MATHS

BOOKS - KUMAR PRAKASHAN KENDRA MATHS (GUJRATI ENGLISH)

BOARD'S QUESTION PAPER MARCH - 2020

Part A

1. Area bounded by curve

$y = \tan \pi x, x \in \left[-\frac{1}{4}, \frac{1}{4}\right]$ and X - axis is ....

A. $\frac{\log 2}{2\pi}$

B. $\frac{\log 2}{2}$

C. $\log 2$

D. $\frac{\log 2}{\pi}$

Answer: D

Watch Video Solution

2. If the area of the region bounded by two curves $y = x^2$ and $y = x^3$ is $\frac{k}{6}$ then k=.......

A. $\frac{1}{3}$

B. $\frac{1}{12}$

C. $\frac{1}{2}$

D. $\frac{1}{4}$

Answer: C

Watch Video Solution

3. Area bounded by the ellipse $\frac{x^2}{4} + \frac{y^2}{16} = 4$ is ....

A. 64π

B. 32π

C. 8π

D. $\frac{\pi}{64}$

Answer: B

Watch Video Solution

4. The order and degree of the differential equation $(y''')^3 + (y'')^4 + (y')^4 + y = 7$ are .... Respectively.

A. 4 and 1

B. 1 and 4

C. 3 and 3

D. 2 and 4

Answer: C

Watch Video Solution

5. The number of arbitrary constant the particular solution of a differential equation of order 4 will be ....

A. 0

B. 2

C. 4

D. 1

Answer: A

Watch Video Solution

6. Integrating factor of the differential equation $ydx - (x - 2y^2)dy = 0$ is .....

A. y

B. $-y$

C. $-\frac{1}{y}$

D. $\frac{1}{y}$

Answer: D

Watch Video Solution

7. Measure of the angle between the vector $\vec{a}=\hat{i}-\hat{j}+\hat{k}$ and $\vec{b}=\hat{i}+\hat{j}+\hat{k}$ is ....

A. $\sin^{-1}\frac{2\sqrt{2}}{3}$

B. $\pi-\cos^{-1}\frac{1}{3}$

C. $\cos^{-1}\frac{1}{\sqrt{3}}$

D. $\sin^{-1}\frac{1}{3}$

Answer: A

Watch Video Solution

8. If $\vec{a} = \hat{i} + 2\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} - 3\hat{k}$ then $\left(\vec{a} + \vec{b}\right).\left(\vec{a} - \vec{b}\right) = \ldots\ldots\ldots$

A. -2

B. -8

C. 8

D. 2

Answer: B

Watch Video Solution

9. Find the area of a parallelogram whose adjacent sides are given by the vectors $\vec{a} = 3\hat{i} + 5\hat{j} - 2\hat{k}$ and $\vec{b} = 2\hat{i} + \hat{j} + 3\hat{k}$.

A. $\frac{1}{2}\sqrt{507}$

B. $\sqrt{387}$

C. $\sqrt{507}$

D. 25

Answer: C

Watch Video Solution

10. Let $|\vec{x}| = |\vec{y}| = |\vec{x} + \vec{y}| = 1$ and if measure of the angle between $\vec{x}$ and $\vec{y}$ is α, then $\sin\alpha = \ldots\ldots$

A. $-\frac{1}{2}$

B. $\frac{\sqrt{3}}{2}$

C. $-\frac{\sqrt{3}}{2}$

D. 1

Answer: A

Watch Video Solution

11.

$\hat{i}.\left(\hat{k}\times\hat{j}\right)+\hat{j}.\left(\hat{i}\times\hat{k}\right)+\hat{k}.\left(\hat{j}\times\hat{i}\right)+\hat{i}.\left(\hat{i}\times\hat{j}\right)+\hat{j}.\left(\hat{j}\times\hat{k}\right)=$ ....

A. -1

B. 1

C. 3

D. -3

Answer: D

Watch Video Solution

12. For three vectors $\overrightarrow{a}, \overrightarrow{b}$ and $\overrightarrow{c}, \overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}=\overrightarrow{0}\left|\overrightarrow{a}\right|=3, \left|\overrightarrow{b}\right|=4, \left|\overrightarrow{c}\right|=5$, then evaluate $2\left(\overrightarrow{a}\cdot\overrightarrow{b}+\overrightarrow{b}\cdot\overrightarrow{c}+\overrightarrow{c}\cdot\overrightarrow{a}\right)$.

