N K MATHS ACADEMY, TIRUPUR

50% PORTION TEST VOL 2

11th Standard

MATHEMATICS

Exam Time : 03:00:00 Hrs Total Marks : 90

I CHOOSE THE BEST ANSWER: 20 x 1 = 20

1) If A=$\begin{bmatrix}1 & -1\\ 2 & -1\end{bmatrix}$,B=$\begin{bmatrix}a & 1\\ b & -1\end{bmatrix}$ and $(A+B)^2=A^2+B^2$, then the values of a and b are

(a) a = 4, b =1 (b) a =1, b = 4 (c) a = 0, b = 4 (d) a = 2, b = 4

2) If A is a square matrix, then which of the following is not symmetric?

(a) $A+A^T$ (b) AA^T (c) A^TA (d) $A-A^T$

3) If $\triangle=\begin{vmatrix}a & b & c\\ x & y & z\\ p & q & r\end{vmatrix}$,then $\begin{vmatrix}ka & kb & kc\\ kx & ky & kz\\ kp & kq & kr\end{vmatrix}$ is

(a) $\triangle$ (b) $k\triangle$ (c) $3k\triangle$ (d) $k^3\triangle$

4) The value of $\overrightarrow{AB}+\overrightarrow{BC}+\overrightarrow{DA}+\overrightarrow{CD}$ is

(a) $\overrightarrow{AD}$ (b) $\overrightarrow{CA}$ (c) $\vec{0}$ (d) $-\overrightarrow{AD}$

5) A vector $\overrightarrow{OP}$ makes 60° and 45° with the positive direction of the x and y axes respectively. Then the angle between $\overrightarrow{OP}$ and the z-axis is

(a) 45° (b) 60° (c) 90° (d) 30°

6) If $\vec{a},\vec{b},\vec{c}$ are the position vectors of three collinear points, then which of the following is true?

(a) $\vec{a}=\vec{b}+\vec{c}$ (b) $2\vec{a}=\vec{b}+\vec{c}$ (c) $\vec{b}=\vec{c}+\vec{a}$ (d) $4\vec{a}+\vec{b}+\vec{c}=0$

7) If $|\vec{a}+\vec{b}|=60$, $|\vec{a}-\vec{b}|=40$ and $|\vec{b}|=46$, then $|\vec{a}|$ is

(a) 42 (b) 12 (c) 22 (d) 32

8) $lim_{\theta\to 0}\frac{Sin\sqrt{\theta}}{\sqrt{sin\theta}}$

(a) 1 (b) -1 (c) 0 (d) 2

9) $lim_{x\to o}\frac{8^x-4^x-2^x+1^x}{x^2}=$

(a) 2 log 2 (b) $2(\log 2)^2$ (c) log 2 (d) 3 log 2

10) The function $f(x)=\begin{cases}\frac{x^2-1}{x^3+1} & x\neq -1\\ P & x=-1\end{cases}$ is not defined for x = −1. The value of f(−1) so that the function extended by this value is continuous is

(a) $\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) 1 (d) 0

11) $\frac{d}{dx}(\frac{2}{\pi}sin\ x^o)$ is

(a) $\frac{\pi}{180}cos\ x^o$ (b) $\frac{1}{90}cos\ x^o$ (c) $\frac{\pi}{90}cos\ x^o$ (d) $\frac{2}{\pi}cos\ x^o$

12) If $y=\cos(\sin x^2)$,then $\frac{dy}{dx}$ at $x=\sqrt{\frac{\pi}{2}}$ is

(a) -2 (b) 2 (c) $-2\sqrt{\frac{\pi}{2}}$ (d) 0

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

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

14) The number of points in **R** in which the function $f(x)=|x-1|+|x-3|+sin\ x$ is not differentiable, is

