

Tsi11M

Tenkasi District

Common First Revision Test - January 2025



13-01-25

Time: 3.00 Hours

Standard 11
MATHEMATICS

Marks: 90

PART - A

20×1=20

I. Choose the correct answer.

- 1) The value of the series $\frac{1}{2} + \frac{7}{4} + \frac{13}{8} + \frac{19}{16} + \dots$ is
 a) 14 b) 7 c) 4 d) 6
- 2) If the projection of $5\hat{i} - \hat{j} - 3\hat{k}$ on the vector $\hat{i} + 3\hat{j} + \lambda\hat{k}$ is same as the projection of $\hat{i} + 3\hat{j} + \lambda\hat{k}$ on $5\hat{i} - \hat{j} - 3\hat{k}$ then λ is equal to
 a) ± 4 b) ± 3 c) ± 5 d) ± 1
- 3) The value of x , for which the matrix $A = \begin{bmatrix} -x & 1 & 0 \\ 1 & -x & 1 \\ 0 & 1 & -x \end{bmatrix}$ is singular.
 a) $0, \pm 2$ b) $0, \pm \sqrt{2}$ c) $1 \pm \sqrt{2}$ d) $1, \sqrt{2}, \sqrt{3}$
- 4) $x \lim_{x \rightarrow 0} \frac{e^{\sin x} - 1}{x} =$
 a) 0 b) $1/e$ c) e d) 1
- 5) The equation of the line with slope 2 and the length of the perpendicular from the origin equal to $\sqrt{5}$ is
 a) $x + 2y = \sqrt{5}$ b) $2x + y = \sqrt{5}$ c) $2x - y = 5$ d) $x + 2y - 5 = 0$
- 6) If two events A and B are such that $P(\bar{A}) = \frac{3}{10}$ and $P(A \cap \bar{B}) = \frac{1}{2}$ then $P(A \cap B)$ is
 a) $1/2$ b) $1/3$ c) $1/4$ d) $1/5$
- 7) The number of 5 digit numbers all digits of which are odd is
 a) 5^6 b) 25 c) 625 d) 5^5
- 8) $\int \frac{\sec x}{\sqrt{\cos 2x}} dx =$
 a) $\tan^{-1}(\sin x) + c$ b) $2\sin^{-1}(\tan x) + c$
 c) $\tan^{-1}(\cos x) + c$ d) $\sin^{-1}(\tan x) + c$
- 9) If $y = \frac{1}{a-z}$, then $\frac{dz}{dy}$ is
 a) $(a-z)^2$ b) $-(z-a)^2$ c) $(z+a)^2$ d) $-(z+a)^2$
- 10) If $n((A \times B) \cap (A \times C)) = 8$ and $n(B \cap C) = 2$, then $n(A)$ is
 a) 6 b) 4 c) 8 d) 16
- 11) The maximum 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
- 12) $a^2 - ac_2 = a^2 - ac_4$ then the value of 'a' is
 a) 2 b) 3 c) 4 d) 5
- 13) $x \lim_{x \rightarrow \infty} \left(\frac{x^2 + 5x + 3}{x^2 + x + 3} \right)^x$ is
 a) e^3 b) e^4 c) 1 d) e^2

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- 14) The unit vector perpendicular to $\cos \theta \hat{i} + \sin \theta \hat{j}$ is
 a) $\hat{i} + \hat{j}$ b) \hat{k}
 c) $\cos \theta \hat{i} - \sin \theta \hat{j}$ d) $\cos \theta \hat{i} + \sin \theta \hat{j}$
- 15) Ten coins are tossed, the probability of getting atleast 8 heads is
 a) $7/64$ b) $7/32$ c) $7/16$ d) $7/128$
- 16) If the derivative of $(ax - 5)e^{3x}$ at $x = 0$ is -13 , then the value of a is
 a) 8 b) -2 c) 5 d) 2
- 17) If $A = \begin{bmatrix} a & x \\ y & a \end{bmatrix}$ and if $xy = 1$ then $\det(AA^T)$ is equal to
 a) $(a - 1)^2$ b) $(a^2 + 1)^2$
 c) $a^2 - 1$ d) $(a^2 - 1)^2$
- 18) If 8 and 2 are the roots of $x^2 + ax + c = 0$ and 3, 3 are the roots of $x^2 + dx + b = 0$ then the roots of the equation $x^2 + ax + b = 0$ are
 a) $-1, 2$ b) $9, 1$ c) $-1, 1$ d) $1, 2$
- 19) The value of $\sec^{-1}(-\sqrt{2})$ is
 a) $\pi/4$ b) $-\pi/4$ c) $3\pi/4$ d) $-3\pi/4$
- 20) $\int \tan x \, dx$ is
 a) $\log \cos x + c$ b) $\log \sec x + c$
 c) $\log \sin x + c$ d) $\log \cot x + c$

