Question Updated

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SNS ACADEMY

SPLIT 2

12th Standard

Date : 20-Dec-22

Reg.No. :

Maths

Exam Time : 00:03:00 Hrs **Total Marks : 80**

20 x 1 = 20

1) Let f(x) = $\begin{vmatrix} cos\ x & 2\ sin\ x & sin\ x \\ x & x & x \\ 1 & 2x & x \end{vmatrix}$, then $\lim_{x \to 0} \frac{f(x)}{x^2}$ is equal to

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

2) If A and B are invertible matrices, then which of the following is not correct?

(a) $\text{adj } A = |A| \cdot A^{-1}$ (b) $\det(A)^{-1} = [\det(A)]^{-1}$ (c) $(AB)^{-1} = B^{-1}A^{-1}$ (d) $(A+B)^{-1} = B^{-1} + A^{-1}$

3) If y = $\tan^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{1}{1+x^4}$ (b) $\frac{-2x}{1+x^4}$ (c) $\frac{-1}{1+x^4}$ (d) $\frac{x^2}{1+x^4}$

4) The function f(x) = $\begin{cases} \frac{e^{1/x}-1}{e^{1/x}+1}, x \neq 0 \\ 0 \quad\quad x = 0 \end{cases}$

(a) is continuous at x = 0 (b) Continuous everywhere (c) Not continuous at x = 0 but can be made continuous (d) Not continuous at x = 0

5) If $y = \sqrt{3x+2} + \frac{1}{\sqrt{2x^2+4}}$,then $\frac{dy}{dx}$ is equal to

(a) $\frac{3}{2\sqrt{3x+2}} - \frac{2x}{(2x^2+4)^{3/2}}$ (b) $\frac{3}{2\sqrt{3x+2}} + \frac{2x}{(2x^2+4)^{3/2}}$ (c) $\frac{3}{2\sqrt{3x+2}} + \frac{2}{(2x^2+4)^{3/2}}$ (d) None of the above

6) The side of an equilateral triangle is increasing at the rate of 2 cm/s. The rate at which area increases when the side is 10 is

(a) 10 cm²/s (b) $\sqrt{3}$ cm²/s (c) 10 $\sqrt{3}$ cm²/s (d) $\frac{10}{3}$cm²/s

7) The interval on which the function $f(x) = 2x^3 + 9x^2 + 12x - 1$ is decreasing is

(a) $[-1, \infty)$ (b) $[-2, -1]$ (c) $(-\infty, -2]$ (d) [-1,1]

8) Which of the following function is decreasing on $\left(0, \frac{\pi}{2}\right)$?

(a) cos x (b) -cos 2x (c) cos 3x (d) tan x

9) If the magnitude of the position vector $\vec{a} = x\hat{i} + 2\hat{j} - 2x\hat{k}$ is 7, the value of x is:

(a) ±1 (b) ±5 (c) ±3 (d) ±2

10) For any two vectors a and b

(a) |a – b| ≥ |a| – |b| (b) |a – b| = |a| – |b| (c) |a + b| ≤ |a – |b| (d) |a – b| = |a + b|

11) If $|\vec{a}| = 10, |\vec{b}| = 2$ and $\vec{a} \cdot \vec{b} = 12$ 12,then the value of $|\vec{a} \times \vec{b}|$ is

(a) 5 (b) 10 (c) 14 (d) 16

12) If $|\vec{a} + \vec{b}| =| \vec{a} - \vec{b}$, then

(a) $\vec{a}$ is parallel to $\vec{b}$ (b) $\vec{a}$ is perpendicular to $\vec{b}$ (c) $|\vec{a}| = |\vec{b}|$ (d) $\vec{a} = \vec{b}$

13) If the direction cosines of a line are $\frac{k}{3}, \frac{k}{3}, \frac{k}{3}$ then value of k is

(a) k > 0 (b) 0 < k < 1. (c) k = $\frac{1}{3}$ (d) k = ± 73

14) If l, m , n are the direction cosines of any line, then sum of the squares of the direction cosines of the line is always

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

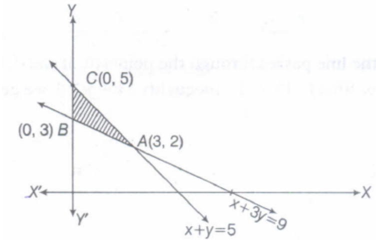
15) The equation of straight line passing through the point (a, b, c) and parallel to Z-axis is

(a) $\frac{x-a}{1} = \frac{y-b}{1} = \frac{z-c}{0}$ (b) $\frac{x-a}{0} = \frac{y-b}{1} = \frac{z-c}{1}$ (c) $\frac{x-a}{1} = \frac{y-b}{0} = \frac{z-c}{0}$ (d) $\frac{x-a}{0} = \frac{y-b}{0} = \frac{z-c}{1}$

