Tsi11M

Tenkasi District Common Examinations
First Revision Examination - January 2023

27-01-2023

Standard 11
MATHEMATICS
Part - A

Time: 3.00 hrs | Marks: 90

Choose the correct answer: **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) The range of the function $\frac{1}{1-2\sin x}$ is
   a) $(-\infty, -1) \cup (\frac{1}{3}, \infty)$ b) $(-1, \frac{1}{3})$ c) $[-1, \frac{1}{3}]$ d) $(-\infty, -1] \cup [\frac{1}{3}, \infty)$

3) The number of roots of $(x+3)^4 + (x+5)^4 = 16$ is
   a) 4 b) 2 c) 3 d) 0

4) $\cos 1° + \cos 2° + \cos 3° + \ldots\ldots + \cos 179° =$
   a) 0 b) 1 c) −1 d) 89

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

6) Number of sides of a polygon having 44 diagonals is
   a) 4 b) 4! c) 11 d) 22

7) The remainder when 38^{15} is divided by 13 is
   a) 12 b) 1 c) 11 d) 5

8) The sum upto n terms of the series $\sqrt{2} + \sqrt{8} + \sqrt{18} + \sqrt{32} + \ldots$
   a) $\frac{n(n+1)}{2}$ b) $2n(n+1)$ c) $\frac{n(n+1)}{\sqrt{2}}$ d) 1

9) The slope of the line which makes an angle 45° with the line $3x - y = -5$ are
   a) 1, −1 b) $\frac{1}{2}, -2$ c) 1, $\frac{1}{2}$ d) 2, $-\frac{1}{2}$

10) If one of the lines given by $6x^2 - xy + 4cy^2 = 0$ is $3x + 4y = 0$, then 'C' equal to
   a) −3 b) −1 c) 3 d) 1

11) If $A = \begin{bmatrix} \lambda & 1 \\ -1 & -\lambda \end{bmatrix}$, then for what value of λ, $A^2 = 0$?
   a) 0 b) ±1 c) −1 d) 1

12) If $\overrightarrow{BA} = 3\hat{i} + 2\hat{j} + \hat{k}$ and the position vector of B is $\hat{i} + 3\hat{j} - \hat{k}$, then the position vector A is
   a) $4\hat{i} + 2\hat{j} + \hat{k}$ b) $4\hat{i} + 5\hat{j}$ c) $4\hat{i}$ d) $-4\hat{i}$

13) If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} + x\hat{j} + \hat{k}$, $\vec{c} = \hat{i} - \hat{j} + 4\hat{k}$ and $\vec{a}.(\vec{b} \times \vec{c}) = 70$, then x is equal to
   a) 5 b) 7 c) 26 d) 10

14) $\lim_{x \to 0} \frac{8^x - 4^x - 2^x + 1^x}{x^2} =$
   a) 2 log 2 b) 2 (log 2)^2 c) log 2 d) 3 log 2

15) $\frac{d}{dx}\left(e^{x+5\log x}\right)$ is

a) $e^x.x^4(x+5)$ b) $e^x.x(x+5)$ c) $e^x+\frac{5}{x}$ d) $e^x-\frac{5}{x}$

16) It is given that f'(a) exists, then $\lim_{x \to a} \frac{x.f(a)-a.f(x)}{x-a}$ is

a) f(a)-a.f'(a) b) f'(a) c) $-f'(a)$ d) f(a)+af'(a)

17) $\int \frac{e^{6\log x}-e^{5\log x}}{e^{4\log x}-e^{3\log x}}dx$ is

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

18) $\int e^{\sqrt{x}}\,dx$ is

a) $2\sqrt{x}\left(1-e^{\sqrt{x}}\right)+c$ b) $2\sqrt{x}\left(e^{\sqrt{x}}-1\right)+c$

c) $2e^{\sqrt{x}}\left(1-\sqrt{x}\right)+c$ d) $2e^{\sqrt{x}}\left(\sqrt{x}-1\right)+c$

19) If A and B are two events such that $A \subset B$ and $P(B) \neq 0$, then which of the following is correct?

a) $P\left(\frac{A}{B}\right)=\frac{P(A)}{P(B)}$ b) $P\left(\frac{A}{B}\right)<P(A)$ c) $P\left(\frac{A}{B}\right)\geq P(A)$ d) $P\left(\frac{A}{B}\right)>P(B)$

20) Ten coins are tossed. The probability of getting atleast 8 heads is

a) $\frac{7}{64}$ b) $\frac{7}{32}$ c) $\frac{7}{16}$ d) $\frac{7}{128}$

Part - B

Answer any seven questions. Question No. 30 is compulsory **7×2=14**

21) On the set of natural numbers let R be the relation defined by aRb if $a+b \leq 6$. Write down the relation by listing all the pairs. Check whether it is reflexive.

