Roll No.----------------------

Paper Code		
5	7	4

(To be filled in the OMR Sheet)

प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No.

प्रश्नपुस्तिका सीरीज
Question Booklet Series
B

B.C.A. (First Semester) Examination, February/March-2022
BCA-1005
Mathematics-I

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

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महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

1. $y = f(x)$ has maxima at $x = a$ if :

(A) $f'(a) = 0$ and $f''(a) < 0$

(B) $f'(a) = 0$ and $f''(a) > 0$

(C) $f'(a) = 0$ and $f''(a) = 0$

(D) None of these

2. Given series $1 - \frac{x}{1!} + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!}$ ....∞ is an expansion of :

(A) e^x

(B) e^{-x}

(C) $\log(1 + x)$

(D) $\log(1 - x)$

3. If $f(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} +$ ....∞ then $f(x)$ is :

(A) $\sin hx$

(B) $\cos x$

(C) $\sin x$

(D) None of these

4. Maclaurin's series is an special case of Taylor's series if a is :

(A) 0

(B) 1

(C) - 1

(D) None of these

5. Coefficient of x^n in Maclaurin's series of $f(x)$ about $a = 0$ is :

(A) $\frac{f^n(0)}{n}$

(B) $f^n(0)$

(C) $\frac{-f^n(0)}{n!}$

(D) $\frac{f^n(0)}{n!}$

6. Coefficient of x in Maclaurin's series of $f(x) = e^{\sin x}$ is :

(A) 2

(B) 1

(C) 3

(D) 0

7. If $f(x) = \sin hx$ then $f''(x)$ is :

(A) $\cos hx$

(B) $-\sin hx$

(C) $\sin hx$

(D) $-\cos hx$

8. The necessary condition for the Maclaurin expansion to be true for the function $f(x)$ is :

(A) $f(x)$ is continuous

(B) $f(x)$ is differentiable

(C) $f(x)$ exists at every point

(D) $f(x)$ should be continuous and differentiable

9. If $y = x^3 + 3$ then $\frac{dy}{dx}$ at $x = 1$ is :

(A) 3

(B) -3

(C) $\frac{-3}{2}$

(D) $\frac{3}{2}$

10. Taylor's expansion of f(a + h) is :

(A) $f(a) + \frac{hf'(a)}{1} + \frac{h^2f''(a)}{2} + \ldots\ldots\ldots\ldots + \frac{h^nf^n(a)}{n} + \ldots\ldots\infty$

(B) $f(a) + \frac{hf'(a)}{1!} + \frac{h^2f''(a)}{2!} + \ldots\ldots\ldots\ldots + \frac{h^nf^n(a)}{n!} + \ldots\ldots\infty$

(C) $f(a) - \frac{hf'(a)}{1!} + \frac{h^2f''(a)}{2!} + \ldots\ldots\ldots\ldots + \frac{(-1)^nf^n(a)}{n!} + \ldots\ldots\infty$

(D) None of these

11. $\int 1\, dx =$

(A) x

(B) k+1

(C) x + k

(D) $\frac{x^2}{2} + k$

12. $\int x^5\, dx =$

(A) $\frac{x^6}{6}$

(B) $\frac{x^6}{6} + c$

(C) $\frac{x^5}{5} + c$

(D) $x^6 + c$

13. $\int_{-1}^{1} |x|\, dx$ is :

(A) 1

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

(C) -1

(D) 2

14. $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) dx$ is :

(A) $\frac{1}{x}(x)^{\frac{1}{3}} + 2\sqrt{x} + c$

(B) $\frac{2}{3}(x)^{\frac{2}{3}} + \frac{x^2}{2} + c$

(C) $\frac{2}{3}(x)^{\frac{3}{2}} + 2\sqrt{x} + c$

(D) $\frac{3}{2}(x)^{\frac{3}{2}} + \frac{1}{2}\sqrt{x} + c$

15. $\frac{d}{dx} \int f(x)\, dx$ is equal to :