16) Feasible region is the set of points which satisfy

(a) the objective functions (b) some of the given constraints (c) all of the given constraints (d) none of these

17) The feasible region for an LPP is shown in the following figure. Then, the minimum value of Z = 11x + 7y is



(a) 21 (b) 47 (c) 20 (d) 31

18) If $P(\dot{A}) = \frac{4}{5}$ and $P(A \cap B) = \frac{7}{10}$,then P(B/ A) is

(a) $\frac{1}{10}$ (b) $\frac{1}{8}$ (c) $\frac{7}{8}$ (d) $\frac{17}{20}$

19) The events $E_1, E_2, \ldots, E_n$ represent a partition of the sample space S, if

(a) $E_i \cap E_j = \phi, i \neq j, i, j = 1, 2, 3, \ldots, n$ (b) $E_1 \cup E_2 \cup \ldots \cup E_n = S$ (c) $P(E_i) > 0$ for all $i = 1, 2, 3, \ldots, n$

(d) All of the above

20) Two events A and B are said to be independent if

(a) $P(A \cup B) = P(A)P(B)$ (b) $P(A \cap B) = 0$ (c) $P(A \cap B) = P(A)P(B)$ (d) none of these

6 x 2 = 12

21) If $A = \begin{vmatrix} 6 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{vmatrix}$, then show that |2A|=8|A|:

22) Show that $f(x) = \frac{x}{\sin x}$ is increasing on $\left(0, \frac{\pi}{2}\right)$

23) Find a vector of magnitude 9, which is perpendicular to both the vectors $4\hat{i} - \hat{j} + 3\hat{k}$ and $-2\hat{i} + \hat{j} - 2\hat{k}$.

24) Find the vector equation of the line which is parallel to the vector $3\hat{i} - 2\hat{j} + 6\hat{k}$ and which passes through the point (1, - 2, 3).

25) a) If P(E) =$\frac{6}{11}$, P(F) =$\frac{5}{11}$ and P(E∪F)=$\frac{7}{11}$ then find (a) P(E/F), (b) P(F/E)

(OR)

b) If P(A)=$\frac{2}{5}$, $P(B) = \frac{1}{3}, P(A \cap B) = \frac{1}{5}$, then find $P(\bar{A}/\bar{B})$.

13 x 3 = 39

26) Find the area of the triangle whose vertices are $P(-1, 2, -1), Q(3, -1, 2)$ and $R(2, 3, -1)$.

27) Find the equations of the line passing through the point(-1,3,-2) and perpendicular to the lines:
$\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and $\frac{x+2}{-3} = \frac{y-1}{2} = \frac{z+1}{5}$

28) a) $If \quad cos \quad y = x \quad cos\,(a+y)\,, \quad prove \quad that \quad \frac{dy}{dx} = \frac{cos^2(a+y)}{sin \quad y}$

(OR)

b) If $y = e^{ax} cos \quad bx$ then $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} + \left(a^2 + b^2\right) y = 0$

29) a) Find absolute maximum and minimum values of a function f given by
$f(x) = 12x^{4/3} - 6x^{1/3}, x \in [-1, 1]$

(OR)

b) Show that the function f(x) = $4x^3$- $18x^2$ + 27x - 7 is always increasing on R.

30) Three machines E_1,E_2,E_3 in a certain factory produce 50%,25% and 25% respectively of the total daily output of electric tubes.It is known that 4% of the tubes produced by each of machines E_1 and E_2 are defective,and that 5% of theose produced on E_3 are defective.If one tube is picked up at random from a day's production,calculate tha probability that it is defective.

31) a) Solve the following linear programming problem graphically: Minimise Z = 200 x + 500 y subject to the constraints
$x + 2y \geq 10,$
$3x + 4y \leq 24,$
$x \geq 0, y \geq 0.$

(OR)

b) Solve the system of linear equations matrix method 4x - 3y = 3 and 3x - 5y = 7.

8 x 4 = 32

32) Find the shortest distance between the following pair of lines
$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}; \frac{x-2}{3} = \frac{y-3}{4} = \frac{z-5}{5}$

33) A bag contains 4 green and 6 white balls. Two balls are drawn one by one without replacement. If the second ball drawn is white, what is the probability that the first ball drawn is also white?

34) a) Show that the semi-vertical angle of the right circular cone of maximum volume and given slant height,is $\tan^{-1}\sqrt{2}$

(OR)

b) A square piece of tin of side 18 cm is to made into a box without top, by cutting a square from each corner and folding up the flaps to form the box. What should be the side of the square to cut off, so that the volume of the box is the maximum possible? Find maximum volume.

35) a)

If f(x)=$f(x) = \begin{cases} \frac{1-cos\quad 4x}{x^2} & , when \quad x<0 \\ a & , when \quad x=0 \\ \frac{\sqrt{x}}{(\sqrt{16+\sqrt{x}})-4} & , when \quad x>0 \end{cases}$ and function is continuous at x=0, find the value of a.

