Q1. Choose the correct answer in exercise: **2 Marks**

$\int \frac{x\,dx}{(x-1)(x-2)}$ equals:

A $\log\left|\frac{(x-1)^2}{x-2}\right| + C$

B $\log\left|\frac{(x-2)^2}{x-1}\right| + C$

C $\log\left|\left(\frac{x-1}{x-2}\right)^2\right| + C$

D $\log|(x-1)(x-2)| + c$

Q2. From the set {1, 2, 3, 4, 5}, two numbers a and b (a ≠ b) are chosen at random. The probability that $\frac{a}{b}$ is an integer is: **1 Mark**

A $\frac{1}{3}$ **B** $\frac{1}{4}$ **C** $\frac{1}{2}$ **D** $\frac{3}{5}$

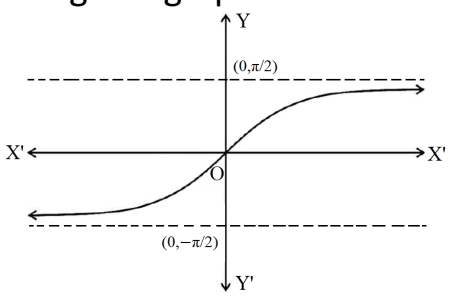
Q3. If f : R → R is defined as $f(x) = 2x - \sin x$, then f is: **1 Mark**

A a decreasing function
B an increasing function
C maximum at $x = \frac{\pi}{2}$
D maximum at x = 0

Q4. IfE and F are two events such that P(E) > 0 and P(F) ≠ 1, then $P\left(\frac{\overline{E}}{\overline{F}}\right)$ is: **1 Mark**

A $\frac{P(\overline{E})}{P(\overline{F})}$
B $1 - P\left(\frac{\overline{E}}{F}\right)$
C $1 - P\left(\frac{E}{F}\right)$
D $\frac{1-P(E \cup F)}{P(\overline{F})}$

Q5. The given graph illustrates:



A $y = \tan^{-1} x$
B $y = \text{cosec}^{-1} x$
C $y = \cot^{-1} x$
D $y = \sec^{-1} x$

Q6. The principal value of $\sin^{-1}\left(\cos\frac{43\pi}{5}\right)$ is: **1 Mark**

A $\frac{-7\pi}{5}$
B $\frac{\pi}{10}$
C $\frac{-\pi}{10}$
D $\frac{3\pi}{5}$

Q7. The distance of the point (2, 3, 4) from the plane $\vec{r}.(3\hat{i} - 6\hat{j} + 2\hat{k}) = -11$ **1 Mark**

A 0 units
B 1 units
C 2 units
D $\frac{15}{7}$ units

Q8. Let f(x) = |x|, x ∈ . R. Then, which of the following statements is incorrect? **1 Mark**

A f has a minimum value at x = 0.
B f has no maximum value in R.
C f is continuous at x = 0.
D f is differentiable at x = 0.

Q9. The length of the perpendicular drawn from the point (4, -7, 3) on the y-axis is: **1 Mark**

A 3 units **B** 4 units **C** 5 units **D** 7 units

Q10. If $f(x) = \begin{cases} \frac{\sin^2 as}{x^2}, & \text{if } x \neq 0 \\ 1, & \text{if } x = 0 \end{cases}$ is continuous at x = 0, then the value of 'a' is: **1 Mark**

A ±1 **B** -1 **C** 0 **D** 1

Q11. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sec^2 x \, dx$ is equal to: **1 Mark**

A -1 **B** 0 **C** 1 **D** 2

Q12. If f and g are two functions from R to R defined as $f(x) = |x| + x$ and $g(x) = |x| - x$, then fog (x) for x<0 is **1 Mark**

A 4x **B** 2x **C** 0 **D** -4x

Q13. The value of $\tan^{-1}\left[\frac{1}{2}\cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right]$ is: **1 Mark**

A $\frac{3+\sqrt{5}}{2}$ **B** $\frac{3-\sqrt{5}}{2}$
C $\frac{-3+\sqrt{5}}{2}$ **D** $\frac{-3-\sqrt{5}}{2}$

