Tsi11M

Tenkasi District

Second Revision Examination - February 2024

14-02-2024

Standard - 11

MATHEMATICS

Time: 3.00 Hours Maximum Marks: 90

I. Answer all questions: **20×1=20**

1) The value of $\log_{\sqrt{2}} 512$ is

a) 9 b) 16 c) 12 d) 18

2) The value of $\lim_{x \to \infty}\left(\frac{x^2+5x+3}{x^2+x+3}\right)^x$ is

a) e^3 b) e^4 c) 1 d) e^2

3) The value of tan 90° is

a) $\sqrt{3}/2$ b) 0 c) 1 d) ∞

4) If $\int f'(x)e^{x^2}dx = (x-1)e^{x^2} + c$ then f(x) is

a) x^3+4x^2+6x+c b) $2x^3 - \frac{x^2}{2} + x + c$

c) $\frac{2x^3}{3} - x^2 + x + c$ d) $\frac{x^3}{2} + 3x^2 + 4x + c$

5) If A and B are two events such that P(A) = 0.4, P(B) = 0.8 and $P(B/A) = 0.6$ then $P(\bar{A} \cap B)$ is

a) 0.56 b) 0.96 c) 0.66 d) 0.24

6) Two vertices of a Δ^{le} having position vectors $3\vec{i} + 4\vec{j} - 4\vec{k}$ and $2\vec{i} + 3\vec{j} + 4\vec{k}$. If the position vector of centroid is $\vec{i} + 2\vec{j} + 3\vec{k}$, then the position vector of third vertex is

a) $2\vec{i} - \vec{j} + 6\vec{k}$ b) $-2\vec{i} - \vec{j} + 9\vec{k}$ c) $-2\vec{i} + \vec{j} + 6\vec{k}$ d) $-2\vec{i} - \vec{j} - 6\vec{k}$

7) The value of x, for which the matrix $A = \begin{bmatrix} e^{x-2} & e^{7+x} \\ e^{x+2} & e^{2x+3} \end{bmatrix}$ is singular

a) 7 b) 9 c) 6 d) 8

8) The n^{th} term of the sequence $\frac{1}{2}, \frac{3}{4}, \frac{7}{8}, \frac{15}{16}, \ldots$ is

a) $2^{-n}+n-1$ b) 2^n-n+1 c) 2^{n-1} d) $1-2^{-n}$

9) The number of solutions of $x^2+|x-1| = 1$ is

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

10) The HM of two positive numbers whose AM and GM are 16, 8 respectively is

a) 10 b) 6 c) 5 d) 4

11) The intercepts of the perpendicular bisector of the line segement joining (1, 2) and (3, 4) with co-ordinate axes are

a) 5, −5 b) 5, 5 c) 5, 3 c) 5, −4

12) 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

13) If $\vec{a}$ and $\vec{b}$ have same magnitude and angle between them is 60° and their scalar product is $\frac{1}{2}$, then $|\vec{a}|$ is

a) 2 b) 3 c) 7 d) 1

14) $\int \tan^{-1}\left(\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}\right)dx =$

a) $X^2 + C$ b) $2X^2+c$ c) $\frac{X^2}{2}+c$ d) $-\frac{X^2}{2}+c$

15) In a certain college 4% of boys and 1% of girls are taller than 1.8 meter. Further 60% of students are girls. If a student is selected at random and is taller than 1.8 meters, then the probability that the student is a girl

a) $\frac{2}{11}$ b) $\frac{3}{11}$ c) $\frac{5}{11}$ d) $\frac{7}{11}$

16) The rule $f(x) = x^2$ is a bijection if the domain and co-domain are given by

a) $(0, \infty)$, R b) R, R c) $[0,\infty), [0,\infty)$ d) R, $(0, \infty)$

17) The points lie on the locus of $3x^2+3y^2-8x-12y+17 = 0$

a) (1, 2) b) (0, 0) c) (0, −1) d) (−2, 3)

18) Number of sides of a polygon having 44 diagonals is

a) 11 b) 4 c) 22 d) 4!