A. 100

B. 50

C. -25

D. -50

Answer: D

Watch Video Solution

13. If the lines $\frac{2x-5}{k}=\frac{y+2}{-5}=\frac{z}{1}$ and $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ are perpendicular to each other, then value of k is....................

A. -7

B. 14

C. 7

D. 26

Answer: B

Watch Video Solution

14. If the plane $2x+3y+4z=1$ intersects X-axis, Y-axis and Z-axis at the points A, B and C respectively, then the centroid of a ΔABC is ....

A. $\left(\frac{2}{3}, 1, \frac{4}{3}\right)$

B. $(6, .9, 12)$

C. $\left(\frac{1}{6}, \frac{1}{9}, \frac{4}{12}\right)$

D. $\left(\frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right)$

Answer: C

Watch Video Solution

15. Distance between the two planes $2x-2y+z=5$ and $6x-6y+3z=25$ is ...... Units.

A. $\frac{20}{9}$

B. $\frac{10}{9}$

C. $\frac{20}{3}$

D. 10

Answer: B

Watch Video Solution

16. The objective function of a linear programming problem is ....

A. a function to be optimized

B. a quadratic equation

C. a constant

D. an inequality

Answer: A

Watch Video Solution

17. The vertices of the feasible region determined by some linear constraints are $(0, 2), (1, 1), (3, 3), (1, 5)$. Let $Z = px + qy$ where $p, q > 0$. The condition on p and q so that the maximum of Z occurs at both the points (3, 3) and (1, 5) is ....

A. $p = q$

B. $p = 2q$

C. $q = 2p$

D. $p = 3q$

Answer: A

Watch Video Solution

18. If the vertices of a feasible region are $O(0, 0), A(10, 0), B(0, 20), C(15, 15)$, then minimum value of a objective function $Z = 10x - 20y + 30$ is..........

A. -120

B. 130

C. 30

D. -370

Answer: D

Watch Video Solution

19. If P(E) = 0.8, P(F) = 0.5 and $P(E \cap F) = 0.4$ then $P(E/F) = \ldots\ldots\ldots$

A. 0.80

B. 0.32

C. 0.64

D. 0.98

Answer: C

Watch Video Solution

20. A random variable X has the following probability distribution :

X	0	1	2	3	4
P(X)	0.1	k	$2k$	$2k$	0.15

then $P(X \leq 1) = \ldots\ldots\ldots$

A. 0.55

B. 0.25

C. 0.15

D. 0.75

Answer: B

Watch Video Solution

21. Choose the correct answer

The probability of obtaining an even prime number on each die, when a pair of dice is rolled is

A. $\frac{1}{36}$

B. 0

C. 1

D. $\frac{35}{36}$

Answer: A

Watch Video Solution

22. Let R be the relation on the set N given by $R = \{(a, b) : a = b - 2, b > 6\}$. Choose the correct answer.

A. $(6, 8) \in R$

B. $(3, 8) \in R$

C. $(2, 4) \in R$

D. $(8, 7) \in R$

Answer: A

Watch Video Solution

23. $a * b = \frac{ab}{1}$ defined on Q. Inverse of 0.001 is..........

A. 1000000

B. 10000

C. 100000

D. 1000

Answer: C

Watch Video Solution

24. For sets $S = \{\pi, \pi^2, \pi^3\}$ and $T = \{e, e^2, e^3\}$ if $F^{-1}: T \to S$ is defined as $F^{-1} = \{(e, \pi^3), (e^2, \pi^2), (e^2, \pi)\}$, then function $F = \ldots\ldots\ldots$

