OMR Answer Sheet No.

Question Booklet Number

1041

BCA (Semester-I) Examination, 2023-24

Booklet Series
D

Mathematics-I

Paper-V

(To be filled by the Candidate / निम्न पूर्तियाँ परीक्षार्थी स्वयं भरें)

Roll No. (in figures)
अनुक्रमांक (अंकों में) _____

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Name of Examination Centre
परीक्षा केन्द्र का नाम _____

[Time : 2 : 00 Hours
[समय : 2 : 00 घण्टे

[Maximum Marks : 50
[अधिकतम अंक : 50

Signature of Invigilator
कक्ष निरीक्षक के हस्ताक्षर

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. **The booklet contains 75 questions. Examinee is required to answer any 65 questions in the OMR Answer-Sheet provided and not in the question booklet. In case Examinee attempts more than 65 Questions, first 65 attempted questions will be evaluated. All questions carry equal marks.**
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be immediately replaced.

(Remaining Instructions on last page)

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 75 प्रश्न हैं। परीक्षार्थी को किन्हीं 65 प्रश्नों को दी गई ओ०एम०आर० आन्सर-शीट पर ही हल करना है। परीक्षार्थी द्वारा 65 से अधिक प्रश्नों को हल करने की स्थिति में, प्रथम 65 उत्तरों को ही मूल्यांकित किया जायेगा। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR उत्तर-पत्रक को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका, जिसमें कुछ भाग छपने से छूट गये हों या प्रश्न एक से अधिक बार छप गये हों या किसी भी प्रकार की कमी हो, उसे तुरन्त बदल लें।

(शेष निर्देश अन्तिम पृष्ठ पर)

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1. Find the value of $\int_0^1 x^2 dx$?

(A) 2/3

(B) 8/3

(C) 2

(D) None of these

2. What is derivatives if x^n?

(A) n

(B) $n.x^n$

(C) $n.x^{n-1}$

(D) None of these

3. $\int_0^{\pi/2} \frac{dx}{1+\sin x}$ is?

(A) 0

(B) 1/2

(C) 1

(D) None of these

4. Find the sum of the vectors $\vec{a} = 6i-3j$ and $\vec{b} = 5i + 4j$

(A) 11i−j

(B) 11i+j

(C) −11i+j

(D) i+j

5. If $\vec{a} = 3i + 4j$ then the magnitude of the vector $\vec{a}$ is?

(A) 3

(B) 4

(C) 5

(D) None of thse

6. If A and B are square matrix of order 2 then $(A+B)^2$ will be

(A) $A^2+2AB+B^2$

(B) $A^2+2BA+B^2$

(C) $A^2+AB+BA+B^2$

(D) None of these

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7. Which one is vector quantity

(A) Distance

(B) Speed

(C) Force

(D) None of these

8. If $\vec{A}$ and $\vec{B}$ are two vector then $\vec{A}.\vec{B}$ is

(A) $|A|.|B|$

(B) 0

(C) $|A|.|B|.\sin\theta$

(D) $|A|.|B|.\cos\theta$

9. If three vectors are colinear than [a,b,c] as their product will be

(A) 0

(B) 1

(C) −1

(D) None of these

10. If A is matrix then $(A^t)^t$ will be

(A) 1

(B) A

(C) 0

(D) None of these

11. What is the relation between f(a) and f(b) according to Rolle's theorem?

(A) Equal to

(B) Greater than

(C) Less than

(D) Unequal

12. Find the $\frac{d}{dx}(\log\cos x)$

(A) tan x

(B) sec x

(C) 1

(D) −tan x

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13. Rank of the matrix $A = \begin{vmatrix} 1 & 2 & 3 \\ -1 & -2 & 1 \\ 1 & 0 & 5 \end{vmatrix}$ is

(A) 3

(B) 1

(C) 2

(D) 4

14. Eigen value of a non singular metrix is k then the eigen value of A^{-1} is

(A) $-k$

(B) $-1/k$

(C) $1/k$

(D) None of these

15. Find the value of the $\int_{-5}^{5} 5x\,dx$

(A) 0

(B) 1

(C) -1

(D) 2

16. A vector quantity has

(A) Only magnitude

(B) Only direction

(C) Has both magnitude and direction

(D) None of these

17. What will be the point of minimum of the function $2x^3+3x^2-36x+10$

(A) 1

(B) 2

(C) 3

(D) 4

18. If $y=ax^2+b$ then $\frac{dy}{dx}$ at $x=2$ is equal to

(A) 2a

(B) 3a

(C) 4a

(D) None of these

19. If $\vec{A} = i + j$ and $\vec{B} = j + k$ then the value of $\vec{A}.\vec{B}$ is

(A) 1

(B) 0

(C) -1

(D) None of these

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20. Magnitude of the vector

$\vec{a} = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} + \frac{1}{\sqrt{3}}\hat{k}$ is