Q14. The value of $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$ is: **1 Mark**

A $\frac{\pi}{6}$ **B** $\frac{\pi}{2}$ **C** $\frac{\pi}{3}$ **D** $\frac{7\pi}{6}$

Q15. For what value of λ the projection of vector $\hat{i} + \lambda\hat{j}$ on vector $\hat{i} - \hat{j}$ is $\sqrt{2}$? **1 Mark**

A -1 **B** 1 **C** 0 **D** 3

Q16. The function f(x) = |x| - x is: **1 Mark**

A Continuous but not differentiable at x = 0. **B** Continuous and differentiable at x = 0.
C Neither continuous nor differentiable at x = 0. **D** Differentiable but not continuous at x = 0.

Q17. The distance of the origin (0, 0, 0) from the plane –2x + 6y – 3z = –7 is: **1 Mark**

A 1 unit **B** $\sqrt{2}$ unit
C $2\sqrt{2}$ unit **D** 3 unit

Q18. The function f: R → R given by f(x) = – |x – 1| is: **1 Mark**

A Continuous as well as differentiable at x = 1. **B** Not continuous but differentiable at x = 1.
C Continuous but not differentiable at x = 1. **D** Neither continuous nor differentiable at x = 1.

Q19. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{1}{x^2}\sin\left(\frac{1}{x}\right)dx$, wheere $x \neq 0$ is equal to: **1 Mark**

A -2 **B** 0 **C** 1 **D** π

Q20. If f(x) = {[x], x € R} is the greatest integer function, then the correct statement is: **1 Mark**

A f is continuous but not differentiable at x = 2. **B** f is neither continuous nor differentiable at x = 2.
C f is continuous as well as differentiable at x = 2. **D** f is not continuous but differentiable at x = 2.

Q21. If the sides AB and AC of ΔABC are represented by vectors $\hat{j} + \hat{k}$ and $3\hat{i} - \hat{j} + 4\hat{k}$ respectively, then the length of the median through A on BC is: **1 Mark**

A $2\sqrt{2}$units **B** $\sqrt{18}$units
C $\frac{\sqrt{34}}{2}$units **D** $\frac{\sqrt{48}}{2}$units

Q22. If f(x) = a(x - cos x) is strictly decreasing in R, then 'a' belongs to: **1 Mark**

A {0} **B** (0, ∞) **C** (-∞, 0) **D** (-∞, ∞)

Q23. **1 Mark**

If $\begin{bmatrix} 4+X & X-1 \\ -2 & 3 \end{bmatrix}$ is a singular matrix, then the value of x is:

A 0 **B** 1 **C** -2 **D** -4

Q24. If $\frac{d}{dx}(f(x)) = \log x$, then f(x) equals: **1 Mark**

A $-\frac{1}{x} + C$ **B** $x(\log x - 1) + C$

C $x(\log x + x) + C$ **D** $\frac{1}{x} + C$

Q25. If $\begin{bmatrix} x & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = 0$, then x equals: **1 Mark**

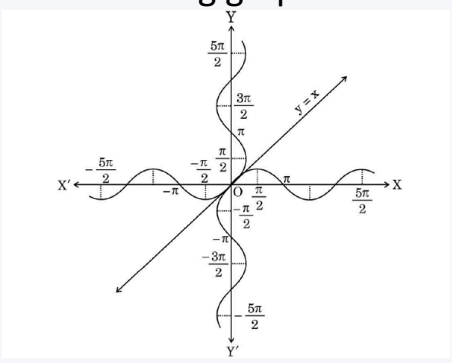
A 0 **B** -2 **C** -1 **D** 2

Q26. If $A = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 5 \end{bmatrix}$, then A is a/an: **1 Mark**

A scalar matrix **B** identity matrix

C symmetric matrix **D** skew-symmetric matrix

Q27. The following graph is a combination of: **1 Mark**



A $y = \sin^{-1} x$ and $y = \cos^{-1} x$ **B** $y = \cos^{-1} x$ and $y = \cos x$

