of $\left(2x^3 - \frac{1}{3x^2}\right)^5$.

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

40) Straight line if one of the angle between the lines $ax^2+2hxy+by^2 = 0$ is 60° then $(a+3b)(3a+b) = 4h^2$.

IV. Answer the following questions: **7×5=35**

41) Let $f, g : R\to R$ be defined as $f(x) = 2x-|x|$ and $g(x) = 2x+|x|$. Find fog.

(OR)

Find the value of K, if the following equation represent a pair of straight lines further. Find whether these lines are parallel or intersecting $12x^2+7xy-12y^1-x+7y+k = 0$.

42) In the set Z of integers, define mRn if m−n is divisible by 7. Prove that R is an equivalence relation.

(OR)

By the principle of mathematical induction, prove that for all $n\geq 1$, $1^2+2^2+3^2+\ldots\ldots+n^2 = \frac{n(n+1)(2n+1)}{6}$.

43) Find all the values of x that satisfies the inequality $\frac{2x-3}{(x-2)(x-4)} < 0$.

(OR)

Express the equation $\sqrt{3}x - y + 4 = 0$ in the following equivalent form
(i) Slope and intercept for m (ii) Intercept form (iii) Normal form

44) Resolve into partial fraction $\frac{2x}{(x^2+1)(x-1)}$.

(OR)

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

45) If $\sec\theta+\tan\theta = p$, obtain the values of $\sec\theta$, $\tan\theta$ and $\sin\theta$ in term of p.

(OR)

Find the distance (i) between two points (5, 4) and (2, 0) (ii) from a point (1, 2) to the line $5x+12y-3 = 0$. (iii) between two parallel lines $3x+4y = 12$ and $6x+8y+1 = 0$.

46) If $A+B+C = \frac{\pi}{2}$, prove that $\sin2A+\sin2B+\sin2C = 4\cos A\cos B\cos C$.

(OR)

In a binomial expansion of $(1+x)^n$ the co-efficients of 5^{th}, 6^{th} and 7^{th} terms are in A.P. find the value of n.

47) Prove that ${}^nC_r+{}^nC_{r-1} = {}^{\overline{n+1}}C_r$.

(OR)

Derive projection formula from (i) Law of sines (ii) Law of cosines.

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