A. $\{(e^2, \pi), (e^3, \pi^2), (e, \pi^3)\}$

B. $\{(\pi, e^2), (\pi^3, e), (\pi^2, e^3)\}$

C. $\{(\pi^3, e), (\pi^2, e^2), (\pi, e^3)\}$

D. $\{(\pi, e), (\pi^2, e^2), (\pi^3, e^3)\}$

Answer: C

Watch Video Solution

25. $\sum_{i=0}^{2} \cot^{-1}\{-(i+1)\} = \ldots\ldots\ .$

A. $-\frac{5\pi}{2}$

B. $-\frac{3\pi}{2}$

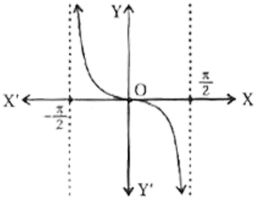
C. $\frac{\pi}{2}$

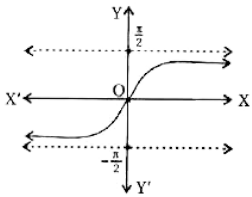
D. $\frac{5\pi}{2}$

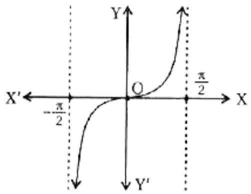
Answer: D

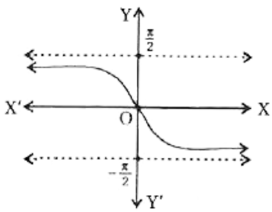
Watch Video Solution

26. Which of the following is a graph of $f(x) = \tan^{-1} x, (x \in R)$?

A. 

B. 

C. 

D. 

Answer: B

Watch Video Solution

27. $\sec^{-1}x + \cos ec^{-1}x + \cos^{-1}(x^{-1}) + \sin^{-1}(x^{-1}) = \ldots..$ (where $|x| \geq 1, x \in R$)

A. π

B. $\frac{3\pi}{2}$

C. $\frac{\pi}{2}$

D. 0

Answer: A

Watch Video Solution

28. $\cot\left\{\frac{2019\pi}{2} - \left(\cos ec^{-1}\frac{5}{3} + \tan^{-1}\frac{2}{3}\right)\right\} = \ldots..$

A. $\frac{17}{6}$

B. $\frac{19}{6}$

C. $-\frac{17}{6}$

D. $-\frac{19}{6}$

Answer: A

Watch Video Solution

29. Construct a 3×4 matrix, elements are given by $a_{ij} = |-3i + 4j|$.

Watch Video Solution

30. A is 3×3 matrix and det(A) $= 7$. IF B = adj A then det(AB)= ....

A. 7

B. 7^2

C. 7^5

D. 7^3

Answer: D

Watch Video Solution

31. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ and $A^2 - 5A = kI$ then $k = ...$

A. 5

B. 7

C. -7

D. -5

Answer: C

Watch Video Solution

32. Matrices X and Y are inverse of each other then........

A. $XY = I, YX = -I$

B. $XY = YX = -I$

C. $XY = YX = 0$

D. $X^{-1}Y^{-1} = Y^{-1}X^{-1} = I$

Answer: D

Watch Video Solution

33. If $\Delta = \begin{vmatrix} x+y+z^2 & x^2+y+z & x+y^2+z \\ z^2 & x^2 & y^2 \\ x+y & y+z & x+z \end{vmatrix}$, (where $(x \neq y \neq z) x, y, z \in R - \{0\}$) then $\Delta = \ldots\ldots.$

A. 0

B. 1

C. $x + y + z$

D. $x^2 + y^2 + z^2$

Answer: A

Watch Video Solution

34. For $\Delta = \begin{vmatrix} 2019 & 2020 & 2021 \\ 2022 & 2023 & 2024 \\ 2025 & 2026 & 2027 \end{vmatrix}$ sum of minor and cofactor of 2020 is.........