C $y = \sin^{-1} x$ and $y = \sin x$ **D** $y = \cos^{-1} x$ and $y = \sin x$

Q28. If A is a square matrix of order 3 and |A| = 5, then the value of |2A'| is: **1 Mark**

A -10 **B** 10 **C** -40 **D** 40

Q29. The domain of the function $f(x) = \sin^{-1}(2x)$ is **1 Mark**

A $[0, 1]$ **B** $[-1, 1]$

C $\left[-\frac{1}{2}, \frac{1}{2}\right]$ **D** $[-2, 2]$

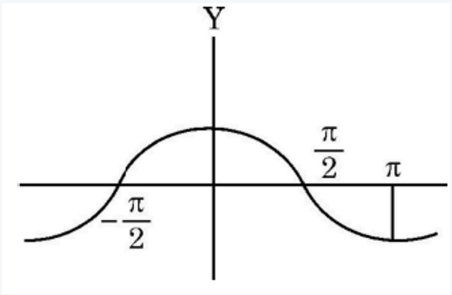
Q30. If $\int \frac{2^{\frac{1}{x}}}{x^2} dx = k\, 2^{\frac{1}{x}} + C$ then K is equal to. **1 Mark**

A $\frac{-1}{\log 2}$ **B** $-\log 2$ **C** -1 **D** $\frac{1}{2}$

Q31. For what value of k may the function $\begin{cases} k(3x^2 - 5x), & x \le 0 \\ \cos x, & x > 0 \end{cases}$ become continuous? **1 Mark**

A 0 **B** 1 **C** $-\frac{1}{2}$ **D** No value

Q32. The graph of a trigonometric function is as shown. Which of the following will represent graph of its inverse? **1 Mark**



A  **B**  **C**  **D** 

Q33. **1 Mark**

$\left[\sec^{-1}\left(-\sqrt{2}\right) - \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)\right]$ is equal to :

A $\frac{11\pi}{12}$ **B** $\frac{5\pi}{12}$ **C** $\frac{5\pi}{12}$ **D** $\frac{7\pi}{12}$

Q34. $\int \sqrt{1+\sin x}\,dx$ is equal to: **1 Mark**

A $2\left(-\sin\frac{x}{2}+\cos\frac{x}{2}\right)+C$ **B** $2\left(\sin\frac{x}{2}-\cos\frac{x}{2}\right)+C$

C $-2\left(\sin\frac{x}{2}+\cos\frac{x}{2}\right)+C$ **D** $2\left(\sin\frac{x}{2}+\cos\frac{x}{2}\right)+C$

Q35. If the direction cosines of a line are $\lambda, \lambda, \lambda,\ then\ \lambda$, is equal to: **1 Mark**

A $-\frac{1}{\sqrt{3}}$ **B** 1

C $\frac{1}{\sqrt{3}}$ **D** $\pm\frac{1}{\sqrt{3}}$

Q36. If $\begin{bmatrix} x & 2 \\ 3 & x-1 \end{bmatrix}$ is a singular matrix, then the product of all possible values of x is: **1 Mark**

A 6 **B** -6 **C** 0 **D** -7

Q37. The primitive of $\frac{2}{1+\cos 2x}$ is: **1 Mark**

A $\sec^2 x$ **B** $2\sec^2 x \tan x$ **C** $\tan x$ **D** $-\cot x$

Q38. The order and degree of the following differential equation are, respectively: $\frac{d^4y}{dx^4}+2e^{\frac{dy}{dx}}+y^2=0$ **1 Mark**

A -4,1 **B** 4, not defined **C** 1,1 **D** 4,1

Q39. $\int \frac{1}{x\log x}dx$ is equal to: **1 Mark**

A $\frac{(\log x)^2}{2}+c$ **B** $\log|\log x|+c$

C $\log|x\log x|+c$ **D** $\frac{1}{\log x}+c$

Q40. The matrix $\begin{bmatrix} 2 & -1 & 3 \\ \lambda & 0 & 7 \\ -1 & 1 & 4 \end{bmatrix}$ is not invertible for: **1 Mark**