(A) $f'(x)$

(B) $f(x)$

(C) $f'(x')$

(D) $f(x) + c$

16. $\int \log_{10} x \; dx =$

(A) $\log_e 10x \log_e \left(\frac{x}{e}\right) + c$

(B) $(\log_{10} e)x \log_e \left(\frac{x}{e}\right) + c$

(C) $(x - 1) \; \log_e x + c$

(D) $\frac{1}{x} + c$

17. $\int x^2 \sin x^3 \; dx =$

(A) $\frac{1}{3} \cos x^3 + c$

(B) $\frac{-1}{3} \cos x + c$

(C) $\frac{-1}{3} \cos x^3 + c$

(D) $\frac{1}{2} \sin^2 x^3 + c$

18. $\int \sec^2(7-4x)\ dx =$

(A) $\frac{-1}{4}\tan(7-4x)+c$

(B) $\frac{1}{4}\tan(7-4x)$

(C) $\frac{1}{4}\tan(7+4x)+c$

(D) $\frac{-1}{4}\tan(7x-4)+c$

19. $\int \frac{1}{\sqrt{1-x^2}}\ dx =$

(A) $\cos^{-1}x+c$

(B) $\sin^{-1}x+c$

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

(D) $\sec^{-1}x+c$

20. $\int \frac{1}{1+x^2}\ dx =$

(A) $\tan^{-1}x$

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

(C) $\tan^{-1}x+c$

(D) $\cot^{-1}x$

21. $\int e^{-x}\ dx =$

(A) $e^{-x}+c$

(B) $-e^{-x}+c$

(C) $-e^{x}+c$

(D) $e^{-x}-c$

22. $\int \sin^{-1} x \, dx =$

(A) $\cos^{-1} x + c$

(B) $x \sin^{-1} x + \sqrt{1 - x^2} + c$

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

(D) None

23. $\int \sin^2 x \cos x \, dx =$

(A) $\frac{1}{3} \sin^3 x + c$

(B) $\frac{1}{3} \sin^3 x$

(C) $\frac{1}{3} \cos^3 x + c$

(D) $\sin^3 x + c$

24. $\int \cos\sqrt{x} \, dx =$

(A) $\sqrt{x} \sin \sqrt{x}$

(B) $2\sqrt{x} \sin \sqrt{x}$

(C) $2\sqrt{x} \sin \sqrt{x} + c$

(D) None

25. $$\int uv \, dx =$$

(A) $u\int v \, dx - v\int u dx$

(B) $u\int v \, dx - \int \frac{d}{dx} u \, dx$

(C) $u\int v \, dx - \int \left(\frac{du}{dx}\right) v \, dx$

(D) $u\int v \, dx - \int \left(\frac{du}{dx}\right)\left(\int v \, dx\right) dx + c$