(A) 1

(B) 1.5

(C) 0.5

(D) $\sqrt{3}$

21. A square matrix A is called orthogonal if

(A) $A=A^2$

(B) $A^T=A^{-1}$

(C) $AA^{-1}=1$

(D) $\bar{A}A^1 = 1$

22. A function f(x) is said to be continuous at a point x=a of its domain, if

(A) $\lim_{x\to a} f(x) = f(a)$

(B) $\lim_{x\to 0} f(x) = f(a)$

(C) $\lim_{x\to a} f(a) = f(b)$

(D) None of these

23. An eigen value of a square matrix A is zero. Then

(A) $|A|\neq 0$

(B) A is symmetric

(C) A is singular

(D) None of these

24. The product of all eigen values of A is equal to

(A) $|A|$

(B) A^{-1}

(C) A'

(D) $\bar{A}'$

25. Inverse of $\begin{bmatrix} 4 & 3 \\ -7 & 1 \end{bmatrix}$ is

(A) $\begin{bmatrix} 1/4 & 1/3 \\ -1/7 & 1 \end{bmatrix}$

(B) $\frac{1}{25}\begin{bmatrix} 4 & 3 \\ -7 & 1 \end{bmatrix}$

(C) $\frac{1}{25}\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

(D) $\frac{1}{25}\begin{bmatrix} 1 & -3 \\ 7 & 4 \end{bmatrix}$

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26. If two vectors

$\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$

$\vec{b} = 3\hat{i} - 2\hat{j} + \hat{k}$

Then the angle between there is

(A) 45°

(B) 60°

(C) 90°

(D) 120°

27. Find the Area of a parallogram whose diagonals are $3\hat{i} + \hat{j} + 2\hat{k}$ and $2\hat{i} - 2\hat{j} + 4\hat{k}$

(A) $4\sqrt{3}$

(B) $4\sqrt{2}$

(C) $8\sqrt{3}$

(D) $8\sqrt{2}$

28. Find the minimum value of

$3x^4 - 2x^3 - 6x^2 + 6x + 1$ in interval (0,2)

(A) 0

(B) 1

(C) 2

(D) 3

29. Evaluate $\lim_{x \to 0} \frac{\sin ax}{\sin bx}$

(A) 1

(B) $\frac{a}{b}$

(C) 0

(D) $\frac{b}{a}$

30. B(m,n) is equal to

(A) $\int_0^1 x^{m-1}(x-1)^{n-1} dx$

(B) $1/2 \int_0^{\pi/2} \sin^{2m-1}\theta \cos^{2n-1}\theta \, d\theta$

(C) $\int_0^\infty \frac{x^{n-1}}{(1+x)^{m+n}} dx$

(D) $2 \int_0^{\pi/2} \sin^m\theta \cos^n\theta \, d\theta$

31. If $f(x)=x^2+2$ and $g(x)=2x-3$ are real functions, then (fog)x is

(A) $4x^2-12x+11$

(B) $4x^2+12x+11$

(C) $4x^2-12x-11$

(D) $4x^2+12x-11$

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32. The value of $\lim_{x\to 1}\frac{x^3-1}{x-1}$ is

(A) 0

(B) 1

(C) 2

(D) 3

33. The Expansion of log (1+x) by Maclaurin series is

(A) $x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+....$

(B) $x+\frac{x^2}{\lfloor 2}+\frac{x^3}{\lfloor 3}+\frac{x^4}{\lfloor 4}+....$

(C) $x-\frac{x^2}{\lfloor 2}+\frac{x^3}{\lfloor 3}-\frac{x^4}{\lfloor 4}+....$

(D) $x+\frac{x^2}{2}+\frac{x^3}{3}+\frac{x^4}{4}+....$

34. The product of two unitary matrices of equal order is

(A) Singular

(B) Non singular

(C) Orthogonal

(D) Unitary

35. A function $f(x)$ is said to have a removable discontinuity at $x=a$ if

(A) $f(a+0)=f(a-0)=f(a)$

(B) $f(a+0)=f(a-0)\neq f(a)$

(C) $f(a+0)\neq f(a-0)=f(a)$

(D) $f(a+0)\neq f(a-0)\neq f(a)$

36. Which of the following limits does not yield 1?

(A) $\lim_{x\to 0} 1$

(B) $\lim_{x\to\infty} x^{-2}+x^{-1}+1$

(C) $\lim_{x\to\infty}\frac{1}{e^x}+1$

(D) $\lim_{x\to\infty}\frac{x^3+x^2+32x+1}{x^2-3x+2}$

37. The integration is the opposite procedure of

(A) Tabulation

(B) Differentiation

(C) Classification

(D) Sublimation

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38. If matrix A is singular matrix then what will the value of x?