A $\lambda=-1$ **B** $\lambda=0$

C $\lambda=1$ **D** $\lambda\in R-(1)$

Q41. If A and B are two square matrices of the same order, then (A + B) (A - B) is equal to: **1 Mark**

A $A^2 - AB + BA - B^2$ **B** $A^2 + AB - BA - B^2$

C $A^2 - AB - BA - B^2$ **D** $A^2 - B^2 + AB + BA$

Q42. The function $f(x)=\frac{x-1}{x(x^2-1)}$ is discontinuous at **1 Mark**

A Exactly one point. **B** Exactly two points. **C** Exactly three points. **D** No point.

Q43. If $A=\begin{bmatrix} 0 & 0 & -5 \\ 0 & 3 & 0 \\ 4.3 & 0 & 0 \end{bmatrix}$, then A is an: **1 Mark**

A skew-symmetric matrix **B** scalar matrix

C diagonal matrix **D** square matrix

Q44. If $A=\begin{bmatrix} -2 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -2 \end{bmatrix}$, then the value of |adj A| is **1 Mark**

A 64 **B** 16 **C** 0 **D** -8

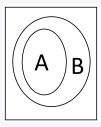
Q45. The principal value of $\tan^{-1}\left(\tan\frac{3\pi}{5}\right)$ is: **1 Mark**

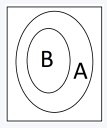
A $\frac{2\pi}{5}$ **B** $\frac{-2\pi}{5}$ **C** $\frac{3\pi}{5}$ **D** $\frac{-3\pi}{5}$

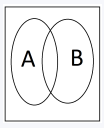
Q46. If $y = \sin^{-1} x, -1 \leq x \leq 0$, then the range of y is: **1 Mark**

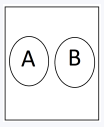
A $\left(\frac{-\pi}{2}, 0\right)$ **B** $\left[\frac{-\pi}{2}, 0\right]$
C $\left[\frac{-\pi}{2}, 0\right]$ **D** $\left(\frac{-\pi}{2}, 0\right]$

Q47. If A denotes the set of continuous functions and B denotes set of differentiable functions, then which of the following depicts the correct relation between set A and B? **1 Mark**

A 

B 

C 

D 

Q48. Questions are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion (A): The number of onto functions from a set P containing 5 elements to a set Q containing 2 elements is 30.

Reason (R): Number of onto functions from a set containing m elements to a set containing n elements is n^m.

A Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
B Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
C Assertion (A) is true and Reason (R) is false.
D Assertion (A) is false and Reason (R) is true.

Q49. If y = a cos (log x) + b sin (log),$x^2\ y_2 + \ x\ y_1$ then is: **1 Mark**

A cot (log x) **B** y **C** -y **D** tan (log x)

Q50. $\int_0^{\frac{\pi}{2}} \cos x \cdot e^{\sin x}\, dx$ is equal to: **1 Mark**

A 0 **B** 1-e **C** e-1 **D** e

Q51. If $\vec{P}$and $\vec{q}$ are unit vectors, then which of the following values of $\vec{P}.\ \vec{q}$ is not possible? **1 Mark**

A $\frac{-1}{2}$ **B** $\frac{1}{\sqrt{2}}$
C $\frac{\sqrt{3}}{2}$ **D** $\sqrt{3}$

Q52. If projection of $\vec{p} = \alpha\hat{i} + \hat{j} + 4\hat{k}$ on $\vec{b} = 2\hat{i} + 6\hat{j} + 2\hat{k}$ and passing through the point (4, -3, 7) is: **1 Mark**

A -13 **B** -5 **C** 13 **D** 5

Q53. A number is chosen randomly from numbers 1 to 60. The probability that the chosen number is a multiple of 2 or 5 is: **1 Mark**