A. 4040

B. 0

C. 2020

D. -2020

Answer: B

Watch Video Solution

35. If area of triangle is 35 sq. units with vertices $(2, -6), (5, 4)$ and $(k, 4)$, then $k = \ldots\ldots\ldots$

A. $-12, -2$

B. -20

C. 1.2

D. $12, \ -2$

Answer: D

Watch Video Solution

36. Let the function f be defined by

$$f(x) = \begin{cases} cx+1, & \text{if } \ x \geq 3 \\ dx+3, & \text{if } \ x < 3 \end{cases}$$

If f is continuous at $x = 3$ then $d - c = \dots\dots .$

A. $-\frac{3}{2}$

B. $\frac{3}{2}$

C. $-\frac{2}{3}$

D. $\frac{2}{3}$

Answer: C

Watch Video Solution

37. Differentiate the functions $(x+3)^2.(x+4)^3.(x+5)^4$

A. $\frac{1}{y}\sum_{i=1}^{3}\frac{i-1}{(x+1-i)}$

B. $\frac{x}{y}\sum_{i=1}^{3}\frac{i+1}{(x+1+i)}$

C. $\frac{y}{x}\sum_{i=2}^{4}\frac{i}{(x+1-i)}$

D. $y\sum_{i=2}^{4}\left(\frac{i}{(x+1)+i}\right)$

Answer: D

Watch Video Solution

38. If $y=\log_e(\log_\pi x),(x>1)$ then $\frac{d^2y}{dx^2}=\ldots\ldots$

A. $-\frac{(x.\log_e x)^2}{\log_e(ex)}$

B. $\frac{\log_e(ex)}{(x.\log_e x)^2}$

C. $-\frac{\log_e(ex)}{(x.\log_e x)^2}$

D. $\frac{\log_e\left(\frac{e}{x}\right)}{\left(x.\log_\pi x\right)^2}$

Answer: C

Watch Video Solution

39. Find the point at which the tangent to the curve $y = \sqrt{4x-3} - 1$ has its slope $\frac{2}{3}$.

A. $\left(\frac{43}{16}, -\frac{7}{8}\right)$

B. $\left(\frac{43}{36}, \frac{1}{3}\right)$

C. $(3, 2)$

D. $(2, 3)$

Answer: B

Watch Video Solution

40. Approximate value of $\sqrt{0.081} = \ldots\ldots.$

A. 0.2866

B. 0.2850

C. 0.2867

D. 0.2845

Answer: D

Watch Video Solution

41. Function $f(x) = |\sin x|, x \in \left(-\frac{\pi}{2}, 0\right)$ is :

A. Only an increasing

B. Neither increasing nor decreasing

C. Strictly increasing

D. Strictly decreasing

Answer: D

Watch Video Solution

42. The local maximum value of $f(x) = x + \frac{1}{x}$ is ....

A. $\frac{1}{2}$

B. -2

C. 2

D. $-\frac{1}{2}$

Answer: B

Watch Video Solution

43. $\int\sqrt{\frac{\cos x - \cos^3 x}{1 - \cos^3 x}}dx = \ldots\ldots. + C.$ (where $x \in R - \left\{\frac{k\pi}{2} / k \in Z\right\}$)