26. $\int \log x^2 \, dx =$

(A) $\log x^2 + x + c$

(B) $x \log x^2 - 2x + c$

(C) $x \log x^2 - 1 + c$

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

27. $\int 2x^3 e^{x^2} \, dx =$

(A) $e^{x^2}(x^2 - 1) + c$

(B) $-e^{x^2}(x^2 + 2) + c$

(C) $2e^{x^2}(x^2 + 1) + c$

(D) $e^{x^2}(x - 1) + c$

28. $\int \sin x \log(\cos x) \, dx =$

(A) $\cos x\,[\log(\sin x) - 1] + c$

(B) $\sin x\,[\log(\cos x) + 1] + c$

(C) $\cos x\,[\log(\cos x) - 1] + c$

(D) $\cos x\,[\log(\cos x) + 1] + c$

29. If the derivative of $\sin x$ is $\cos x$ then integration of $\cos x$ is :

(A) $-\cos x$

(B) $-\sin x$

(C) $\sin x$

(D) None of these

30. $\int k\, f(x) \, dx =$

(A) $k \int f(x) \, dx$

(B) $k \int f'(x) \, dx$

(C) $k\, f(x)$

(D) $k \int f(x) \, dx + c$

31. Magnitude of the vector $\vec{a} = 2i - 7j - 3k$ is :

(A) $\sqrt{63}$

(B) $\sqrt{62}$

(C) $\sqrt{61}$

(D) $\sqrt{65}$

32. Unit vector of $\vec{a} = i + j + k$ is :

(A) $\frac{i+j+k}{\sqrt{3}}$

(B) $i + j + k$

(C) $\frac{i+j+k}{\sqrt{2}}$

(D) $\frac{i+j+k}{\sqrt{9}}$

33. If $2i + 3j$ and $xi + yj$ are equal vectors then x and y are :

(A) $x = 3, y = 2$

(B) $x = 3, y = -2$

(C) $x = 2, y = 3$

(D) $x = 3, y = 3$

34. Value of x for which $\vec{a} = x(i + j + k)$ is unit vector is :

(A) $x = \pm\frac{1}{\sqrt{2}}$

(B) $x = \pm\frac{1}{\sqrt{7}}$

(C) $x = \pm\frac{1}{\sqrt{5}}$

(D) $x = \pm\frac{1}{\sqrt{3}}$

35. Scalar product of two non-zero vectors $\vec{a}$and$\vec{b}$ is :

(A) $\bar{a}\,.\,\bar{b}$

(B) $\bar{a} \times \bar{b}$

(C) $\overrightarrow{ab}$

(D) ab

36. Scalar product of two non zero vectors $\vec{a}$and$\vec{b}$ is :

(A) $\vec{a}\,.\,\vec{b} = 2\,|\bar{a}||\bar{b}|\cos\theta$

(B) $\bar{a}\,.\,\bar{b} = |\bar{a}||\bar{b}|\cos\theta$

(C) $\bar{a}\,.\,\bar{b} = |\bar{a}||\bar{b}|\sin\theta$

(D) $\bar{a}\,.\,\bar{b} = 2\,|\bar{a}||\bar{b}|\sin\theta$

37. If $\bar{a} = a_1 i + a_2 j + a_3 k, \vec{b} = b_1 i + b_2 j + b_3 k$ then $\bar{a}\,.\,\bar{b} =$

(A) $a_1b_1 - a_2b_2 + a_3b_3$

(B) $a_1b_1 + a_2b_2 - a_3b_3$

(C) $a_1b_1 - a_2b_2 - a_3b_3$

(D) $a_1b_1 + a_2b_2 + a_3b_3$

38. Cross product $\bar{a} \times \bar{b} =$

(A) $|\bar{a}||\bar{b}|\sin\theta$

(B) $-|\bar{a}||\bar{b}|\sin\theta$

(C) $|\bar{a}||\bar{b}|\cos\theta$

(D) $|\bar{a}||\bar{b}|\sin\theta\,\hat{n}$

39. If $\vec{a} = 3i + j + 2k$ and $\vec{b} = 2i - 2j + 4k$ then $|\vec{a} \times \vec{b}|$ is equal to :

(A) $19\sqrt{5}$

(B) $17\sqrt{2}$

(C) $8\sqrt{3}$

(D) $19\sqrt{3}$

40. If $\vec{a} \,.\, \vec{b} \geq 0$ then angle θ between $\vec{a}$ and $\vec{b}$ is :

(A) $0 \leq \theta \leq \frac{\pi}{2}$

(B) $0 < \theta < \frac{\pi}{2}$

(C) $0 < \theta < \pi$

(D) $\frac{-\pi}{2} < \theta < \frac{\pi}{2}$

41. Vector has :

(A) Direction only

(B) Direction as well as magnitude

(C) Magnitude only

(D) None of these

42. Direction cosines are :

(A) tangents of direction angles

(B) sines of direction angles

(C) cosines of direction angles

(D) cotangents of direction angles

43. Vectors $\vec{a}$ and $\vec{b}$ are collinear if :

(A) They have equal magnitudes

(B) They are in the same line

(C) They are parallel to the same line irrespective of their magnitudes and directions.

(D) None of these

44. If $|\vec{a}+\vec{b}| = |\vec{a}-\vec{b}|$ then vectors $\vec{a}$ and $\vec{b}$ are :

(A) Parallel

(B) Perpendicular

(C) $\vec{a} = \vec{b}$

(D) None of these

45. Unit vectors along the axes ox, oy and oz are :

(A) $-i, -j, k$

(B) $i, j, -k$

(C) i, j, k

(D) $i, -j, k$

46. Which of the following is a vector ?

(A) Acceleration

(B) Charge

(C) Energy

(D) Mass

47. Angle between $\hat{i}$ and $\hat{j}$ is :

(A) $45°$

(B) $90°$

(C) $180°$

(D) $270°$

48. Scalar triple product of three vectors $\bar{a}, \bar{b}$ and $\bar{c}$ is denoted as :

(A) $\bar{a} . (\bar{b} \times \bar{c})$

(B) $\bar{a}\bar{b}\bar{c}$

(C) $\bar{a} . \bar{b} . \bar{c}$

(D) $\bar{a} .\ \bar{b}\bar{c}$

49. $(\bar{a} \times \bar{b}) \times \bar{c} =$

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

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

(C) $(\bar{a} \times \bar{c}) . \bar{b}$

(D) $(\bar{a} \times \bar{a})\bar{b} - (\bar{a} \times \bar{b}) \times \bar{c}$

50. $i \times (j \times k) + j \times (k \times i) =$

(A) 1

(B) 2

(C) 0

(D) -1

51. The transpose of a column matrix is :

(A) Diagonal matrix

(B) Row matrix

(C) Zero matrix

(D) Column matrix

52. If A is symmetric matrix than $A^T =$

(A) A

(B) $|A|$

(C) $-A$

(D) A^T

53. If $a_{ij} = \frac{3i-2j}{2}$, and $A = [a_{ij}]_{2\times2}$ then A is :

(A) $\begin{bmatrix} \frac{1}{2} & 2 \\ -\frac{1}{2} & 1 \end{bmatrix}$

(B) $\begin{bmatrix} \frac{1}{2} & 2 \\ 1 & -\frac{1}{2} \end{bmatrix}$

(C) $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} \\ 2 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} -\frac{1}{2} & \frac{1}{2} \\ 1 & 2 \end{bmatrix}$