A $\frac{2}{5}$ **B** $\frac{3}{5}$ **C** $\frac{7}{10}$ **D** $\frac{9}{10}$

Q54. If M and N are square matrices of order 3 such that det (M) = m and MN = mI, then det (N) is equal to: **1 Mark**

A -1 **B** 1 **C** $-m^2$ **D** m^2

Q55. Direction cosines of a line perpendicular to both x-axis and z-axis are: **1 Mark**

A 1, 0, 1 **B** 1, 1, 1 **C** 0, 0, 1 **D** 0, 1, 0

Q56. The line $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ is parallel to the plane: **1 Mark**

A $2x + 3y + 4z = 0$ **B** $3x + 4y - 5z = 7$
C $2x + y - 2z = 0$ **D** $x - y + z = 2$

Q57. The derivative of log x with respect to $\frac{1}{x}$ is **1 Mark**

A $-\frac{1}{x^3}$ **B** $-\frac{1}{x}$
C $-x$ **D** $\frac{1}{x}$

Q58. If A is a square matrix of order 2 such that det (A) = 4, then det (4 adj A) is equal to: **1 Mark**

A 16 **B** 64 **C** 256 **D** 512

Q59. ABCD is a rhombus whose diagonals intersect at E. Then $\overrightarrow{\mathrm{EA}}+\overrightarrow{\mathrm{EB}}+\overrightarrow{\mathrm{EC}}+\overrightarrow{\mathrm{ED}}$ equal: **1 Mark**

A $\vec{0}$ **B** $\overrightarrow{\mathrm{AD}}$

C $2\overrightarrow{\mathrm{BC}}$ **D** $2\overrightarrow{\mathrm{AD}}$

Q60. Let f $\mathrm{x}^2, \quad \mathrm{x} \in \mathrm{R}$ Then, which of the following statements is incorrect? **1 Mark**

A Minimum value of f does not exist. **B** There is no point of maximum value of fin R.

C f is continuous at x = 0. **D** fis differentiable at x = 0.

Q61. The value of k so that f defined by $\mathrm{f}(\mathrm{x})=\begin{cases}\mathrm{x}^2 \sin\left(\frac{1}{\mathrm{x}}\right) & \text{if} \quad \mathrm{x} \neq 0 \\ \mathrm{k} & \text{if} \quad \mathrm{x}=0\end{cases}$ is continuous at x = 0 is **1 Mark**

A 0 **B** $\frac{1}{2}$ **C** 1 **D** 2

Q62. If $\mathrm{P}(\mathrm{A})=\frac{1}{5}, \mathrm{P}(\mathrm{B})=\frac{3}{5}$ and $\mathrm{P}\left(\frac{\mathrm{A}}{\mathrm{B}}\right)=\frac{2}{5}$, then $\mathrm{P}(\mathrm{A}' \cap \mathrm{B}')$ is: **1 Mark**

A $\frac{11}{25}$ **B** $\frac{19}{25}$ **C** $\frac{8}{25}$ **D** $\frac{6}{25}$

Q63. Direction cosines of the line $\frac{\mathrm{x}-1}{2}=\frac{1-\mathrm{y}}{3}=\frac{2\mathrm{z}-1}{12}$ are: **1 Mark**

A $\frac{2}{7}, \frac{3}{7}, \frac{6}{7}$ **B** $\frac{2}{\sqrt{157}}, -\frac{3}{\sqrt{157}}, \frac{12}{\sqrt{157}}$

C $\frac{2}{7}, \frac{3}{7}, -\frac{6}{7}$ **D** $\frac{2}{7}, -\frac{3}{7}, \frac{6}{7}$

Q64. **Direction:** Question numbers 19 and 20 are Assertion (A) and Reason (R) based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and other labelled Reason (R). Select the correct answer from the options (A), (B), (C) and (D) as given below. **1 Mark**

Assertion (A): $\mathrm{f}(\mathrm{x})=\begin{cases}3\mathrm{x}\text{-}8, & \mathrm{x} \leq 5 \\ 2\mathrm{k}, & \mathrm{x}>5\end{cases}$ is continuous at x = 5 for $\mathrm{k}=\frac{5}{2}$.