$$A = \begin{bmatrix} 8 & x & 0 \\ 4 & 0 & 2 \\ 12 & 6 & 0 \end{bmatrix}$$

(A) 2

(B) 4

(C) 6

(D) 8

39. For any square matrix A. If $A=A^T$, then A is _____ matrix

(A) Hermitian

(B) Orthogonal

(C) Symmetric

(D) Involuntary

40. If a matrix A is such that $4A^3+2A^2+7A+I=0$, then A^{-1} equals

(A) $-(4A^2+2A+71)$

(B) $(4A^2+2A+71)$

(C) $-(4A^2-2A+71)$

(D) $(4A^2+2A-71)$

41. Which is true about matrix multiplication?

(A) It is commutative

(B) It is associate

(C) Both (A) and (B)

(D) None of these

42. Determine the Eigen values of the matrix A.

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

(A) 0, 5, 10

(B) 0, 3, 10

(C) 0, 3, 5

(D) 0, 3; 15

43. Rank of Matrix X is

$$x = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$$

(A) 4

(B) 3

(C) 2

(D) 1

44. Apply Cramer's Rule and solve

$3x+5y-7z=13$

$4x+y-12z=6$

$2x+9y-3z=20$

(A) x=1, y=2, z=0

(B) x=0, y=2, z=1

(C) x=0, y=1, z=2

(D) x=0, y=2, z=0

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45. Evaluate $\lim_{x\to\infty}\frac{(3x-1)(4x-2)}{(x+8)(x-1)}$

(A) 11

(B) 12

(C) 13

(D) Limit does not exist

46. What is/are conditions for a function to be continuous on (a,b)?

(A) The function is right continuous

(B) The function is left continuous

(C) The function is continuous at each point of (a, b)

(D) All of the above

47. Evaluate $\lim_{x\to 0}\frac{\sin x}{x}$

(A) 0

(B) 1

(C) 2

(D) None of the above

48. Examine the continuity of the function f(x) defined of

$$f(x)=\begin{cases}5x-4, & \text{if } 0<x\le 1\\ 4x^3-3x, & \text{if } 1<x<2\end{cases} \text{ at } x=1$$

(A) f(x) is continuous at x=1

(B) f(x) is discontinuous at x=1

(C) Can't say

(D) None of the above

49. $\frac{d}{dx}(\cot^{-1}x)=$

(A) $\frac{1}{1+x^2}$

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

(C) $\frac{-1}{1-x^2}$

(D) $\frac{1}{1-x^2}$

50. $\frac{d}{dx}\left(\frac{x^3\log x+x-x^3.e^x}{x^3}\right)$

(A) $\frac{1}{x}-\frac{2}{x^3}-e^x$

(B) $\frac{1}{x}+\frac{2}{x^3}-e^x$

(C) $\frac{1}{x}+\frac{2}{x^3}+e^x$

(D) None of the above

51. Discuss the continuity of the function $f(x)=\frac{\sin 2x}{x}$ when $x\neq 0$ and $f(0)=1$ at $x=0$

(A) f(x) is continuous at x=0

(B) f(x) is discontinuous at x=0

(C) Can;t say

(D) None of the above

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52. Differentiate $\sin^{-1}\left(\frac{1-x}{1+x}\right)$ with respect to $\sqrt{x}$

(A) $\frac{2}{1-x}$

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

(C) $\frac{2}{1+x}$

(D) $\frac{-2}{1+x}$

53. Rolle's theorem tells about the

(A) Existence of point c where derivative of a function is positive

(B) Existence of point c where derivative of a function becomes zero

(C) Existence of point c where derivative of a function is negative

(D) Existence of point c where derivative of a function is either positive or negative

54. If the function $f(x)=x^2-8x+12$ satisfied the condition of Rolle's theorem on (2, 6), find the value of c such that $f'(c)=0$:

(A) 6

(B) 8

(C) 4

(D) 2

55. A determinant of 3 rows (R_1, R_2, R_3) and 3 columns (C_1, C_2, C_3) has a value $\Delta=15$, if two columns C_2 and C_3 of determinant are interchanged, then the value of determinant will be

(A) 15

(B) -15

(C) 45

(D) -45

56. According to Lagrange's Mean Value Theorem, there exists at least one value c of x lying in the open interval]a, b[such that $f'(c)=$

(A) $\frac{f(b)-f(a)}{b-a}$

(B) $\frac{f(a)-f(b)}{a-b}$

(C) $\frac{f(b)+f(a)}{b+a}$

(D) $\frac{f(a)+f(b)}{a+b}$

57. If $f(x)=(x-1)(x-3)(x-5)$ and $a=0$, $b=4$, find c using Lagrange's Mean Value Theorem.

(A) 1

(B) 2

(C) 3

(D) 4

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58. For Cauchy's Mean Value Theorem, there exists at least one value c of x lying in the open interval]a,b[such that https://www.rmpssuonline.com