A. $\frac{2}{3}\cos^{-1}\left(\sin^{\frac{3}{2}} x\right)$

B. $\frac{2}{3}\tan^{-1}\left(\cos^{\frac{3}{2}} x\right)$

C. $-\frac{2}{3}\sin^{-1}\left(\cos^{\frac{3}{2}} x\right)$

D. $\frac{2}{3}\sin^{-1}\left(\sin^{\frac{3}{2}} x\right)$

Answer: C

Watch Video Solution

44. If $\int\frac{1}{e^x+1}dx = px - q\log|1+e^x| + C$ then $p+q= \ldots\ldots\ldots\ldots$

A. 0

B. 2

C. -2

D. 1

Answer: B

Watch Video Solution

45. $\int e^{x^3} . 5^{x^2} . x . [2 \log 5 + 3x] dx = \dots\dots\dots + C.$

A. $e^{x^3} . 5^{x^2} . x$

B. $\frac{1}{6} . e^{x^3} . 5^{x^2}$

C. $\frac{1}{6} . e^{x^3} . 5^{x^2} . x$

D. $e^{x^3} . 5^{x^2}$

Answer: D

Watch Video Solution

46. $\int \frac{dx}{\sqrt{2x - x^2}} = \dots\dots\dots + C.$

A. $2 \sin^{-1}(x - 1)$

B. $\frac{1}{2} \sin^{-1}(x - 1)$

C. $\sin^{-1}(x - 1)$

D. $\log\left|(x-1)+\sqrt{2x-x^2}\right|$

Answer: C

Watch Video Solution

47. $\int_{-1}^{\sqrt{3}} \frac{dx}{1+x^2} = \ldots\ldots\ldots$

A. $\frac{7\pi}{12}$

B. $\frac{\pi}{6}$

C. $\frac{\pi}{12}$

D. $\frac{5\pi}{12}$

Answer: A

Watch Video Solution

48. $\int_0^{\pi} \cos^3 x . \sin^4 x dx = \ldots\ldots$

A. $-\pi$

B. 0

C. π

D. 2π

Answer: B

View Text Solution

49. $\int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} \sin^5 x \cos^2 x dx = \dots\dots\dots$

A. $\frac{1}{\sqrt{2}} - 1$

B. 0

C. $\left(\frac{\pi}{5}\right)^5 - \left(\frac{\pi}{6}\right)^2$

D. $\left(\frac{\pi}{6}\right)^2 - \left(\frac{\pi}{6}\right)^5$

Answer: B

View Text Solution

View Text Solution

50. $\int_0^2 f(x)dx = \ldots\ldots$, where $f(x) = \max\{x, x^2\}$.

A. $\frac{8}{3}$

B. $\frac{13}{6}$

C. $\frac{17}{6}$

D. $\frac{19}{6}$

Answer: A

Watch Video Solution

Part B Section A

1. Find the values of each of the following :

$\tan\frac{1}{2}\left[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}\right], |x| < 1, y > 0 \text{ and } xy < 1$

Watch Video Solution

2. If $y = 50e^{10x} + 60e^{-10x}$, prove that, $\frac{d^2y}{dx^2} = 100y$.

Watch Video Solution

3. Evaluate $\int_0^1 e^x dx$ as the limit of sum.

Watch Video Solution

4. Find the area between the curves $y = 2x \text{ and } y = x^2$.

Watch Video Solution

Part B Section B

1. Consider $f, R^{+} \rightarrow [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible with $f^{-1}(y) = \left(\frac{\left(\sqrt{y+6}\right) - 1}{3}\right)$, where R^{+} is the set of all non-negative real numbers.

Watch Video Solution

2. Express the matrix $A = \begin{bmatrix} 3 & -2 & 1 \\ 4 & 0 & 6 \\ -1 & 2 & 1 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrices.

Watch Video Solution

3. If $x = a(\cos t + t \sin t)$ and $y = a(\sin t - t \cos t)$, find $\frac{d^2y}{dx^2}$.

Watch Video Solution

4. A line makes angles α, β, γ and δ with the diagonals of a cube, prove that $\sin^2\alpha + \sin^2\beta + \sin^2\gamma + \sin^2\delta = \frac{8}{3}$.

Watch Video Solution

5. Find the equation of the line passing through $(1, 2, 3)$ and parallel to the planes $x - y + 2z - 5 = 0$ and $3x + y + z - 6 = 0$.

Watch Video Solution

6. Solve the following linear programming problem graphically. Subject to the constraints : $x \geq 0, y \geq 0, x + y \leq 50, 3x + y \geq 90$, obtain the maximum and minimum values of $Z = 5x + 10y$.

Watch Video Solution

7. If a fair coin is tossed 10 times, find the probability of

i) exactly 2 heads

ii) at least 9 heads

Watch Video Solution

Part B Section C

1. Find the global maximum and minimum values of the function f given by $f(x) = 2x^3 - 15x^2 + 36x + 1, x \in [1, 5]$.

Watch Video Solution

2. Show that of all rectangles inscribed in a given fixed circle, the square has the maximum area.

Watch Video Solution

3. Find: $\int \sqrt[3]{\tan x} dx$ (where $x \neq \frac{k\pi}{2}, k \in Z$)

Watch Video Solution

4. Obtain the particular solution of the differential equation:

$\left\{x \cos\left(\frac{y}{x}\right) + y \sin\left(\frac{y}{x}\right)\right\} y dx = \left\{y \sin\left(\frac{y}{x}\right) - x \cos\left(\frac{y}{x}\right)\right\} x dy$ where : $x = 2$ when $y = \frac{\pi}{2}$.

Watch Video Solution