Reason (R): For a function f to be continuous at $\mathrm{x}=\mathrm{a} \lim_{\mathrm{x} \to \mathrm{a}-} \mathrm{f}(\mathrm{x})=\lim_{\mathrm{x} \to \mathrm{a}^+} \mathrm{f}(\mathrm{x})=\mathrm{f}(\mathrm{a})$.

A Both Assertion (A) and Reason (R) are true and the Reason (R) is the correct explanation of the Assertion (A).

B Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

C Assertion (A) is true, but Reason (R) is false.

D Assertion (A) is false, but Reason (R) is true.

Q65. The function f defined by **1 Mark**

$$\mathrm{f}(\mathrm{x})=\begin{cases}\mathrm{x} & \text{if} \quad \mathrm{x} \leq 1 \\ 5, & \text{if} \quad \mathrm{x}>1\end{cases}$$

is not continuous at:

A x = 0 **B** x = 1 **C** x = 2 **D** x = 5

Q66. The two lines x = ay + b, z = cy + d; and x = a'y + b', z = c'y + d' are perpendicular to each other, if: **1 Mark**

A $\frac{\mathrm{a}}{\mathrm{a}'}+\frac{\mathrm{c}}{\mathrm{c}'}=1$ **B** $\frac{\mathrm{a}}{\mathrm{a}'}+\frac{\mathrm{c}}{\mathrm{c}'}=-1$

C $\mathrm{aa}'+\mathrm{cc}'=1$ **D** $\mathrm{aa}'+\mathrm{cc}'=-1$

Q67. The absolute maximum value of function f(x) = x3 - 3x + 2 in [0, 2] is: **1 Mark**

A 0 **B** 2 **C** 4 **D** 5

Q68. A cylindrical tank of radius 10cm is being filled with sugar at the rate of $100\pi \mathrm{cm}^3/\mathrm{s}$. The rate, at which the height of the sugar inside the tank is increasing, is: **1 Mark**

A 0.1cm/ s **B** 0.5 cm/ s **C** 1cm/ s **D** 1.1cm/ s

Q69. If $\begin{vmatrix}2\mathrm{X} & 5 \\ 12 & \mathrm{X}\end{vmatrix}=\begin{vmatrix}6 & -5 \\ 4 & 3\end{vmatrix}$,then the value of x is: **1 Mark**

A 3 **B** 7 **C** ± 7 **D** ± 3

Q70. **1 Mark**

The degree of the differential equation $x^2\frac{d^2y}{dx^2} = \left(x\frac{dy}{dx} - y\right)^3$ is

A 1 **B** 2 **C** 3 **D** 6

Q71. If a matrix has 36 elements, the number of possible orders it can have, is: **1 Mark**

A 13 **B** 3 **C** 5 **D** 9

Q72. If A and B are square matrices of same order, then (AB^T - BA^T) is a: **1 Mark**

A symmetric matrix **B** skew-symmetric matrix **C** null matrix **D** unit matrix

Q73. The number of corner points of the feasible region determined by the constraints $x - y \geq 0, 2y \leq x + 2, x \geq 0, y \geq 0$ is: **1 Mark**

A 2 **B** 3 **C** 4 **D** 5

Q74. If A and B are two events such that $P(B) = \frac{1}{5}, P(A|B) = \frac{2}{3}$ and $P(A \cup B) = \frac{3}{5}$, then P(A) is: **1 Mark**

A $\frac{10}{15}$ **B** $\frac{2}{15}$ **C** $\frac{1}{5}$ **D** $\frac{8}{15}$

Q75. If $ten^{-1} = (x^2 - y^{-2}) = a$, where 'a'is a constant, then $\frac{dy}{dx}$is: **1 Mark**

A $\frac{x}{y}$ **B** $\frac{x}{y}$
C $\frac{a}{x}$ **D** $\frac{a}{y}$

Q76. If $y = a\cos(\log x) + b\sin(\log x),$ then $x^2y_2 + x\,y_1$ is: **1 Mark**