PART - B

7×2=14

II. Answer any 7 questions. Q.No.30 is compulsory.

- 21) Resolve : $\frac{3x+1}{(x-2)(x+1)}$ into partial fraction
- 22) Find $\frac{dy}{dx}$ is $y = e^x \sin x$
- 23) Find a unit vector along the direction of the vector $5\hat{i} - 3\hat{j} + 4\hat{k}$
- 24) Find the complete set of value of 'a' for which the quadratic $x^2 - ax + a + 2 = 0$ has equal roots.
- 25) Find the middle term in the expansion of $(x + y)^6$
- 26) The length of the perpendicular drawn from the origin to a line is 12 and makes an angle 150° with positive direction of the x - axis. Find the equation of the line.
- 27) Find the value of $\sin 150^\circ$ and $\cot (-1410^\circ)$
- 28) How many letter strings together can be formed with the letters of the word 'VOWELS' so that
 i) the strings begin with E
 ii) the strings begin with E and end with W
- 29) A die is Rolled. If it shown an even number, then find the probability of getting 6.
- 30) Evaluate : $x \lim_{x \rightarrow 1} \frac{(x + x^2 + x^3 + \dots + x^n) - n}{x - 1}$

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PART - C

7×3=21

III. Answer any 7 questions. Q.No.40 is compulsory.

31) Find the number of subsets of A if $A = \{x : x = 4n + 1, 2 \leq n \leq 5, n \in \mathbb{N}\}$ 32) Prove that
$$\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (x - y)(y - z)(z - x)$$
33) If $(n + 2)C_8 : (n - 2)P_4 = 57 : 16$ find 'n'34) Let $\vec{a}, \vec{b}, \vec{c}$ be unit vectors such that $\vec{a} \cdot \vec{b} = \vec{a} \cdot \vec{c} = 0$ and the angle between \vec{b} and \vec{c} is $\frac{\pi}{3}$. Prove that $\vec{a} = \pm \frac{2}{\sqrt{3}}(\vec{b} \times \vec{c})$ 35) If a, b, c are in geometric progression and if $a^{1/x} = b^{1/y} = c^{1/z}$, then Prove that x, y, z are in arithmetic progression36) Evaluate : $x \xrightarrow{4} 0 \frac{\sqrt{1+x^2} - 1}{x}$ 37) If $a \sin^2\theta + b \cos^2\theta = C$, show that $\tan^2\theta = \frac{c - b}{a - c}$ 38) Prove that one of the straight lines given by $ax^2 + 2hxy + by^2 = 0$ will bisect the angle between the co-ordinate axes if $(a+b)^2 = 4h^2$.39) If $y = \tan^{-1}\left(\frac{1+x}{1-x}\right)$, find 'y'40) Integrate : $\int x^3 \cos x \, dx$

PART - D

7×5=35

IV. Answer all the questions.

41) a) Let $f, g : \mathbb{R} \rightarrow \mathbb{R}$ be defined as $f(x) = 2x - |x|$ and $g(x) = 2x + |x|$ find $f \circ g$.

(OR)

b) Integrate $\int \frac{3x+5}{x^2+4x+7} dx$ 42) a) Prove that
$$\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = 4a^2b^2c^2$$

(OR)

b) Show that the equation $9x^2 - 24xy + 16y^2 - 12x + 16y - 12 = 0$ represents a pair of parallel lines. Find the distance between them.43) a) Show that the points whose position vectors $4\hat{i} + 5\hat{j} + \hat{k}, -\hat{j} - \hat{k}, 3\hat{i} + 9\hat{j} + 4\hat{k}$ and $-4\hat{i} + 4\hat{j} + 4\hat{k}$ are coplanar.

(OR)

b) A consulting firm rents car from three agencies such that 50% from agency L, 30% from agency M and 20% from agency N. If 90% of the cars from L, 70% of cars from M and 60% of the cars from N are in good conditions.

i) What is the probability that the firm will get a car in good condition?

ii) If a car is in good condition, what is probability, that it has come from agency N?

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44) a) If $A + B + C = \pi$, Prove that $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2 \cos A \cos B \cos C$.

(OR)

b) If $y = (\cos^{-1}x)^2$, prove that $(1-x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - 2 = 0$. Hence find y_2 when $x = 0$.

45) a) By the principle of Mathematical induction, prove that for $1.2 + 2.3 + 3.4 + \dots + n(n+1) = \frac{n(n+1)(n+2)}{3}$

(OR)

b) Find the value of $\sum_{n=1}^{\infty} \frac{1}{2n-1} \left(\frac{1}{9^{n-1}} + \frac{1}{9^{2n-1}} \right)$

46) a) Find the points of discontinuity of the function f , where

$$f(x) = \begin{cases} 4x + 5 & x \leq 3 \\ 4x - 5 & x > 3 \end{cases}$$

(OR)

b) An ΔABC , Prove that $\frac{a+b}{a-b} = \tan(A+B) \cot\left(\frac{A-B}{2}\right)$

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

(OR)

b) i) Integrate $\frac{x^{15}}{1+x^{12}}$ with respect to x

ii) If $P(A) = 0.5$, $p(B) = 0.8$ and $P(BA) = 0.8$ find $P(A/B)$.

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