(a) 3 (b) 2 (c) 1 (d) 4

15) $\int\frac{e^x(1+x)}{cos^2(xe^x)}dx$ is

(a) $\cot(xe^x)+c$ (b) $\sec(xe^x)+c$ (c) $\tan(xe^x)+c$ (d) $\cos(xe^x)+c$

16) $\int tan^{-1}\sqrt{\frac{1-cos\ 2x}{1+cos\ 2x}}dx$ is

(a) x^2+c (b) $2x^2+c$

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

17) $\int \sqrt{\frac{1-x}{1+x}}dx$ is

(a) $\sqrt{1-x^2}+sin^{-1}x+c$ (b) $sin^{-1}x-\sqrt{1-x^2}+c$ (c) $log|x+\sqrt{1-x^2}|-\sqrt{1-x^2}+c$ (d) $\sqrt{1-x^2}+log|x+\sqrt{1-x^2}|+c$

18) A man has 3 fifty rupee notes, 4 hundred rupees notes, and 6 five hundred rupees notes in his pocket. If 2 notes are taken at random, what are the odds in favour of both notes being of hundred rupee denomination?

(a) 1:12 (b) 12:1 (c) 13:1 (d) 1:13

19) If X and Y be two events such that P(X/Y) = $\frac{1}{2}$, $P(Y/X)=\frac{1}{3}$ and $P(X\cap Y)=\frac{1}{6}$, then P(X∪Y) is

(a) $\frac{1}{3}$ (b) $\frac{2}{5}$ (c) $\frac{1}{6}$ (d) $\frac{2}{3}$

20) The probability of two events A and B are 0.3 and 0.6 respectively. The probability that both A and B occur simultaneously is 0.18. The probability that neither A nor B occurs is

(a) 0.1 (b) 0.72 (c) 0.42 (d) 0.28

II. ANSWER ANY 7 QUESTIONS (Q.NO 30 IS COMPULSORY) 7 x 2 = 14

21) Find the value of x if $\begin{vmatrix} x-1 & x & x-2 \\ 0 & x-2 & x-3 \\ 0 & 0 & x-3 \end{vmatrix}=0$

22) Find the area of the triangle whose vertices are (0, 0), (1, 2) and (4, 3).

23) Prove that the relation R defined on the set V of all vectors by '$\vec{a}R\vec{b}\ if \vec{a}=\vec{b}$ is an equivalence relation on V.

24) Find the area of the parallelogram whose adjacent sides are $\vec{a}=3\hat{i}+\hat{j}+4\hat{k}$ and $\vec{b}=\hat{i}-\hat{j}+\hat{k}$.

25) Calculate $lim_{x\to -1}(x^2-3)^{10}$

26) Differentiate the following with respect to x :$y=\frac{cos\ x}{x^3}$

27) Differentiate : y = $e^{\sin x}$.

28) Integrate the function with respect to x: $e^{-3x}cos\ x$

29) If A and B are two events such that $P(A\cup B)=\frac{5}{6}, P(A\cap B)=\frac{1}{3}, P(\bar{B})=\frac{1}{2}$ show that A and B are independent.

30) Examine the continuity of the following:$\frac{|x-2|}{|x+1|}$

III . ANSWER ANY 7 QUESTIONS (Q.NO 40 IS COMPULSORY) 7 x 3 = 21

31) Without expanding the determinant, prove that $\begin{vmatrix} s & a^2 & b^2+c^2 \\ s & b^2 & c^2+a^2 \\ s & c^2 & a^2+b^2 \end{vmatrix}=0$

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

33) Show that the vectors $\vec{a}=2\hat{i}+3\hat{j}+6\hat{k}, \vec{b}=6\hat{i}+2\hat{j}-3\hat{k}$, and $\vec{c}=3\hat{i}-6\hat{j}+2\hat{k}$ are mutually orthogonal.