(A) $\frac{f'(c)}{g'(c)} = \frac{f(b)+f(a)}{g(b)-g(a)}$

(B) $\frac{f'(c)}{g'(c)} = \frac{f(b)-f(a)}{g(b)+g(a)}$

(C) $\frac{f'(c)}{g'(c)} = \frac{f(b)-f(a)}{g(b)-g(a)}$

(D) None of the above

59. Find the points of maxima and minima of the function

$f(x)=x^3-6x^2+9x+15$

(A) Maxima=1; Minima=3

(B) Maxima=-1; Minima=3

(C) Maxima=3; Minima=1

(D) Maxima=3; Minima=-1

60. Find work done by the force $\vec{F} = \hat{i}+\hat{j}+\hat{k}$ acting on a particle, of it is displaced from the point A(3,3,3) to the point B(4,4,4)

(A) 2 units

(B) 3 units

(C) 4 units

(D) 5 units

61. For what value of $\lambda, \vec{a} = 3\hat{i}-\hat{j}+4\hat{k}$ and $\vec{b} = -\lambda\hat{i}+3\hat{j}+3\hat{k}$ are perpendicular

(A) 3

(B) 4

(C) 5

(D) 6

62. Find the volume of parallelopiped whose edges are represented by $\vec{a} = 2\hat{i}-3\hat{j}+\hat{k}, \vec{b} = \hat{i}-\hat{j}+2\hat{k}$ and $\vec{c} = 2\hat{i}+\hat{j}-\hat{k}$

(A) 14

(B) 18

(C) -14

(D) -18

63. In $\Delta OAB, \overrightarrow{OA} = 3\hat{i}+2\hat{j}-\hat{k}$ and $\overrightarrow{OB} = \hat{i}+3\hat{j}+\hat{k}$ Then, the area of the triangle is

(A) $\frac{3}{2}\sqrt{10}$ sq. units

(B) $\frac{5}{2}\sqrt{10}$ sq. units

(C) $\frac{7}{2}\sqrt{10}$ sq. units

(D) $\frac{2}{3}\sqrt{10}$ sq. units

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64. Evaluate $\int (\tan x + \cot x)^2 dx$

(A) tan x+cot x+c

(B) tan x−cot x+c

(C) tan x−x+c

(D) tan x+x+c

65. For any three vectors $\vec{a}, \vec{b}, \vec{c}$, then vector triple product $\vec{a} \times (\vec{b} \times \vec{c}) =$

(A) $(\vec{a}.\vec{c})\vec{b} - (\vec{a}.\vec{b})\vec{c}$

(B) $(\vec{b}.\vec{c})\vec{a} - (\vec{a}.\vec{c})\vec{b}$

(C) $(\vec{a}.\vec{c})\vec{b} + (\vec{a}.\vec{b})\vec{c}$

(D) $(\vec{b}.\vec{c})\vec{a} + (\vec{a}.\vec{c})\vec{b}$

66. Find the value of λ so that the vectors $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}, \vec{b} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{c} = \hat{j} + \lambda\hat{k}$ are coplanar.

(A) 1

(B) −1

(C) 0

(D) 2

67. Evaluate $\int \frac{dx}{1 + \cos x}$

(A) cot x+cosec x+c

(B) cot x−cosec x+c

(C) −cot x+cosec x+c

(D) None of the above

68. Integrate $\int (5x-2)^3 dx$

(A) $\frac{1}{20}(5x-2)^4 + c$

(B) $\frac{1}{20}(5x+2)^4 + c$

(C) $\frac{1}{16}(5x-2)^2 + c$

(D) None of the above

69. Evaluate $\int x \cos x \, dx$

(A) $x \sin x - \cos^2 x + c$

(B) $x^2 \sin x + \cos^2 x + c$

(C) $x \sin^2 x + \cos x + c$

(D) $x \sin x + \cos x + c$

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70. Solve $\int_1^2 x^2 dx$

(A) 8/3

(B) 7/3

(C) 1/3

(D) 5/3

71. What is the value of $\lim_{y \to 2} \frac{y^2-4}{y-2}$

(A) 4

(B) 3

(C) 2

(D) 1

72. The matrices can be added if their

____ is same

(A) Rank

(B) Order

(C) Mod

(D) None of these

73. The value of $\lim_{x \to 0} \frac{|x|}{x}$ is?

(A) 1

(B) −1

(C) 0

(D) Does not exist

74. If A is a unit matrix of order N, then A*ADJ(A) is

(A) Unit matrix

(B) Zero matrix

(C) Row matrix

(D) None of these

75. If $f(x)=e^x$ then the value of $\frac{d}{dx}f(x)$ is?

(A) 1

(B) e

(C) e^x

(D) None of these

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