19) The value of $\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\ldots$ is

a) $\frac{e^2-1}{2e}$ b) $\frac{e^2+1}{2e}$ c) $\frac{(e+1)^2}{2e}$ d) $\frac{(e-1)^2}{2e}$

20) If $X = at^2$, $y = 2at$ then $\frac{dy}{dx} =$

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

II. Answer any Seven questions. Question No. 30 is compulsory. 7×2=14

21) If A = {1, 2, 3, 4}, B = {3, 4, 5, 6} Find $n[(A\cup B)\times(A\cap B)\times(A\Delta B)]$

22) Prove that $\log a + \log a^2 + \log a^3 + \ldots + \log a^n = \frac{n(n+1)}{2}\log a$

23) Evaluate the limit $\lim_{\sqrt{x}\to 3} \frac{x^2-81}{\sqrt{x}-3}$

24) If $A = \begin{bmatrix} 1 & -2 & 3 \\ 1 & 2 & 1 \\ X & 2 & -3 \end{bmatrix}$ is singular, find the value of X.

25) If ${}^{n}C_4 = 495$, find the value of n.

26) Express sin 50° + sin 20° as a product.

27) Find the equation of the line passing through the pts (1, 1) and (-2, 3)

28) Find the unit vector along the direction of the vector $5\vec{i} - 3\vec{j} + 4\vec{k}$

29) If two coins are tossed simultaneously, then find the probability of getting at the most two tails.

30) Resolve $\frac{3x+1}{(x-2)(x+1)}$ into partial fraction.

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

31) From the curve y = sin x, draw y = sin |x|

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

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

34) Evaluate: $\int\left[\frac{12}{(4x-5)^3} + \frac{6}{3X+2} + 16e^{4x+3}\right]dx$

35) Find the distance from a point (1, 2) to the line 5X+12y−3 = 0

36) Find the constant b that makes g continuous on (−∞, ∞) g(x) = $\begin{cases} x^2 - b^2, \text{if } x < 4 \\ bx + 20, \text{ if } x \geq 4 \end{cases}$

37) Find the value of the product $\begin{vmatrix} \log_3 64 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix} \times \begin{vmatrix} \log_2 3 & \log_8 3 \\ \log_3 4 & \log_3 4 \end{vmatrix}$

38) In how many ways 5 boys and 4 girls can be seated, so that no two girls are together?

39) Prove that $\vec{a}\times(\vec{b}+\vec{c})+\vec{b}\times(\vec{c}+\vec{a})+\vec{c}\times(\vec{a}+\vec{b})=\vec{0}$

40) Find the second derivative of log(log x) w.r.t. X.

IV. Answer all questions: **7×5=35**

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

(OR)

Evaluate: $\int \frac{2x+4}{x^2+4x+6}dx$

42) For what value of K does the equation $12x^2+2Kxy+2y^2+11x-5y+2 = 0$ represent two straight lines.

(OR)

Evaluate: $\lim_{x \to 0} \frac{\tan 2x}{\tan 5x}$

43) Derive cosine formula using the law of sines in a ΔABC.

(OR)

Find $\sqrt[3]{65}$ using binominal expansion upto 2 place decimals.

44) Show that the points whose position vectors $4\vec{i}+5\vec{j}+\vec{k}$, $-\vec{j}-\vec{k}$, $3\vec{i}+9\vec{j}+4\vec{k}$ and $-4\vec{i}+4\vec{j}+4\vec{k}$ are coplanar.

(OR)

Using the mathematical induction show that for any natural no. n

$$\frac{1}{1.2.3}+\frac{1}{2.3.4}+\frac{1}{3.4.5}+\dots+\frac{1}{n(n+1)(n+2)}=\frac{n(n+3)}{4(n+1)(n+2)}$$

45) If A+B+C = 180° prove that $\tan\frac{A}{2}\tan\frac{B}{2}+\tan\frac{B}{2}\tan\frac{C}{2}+\tan\frac{C}{2}\tan\frac{A}{2}=1$

(OR)

How many ways 4 mathematics books, 3 physics books, 2 chemistry books and 1 biology book can be arranged on a shelf so that all books of the same subjects are together.

46) If $y=\sin^{-1}\frac{1}{2}\left(\sqrt{1+x}+\sqrt{1-x}\right)$ then show that $\frac{dy}{dx}=\frac{-1}{2\sqrt{1-x^2}}$

(OR)

Express the matrix $A=\begin{bmatrix}1 & 3 & 5\\ -6 & 8 & 3\\ -4 & 6 & 5\end{bmatrix}$ as the sum of symmetric and skew-symmetric matrices.

47) There are two identical urns containing respectively 6 black and 4 red balls, 2 black and 2 red balls. An urn is chosen at random and a ball is drawn from it. Find the probability that the ball is black.

(OR)

Solve: $3x^2+5x-2\leq 0$

SIVAKUMAR.M,
Sai Ram Matric HSS
Vallam-627809
Tenkasi Dist.