34) Verify the existence of $lim_{x\to 1}f(x)$, where $f(x)=\begin{cases}\frac{|x-1|}{x-1}, & \text{for } x\neq 1\\ 0, & \text{for } x=1\end{cases}$

35) Evaluate : $lim_{x\to\infty}(\frac{x+2}{x-2})^x$.

36) Find f'(x)if f(x)=$\cos^{-1}(4x^3-3x)$.

37) Find the derivative of $\sin^{-1}(\frac{2x}{1+x^2})$ with respect to $\tan^{-1}x$.

38) Evaluate:$\int \frac{1-cos\ x}{1+cos\ x}dx$

39) If D and E are the midpoints of the sides AB and AC of a triangle ABC, prove that $\overrightarrow{BE}+\overrightarrow{DC}=\frac{3}{2}\overrightarrow{BC}$.

40) Urn-I contains 8 red and 4 blue balls and urn-II contains 5 red and 10 blue balls. One urn is chosen at random and two balls are drawn from it. Find the probability that both balls are red.

IV .ANSWER THE FOLLOWING 7 x 5 = 35

41) a) If ABCD is a quadrilateral and E and F are the midpoints of AC and BD respectively, then prove that $\overrightarrow{AB}$ + $\overrightarrow{AD}$ +$\overrightarrow{CB}$+$\overrightarrow{CD}$ = 4$\overrightarrow{EF}$.

(OR)

b) If $\vec{a}, \vec{b}, \vec{c}$ are position vectors of the vertices A, B, C of a triangle ABC, show that the area of the triangle ABC is $\frac{1}{2}|\vec{a} \times \vec{b} + \vec{b} + \vec{c} + \vec{c} \times \vec{a}|$ .Also deduce the condition for collinearity of the points A, B, and C.

42) a) A function f is defined as follows :

$$f(x)=\begin{cases} 0, & for\ x < 0; \\ x, & for\ 0 \le x < 1; \\ -x^2 + 4x - 2, & for\ 1 \le x < 3; \\ 4 - x, & for\ x \ge 3 \end{cases}$$

Is the function continuous?

(OR)

b) Differentiate $(2x + 1)^5 (x^3 - x + 1)^4$.

43) a) Differentiate: $y = \frac{x^{\frac{3}{4}}\sqrt{x^2+1}}{(3x+2)^5}$

(OR)

b) Find the derivative of the $y = x^{\log x} + (\log x)^x$

44) a) A problem in Mathematics is given to three students whose chances of solving A problem in Mathematics is given to three students whose chances of solving $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{5}$ (i) What is the probability that the problem is solved? (ii) What is the probability that exactly one of them will solve it?

(OR)

b) A factory has two machines I and II. Machine I produces 40% of items of the output and Machine II produces 60% of the items. Further 4% of items produced by Machine I are defective and 5% produced by Machine II are defective. An item is drawn at random. If the drawn item is defective, find the probability that it was produced by Machine II.

45) a) Evaluate $\int \frac{x+3}{(x+2)^2(x+1)}dx$

(OR)

b) Evaluate the integral $\int \frac{5x-7}{\sqrt{3x-x^2-2}}dx$

46) a) Find the derivative of the If cos (xy) = x, show that $\frac{dy}{dx} = \frac{-(1+y\ sin(xy))}{x\ sin\ xy}$

(OR)

b) If $y=e^{\tan^{-1}x}$, Show that $(1+x^2)y''+(2x-1)y'=0$.

47) a) Using Factor Theorem, prove that $\begin{vmatrix} x+1 & 3 & 5 \\ 2 & x+2 & 5 \\ 2 & 3 & x+4 \end{vmatrix}$ =$(x-1)^2(x+9)$

(OR)

b) If $\begin{vmatrix} a & b & a\alpha+b \\ b & c & b\alpha+c \\ a\alpha+b & b\alpha+c & 0 \end{vmatrix} = 0.$ prove that a, b, c are in G.P. or α is a root of $ax^2 + 2bx + c = 0$.

ALL THE BEST

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