A $\cot(\log x)$ **B** y
C -y **D** $\tan(\log x)$

Q77. The order of the differential equation of the family of circles touching x-axis at the origin is: **1 Mark**

A 1 **B** 2 **C** 3 **D** 4

Q78. The principal value of $\cot^{-1}(-\sqrt{3})$ is **1 Mark**

A $-\frac{\pi}{6}$ **B** $\frac{\pi}{6}$ **C** $\frac{2\pi}{3}$ **D** $\frac{5\pi}{6}$

Q79. $\left(\tan^{-1}\frac{7}{9} + \tan^{-1}\frac{1}{8}\right)$ is equal to **1 Mark**

A $\tan^{-1}\left(\frac{65}{72}\right)$ **B** $\tan^{-1}\left(\frac{63}{65}\right)$
C $\frac{\pi}{4}$ **D** $\frac{\pi}{2}$

Q80. If $|\vec{a}| = 4$ and $-3 \leq \lambda \leq 2$, then, $|\vec{\lambda}a|$ lies in: **1 Mark**

A [0, 12] **B** [2, 3] **C** [8, 12] **D** [–12, 8]

Q81. The principal value of $\sin^{-1}(\sin(-\frac{10\pi}{3}))$ is: **1 Mark**

A $-\frac{2\pi}{3}$ **B** $-\frac{\pi}{3}$ **C** $\frac{\pi}{3}$ **D** $\frac{2\pi}{3}$

Q82. The function f : R→[– 1, 1] defined by $f(x) = \cos x$ is **1 Mark**

A Both one-one and onto. **B** Not one-one, but onto.
C One-one, but not onto. **D** Neither one-one, nor onto.

Q83. Which of the following statements is true for the function $f(x) = \begin{cases} x + 3, & x \neq 0 \\ 1 & , \quad x = 0 \end{cases}$? **1 Mark**

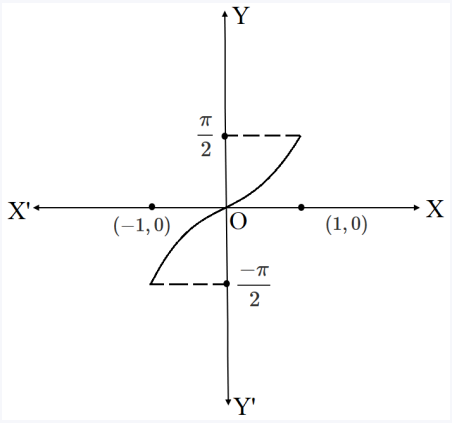
A f(x) is continuous and differentiable $\forall\, x \in \mathbb{R}$ **B** f(x) is continuous $\forall\, x \in \mathbb{R}$
C f(x) is continuous and differentiable $\forall\, x \in \mathbb{R} - (0)$ **D** f(x) is discontinuous at infinitely many points

Q84. **1 Mark**

If $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ nd (31 + 4A) (3I + 4A) = x^2I, then the value(s) x is/ are:

A $\pm\sqrt{7}$ **B** 0 **C** ± 5 **D** 25

Q85. Study the given graph. It illustrates: **1 Mark**



A $y = \tan^{-1} x$ **B** $y = \cos^{-1} x$

C $y = \sec^{-1} x$ **D** $y = \sin^{-1} x$

Q86. If f(x) = $-2x^8$, then the correct statement is: **1 Mark**

A $f'\left(\frac{1}{2}\right) = f'\left(-\frac{1}{2}\right)$ **B** $f'\left(\frac{1}{2}\right) = -f'\left(-\frac{1}{2}\right)$

C $-f'\left(\frac{1}{2}\right) = f'\left(-\frac{1}{2}\right)$ **D** $f\left(\frac{1}{2}\right) = -f\left(-\frac{1}{2}\right)$

Q87. If A is a 3 × 3 matrix and |A| = -2, then value of |A (adj A)| is: **1 Mark**