(OR)

b) Differentiate the following w.r.t. x or find $\frac{dy}{dx}$: $y = tan^{-1}\left[\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right]$

3 x 4 = 12

36) Shobhit's father wants to construct a rectangular garden using a brick wall on one side of the garden and wire fencing for the other three sides as shown in' figure. He has 200 ft of wire fencing.


Based on the above information, answer the following questions.

(i) To construct a garden using 200 ft of fencing, we need to maximise its

(a) volume(b) area(c) perimeter(d) length of the side

(ii) If x denote the length of side of garden perpendicular to brick wall and y denote the length, of side parallel to brick wall, then find the relation representing total amount of fencing wire.

(a) x+2y=150 (b) x+2y=50 (c) y+2x=200 (d) y+2x=100

(iii) Area of the garden as a function of x, say A(x), can be represented as

(a) 200 + 2x^2 (b) x - 2x^2 (c) 200x - 2x^2 (d) 200-x^2

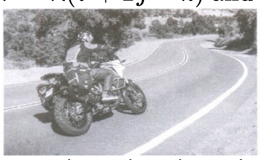
(iv) Maximum value of A(x) occurs at x equals

(a) 50 ft (b) 30 ft (c) 26ft (d) 31 ft

(v) Maximum area of garden will be

(a) 2500sq.ft(b) 4000sq.ft(c) 5000sq.ft(d) 6000 sq. ft

37) Two motorcycles A and B are running at the speed more than allowed speed on the road along the lines $\vec{r} = \lambda(\hat{i} + 2\hat{j} - \hat{k})$ and $\vec{r} = 3\hat{i} + 3\hat{j} + \mu(2\hat{i} + \hat{j} + \hat{k})$, respectively.




Based on the above information, answer the following questions.

(i) The cartesian equation of the line along which motorcycle A is running, is

(a) $\frac{x+1}{1} = \frac{y+1}{2} = \frac{z-1}{-1}$ **(b)** $\frac{x}{1} = \frac{y}{2} = \frac{z}{-1}$ **(c)** $\frac{x}{1} = \frac{y}{2} = \frac{z}{1}$ **(d) none of these**

(ii) The direction cosines of line along which motorcycle A is running, are

(a) < 1,-2,1 > (b) < 1,2,-1 > (c) $< \frac{1}{\sqrt{6}}, \frac{-2}{\sqrt{6}}, \frac{1}{\sqrt{6}} >$ **(d)** $< \frac{1}{\sqrt{6}}, \frac{2}{\sqrt{6}}, \frac{-1}{\sqrt{6}} >$

(iii) The direction ratios of line along which motorcycle B is running, are

(a) < 1,0,2 > (b) < 2,1,0 > (c) < 1, 1,2 > (d) < 2, 1, 1 >

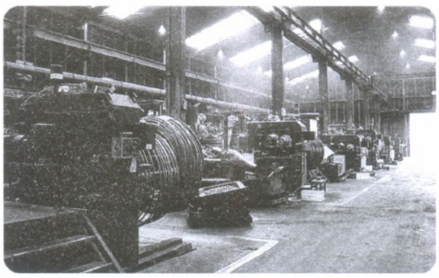
(iv) The shortest distance between the gives lines is

(a) 4 units (b) 2.$\sqrt{3}$ units (c) 3.$\sqrt{2}$ units (d) 0 units

(v) The motorcycles will meet with an accident at the point

(a) (-1,1,2) (b) (2,1, -1) (c) (1,2, -1) (d) does not exist

38) A factory has three machines A, Band C to manufacture bolts. Machine A manufacture 30%, machine B manufacture 20% and machine C manufacture 50% of the bolts respectively. Out of their respective outputs 5%, 2% and 4% are defective. A bolt is drawn at random from total production and it is found to be defective.



Based on the above information, answer the following questions.

(i) Probability that defective bolt drawn is manufactured by machine A, is

(a) $\frac{4}{13}$ **(b)** $\frac{5}{13}$ **(c)** $\frac{6}{13}$ **(d)** $\frac{9}{13}$

(ii) Probability that defective bolt drawn is manufactured by machine B, is

(a) 0.3 (b) 0.1 (c) 0.2 (d) 0.4

(iii) Probability that defective bolt drawn is manufactured by machine C, is

(a) $\frac{16}{39}$ **(b)** $\frac{17}{39}$ **(c)** $\frac{20}{39}$ **(d)** $\frac{15}{39}$

(iv) Probability that defective bolt is not manufactured by machine B, is

(a) $\frac{35}{39}$ **(b)** $\frac{61}{39}$ **(c)** $\frac{41}{39}$ **(d) none of these**

(v) Probability that defective bolt is not manufactured by machine C, is

(a) 0.03 **(b) 0.09** **(c) 0.5** **(d) 0.9**

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