22) Solve: $2|x+1|-6 \leq 7$ and graph the solution set in a number line.

23) Find the value of sin (22½°)

24) How many strings can be formed from the letters of the word ARTICLE, so that vowels occupy the even places?

25) Find the equation of the straight line cutting an intercept of 5 from the negative direction of the y-axis and is inclined at an angle 150° to the x-axis.

26) If P(r, c) is mid point of a line segment between the axes, then show that $\frac{x}{r}+\frac{y}{c}=2$

27) Express the matrix $\begin{bmatrix} 4 & -2 \\ 3 & -5 \end{bmatrix}$ as the sum of a symmetric matrix and a skew-symmetric matrix.

28) Differentiate: $y = \sin(x^2)$

29) The odds that the event A occurs is 5 to 7, find P(A)

30) Differentiate: $y = \tan(\cos x)$

Part - C

Answer any seven questions. Question No. 40 is compulsory. **7×3=21**

31) If A = {1, 2, 3, 4} and B = {3, 4, 5, 6} then verify $A\times(B\cap C) = (A\times B)\cap(A\times C)$

32) Find a quadratic polynomial f(x) such that f(0) = 1, f(−2) = 0 and f(1) = 0

33) If A+B = 45°, show that (1+tan A) (1+tan B) = 2

34) Find $\sqrt[3]{65}$

35) Show that the points (1, 3) (2, 1) and (½, 4) are collinear by using concept of slope.

36) Show that $\begin{vmatrix} 2bc-a^2 & c^2 & b^2 \\ c^2 & 2ca-b^2 & a^2 \\ b^2 & a^2 & 2ab-c^2 \end{vmatrix} = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2$

37) Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $|\vec{a}|=3$, $|\vec{b}|=4$, $|\vec{c}|=5$ and each one of them being perpendicular to the sum of the other two, find $|\vec{a}+\vec{b}+\vec{c}|$

38) Differentiate: $y = \frac{\tan x}{x}$

39) Integrate: $4\cos(5-2x) + 9.e^{3x-6} + \frac{24}{6-4x}$

40) Evaluate: $\lim_{x\to 0} \frac{\sqrt{1+x^2}-1}{x}$

Part - D

Answer all the questions: **7×5=35**

41) a] If f, g: $\mathbb{R} \to \mathbb{R}$ are defined by f(x) = |x|+x and g(x) = |x|−x, find g of and fog.

(OR)

b] If A+B+C = π, prove that $\cos^2A + \cos^2B + \cos^2C = 1-2\cos A.\cos B.\cos C$

42) a] Resolve into partial fractions: $\frac{x^2+x+1}{x^2-5x+6}$

(OR)

b] In the binomial coefficients of $(1+x)^n$, the coefficients of the 5th, 6th and 7th terms are in A.P. Find all values of n.

43) a] By the principle of mathematical induction, prove that for n ≥ 1,

$$1^2+3^2+5^2+.....+(2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$$

(OR)

b] Prove that one of the straight lines given by $ax^2+2hxy+by^2 = 0$ will bisect the ange between the co-ordinate axes if $(a+b)^2 = 4h^2$

44) a] Prove that $|A| = \begin{vmatrix} (q+r)^2 & p^2 & p^2 \\ q^2 & (r+p)^2 & q^2 \\ r^2 & r^2 & (p+q^2) \end{vmatrix} = 2pqr\,(p+q+r)^3$

(OR)

b] Integrate: $\int \frac{2x+3}{\sqrt{x^2+x+1}}\,dx$

45) a] A quadrilateral is a parallelogram if and only if its diagonals bisect each other.

(OR)

b] If $y = \frac{\sin^{-1} x}{\sqrt{1-x^2}}$, show that $(1-x^2)y_2 - 3xy_1 - y = 0$

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46) a] Prove that $\lim_{x \to a} \frac{x^n - a^n}{x-a} = n.a^{n-1}$

(OR)

b] Integrate: $\tan^{-1}\left[\frac{8x}{1-16x^2}\right]$

47) a] Show that the vectors $5\hat{i}+6\hat{j}+7\hat{k}$, $7\hat{i}-8\hat{j}+9\hat{k}$, $3\hat{i}+20\hat{j}+5\hat{k}$ are coplanar.

(OR)

b] A firm manufactures PVC pipes in three plants viz X, Y and Z. The daily production volumes from the three firms X, Y and Z are respectively 2000 units, 3000 units and 5000 units. It is known from the past experience that 3% of the output from plant X, 4% from plant Y and 2% from plant Z are defective. A pipe is selected at random from a day's total production, if the selected pipe is a defective, then what is the probability that it was produced by plant Y?

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