A -2 **B** 2 **C** -8 **D** 8

Q88. If A and B are two independent events with $P(A) = \frac{1}{3}$ and $P(B) = \frac{1}{4}$, then P(B'|A) is equal to: **1 Mark**

A $\frac{1}{4}$ **B** $\frac{1}{3}$ **C** $\frac{3}{4}$ **D** 1

Q89. The area of a triangle formed by vertices O, A and B, where $\vec{OA} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{OB} = -3\hat{i} - 2\hat{j} + \hat{k}$ is: **1 Mark**

A $3\sqrt{5}$ sq. units **B** $5\sqrt{5}$ sq. units

C $6\sqrt{5}$ sq. units **D** 4 sq. units

Q90. $\int \frac{e^{9\log x} - e^{8\log x}}{e^{6\log x} - e^{5\log x}} dx$ is equal to: **1 Mark**

A $x + C$ **B** $\frac{x^2}{2} + C$

C $\frac{x^4}{4} + C$ **D** $\frac{x^3}{3} + C$

Q91. The integrating factor of the differential equation $(x + 3y^2)\frac{dy}{dx} = y$ is: **1 Mark**

A y **B** $-y$ **C** $\frac{1}{y}$ **D** $-\frac{1}{y}$

Q92. The order and degree of the differential equation **1 Mark**
$\left(\frac{d^2y}{dx}\right)^2 + \left(\frac{dy}{dx}\right)^2 = x\sin\left(\frac{dy}{dx}\right)$ are:

A order 2, degree 2 **B** order 2, degree 1

C order 2, degree not defined **D** order 1, degree not defined

Q93. $\int 4^x 3^x dx$ equals: **1 Mark**

A $\frac{12^x}{\log 12} + C$ **B** $\frac{4^x}{\log 4} + C$

C $\left(\frac{4^x.3^x}{\log 4.\log 3}\right) + C$ **D** $\frac{3^x}{\log 3} + C$

Q94. The respective values of $|\vec{a}|$ and $|\vec{b}|$, if given $(\vec{a} - \vec{b}) \cdot (\vec{a} + \vec{b}) = 512$ and $|\vec{a}| = 3|\vec{b}|$, are : **1 Mark**

A 48 and 16 **B** 3 and 1 **C** 24 and 8 **D** 6 and 2

Q95. $\int e^x(\cos x - \sin x)dx$ is equal to: **1 Mark**

A $e^x \sin x + C$ **B** $-e^x \sin x + C$

C $-e^x \cos x + C$ **D** $e^x \cos x + C$

Q96. A meeting will be held only if all three members A, B and C are present. The probability that member A does not turn up is 0-10, member B does not turn up is 020 and member C does not turn up is 0-05.The probability of the meeting being cancelled is: **1 Mark**

A 0.35 **B** 0.316 **C** 0.001 **D** 0.65

Q97. Let $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$. If $\vec{b}$ is a vector such that $\vec{a}.\vec{b} = |\vec{b}|^2$ and $|\vec{a} - \vec{b}| = \sqrt{7}$, then $|\vec{b}|$ equals: **1 Mark**

A 7 **B** 14 **C** $\sqrt{7}$ **D** 21

Q98. The direction ratios of a line parallel to z-axis are: **1 Mark**

A < 1, 1, 0 > **B** < 1, 1, 1 > **C** < 0, 0, 0 > **D** < 0, 0, 1 >

Q99. A Dbox has 4 green, 8 blue and 3 red pens. A student picks up a pen at random, checks its colour and replaces it in the box. He repeats this process 3 times. The probability that at least one pen picked was red is: **1 Mark**

A $\frac{3}{2}$ sq units **B** $\frac{2}{3}$ sq units
C 3 sq units **D** $\frac{4}{3}$ sq units

Q100. The area of the region enclosed by the curve $x = \sqrt{2}$ and the lines x = 0 and x = 4 and x-axis is: **1 Mark**

A $\frac{16}{9}$sq. units **B** $\frac{32}{9}$sq. units
C $\frac{16}{3}$sq. units **D** $\frac{32}{3}$sq. units