54. Which of the following is not true about the matrix $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(A) A scalar matrix

(B) A diagonal matrix

(C) Upper triangular matrix

(D) Lower triangular matrix

55. If $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$, then characteristic equation of A is :

(A) $\lambda^2 + 4\lambda + 3 = 0$

(B) $\lambda^2 + 4\lambda - 3 = 0$

(C) $\lambda^2 - 4\lambda + 3 = 0$

(D) $\lambda^2 - 4\lambda - 3 = 0$

56. If A is square matrix, then which of the following is not symmetric ?

(A) $A + A^T$

(B) AA^T

(C) A^TA

(D) $A - A^T$

57. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 0 & 0 & 6 \end{bmatrix}$ then det (A) is :

(A) -24

(B) 10

(C) 11

(D) 24

58. If A is invertible matrix then A^{-1} is :

(A) $\frac{\text{adjoint (A)}}{|A|}$

(B) $|A|$ adjoint (A)

(C) $\frac{\text{adjoint(A)}}{A}$

(D) None

59. If $A^2 - A + I = 0$, and A is invertible than A^1 is :

(A) A^{-2}

(B) $A + I$

(C) $I - A$

(D) $A - I$

60. If $|A| = 2, |B| = 3$, then $|AB|$ is :

(A) 5

(B) 6

(C) -6

(D) None

61. If A and B are square matrices of same order then :

(A) $(AB)^T = B^T A^T$

(B) $(AB)^T = A^T B^T$

(C) $(AB)^T = AB$

(D) None

62. If $A = \begin{bmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{bmatrix}$ then $|A|$ is :

(A) 1

(B) w

(C) -1

(D) 0

63. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then :

(A) $A^2 - 5A - 2I = 0$

(B) $A^2 + 5A - 2I = 0$

(C) $A^2 - 5A + 2I = 0$

(D) $A^2 + 5A + 2I = 0$

64. Adjoint of matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is :

(A) $\begin{bmatrix} 4 & 2 \\ 3 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

65. If $A = \begin{bmatrix} 1 & 2 & x \\ 1 & 1 & 1 \\ 2 & 1 & -1 \end{bmatrix}$ is singular then x is :

(A) 1

(B) 2

(C) 3

(D) 4

66. If $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ then A^{-1} is :

(A) $\frac{A^2+3I}{2}$

(B) $\frac{-A^2+3I}{2}$

(C) $\frac{A^2-3I}{2}$

(D) $\frac{-A^2-3I}{2}$

67. If $A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$ then A^{-1} is :

(A) $\frac{1}{17}\begin{bmatrix} 2 & 3 \\ -3 & 4 \end{bmatrix}$

(B) $\frac{1}{17}\begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix}$

(C) $\frac{-1}{17}\begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix}$

(D) $\frac{1}{17}\begin{bmatrix} 4 & 3 \\ -3 & -2 \end{bmatrix}$

68. If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, then minor of the element a_{23} is :

(A) -7

(B) 4

(C) 7

(D) 8

69. If $A = \begin{bmatrix} x & -7 \\ x & 5x+1 \end{bmatrix}$ then $|A|$ is :

(A) $3x^2 + 4$

(B) $5x^2 + 8x$

(C) $5x^2 - 8x$

(D) $3x^2 + 4x$

70. Statement 'Every square matrix satisfies its own characteristic equation.' is known as :

(A) Caley's theorem

(B) Hamilton theorem

(C) Caley Hamilton theorem

(D) None

71. $\lim_{x \to a} \frac{x^2 - a^2}{x - a}$ is :

(A) $-2a$

(B) a

(C) 2a

(D) Does not exist

72. $\lim_{x \to 0} \frac{\tan x}{x}$ is :

(A) 1

(B) 2

(C) 0

(D) ∞

73. $\lim_{x \to 0} x^2 \sin \frac{1}{x}$ is :

(A) 1

(B) 0

(C) ∞

(D) Does not exist

74. $\lim_{x \to \infty} x \sin \frac{1}{x}$ is :

(A) 1

(B) ∞

(C) 0

(D) Does not exist

75. $f(x) = [x]$,greatest integer function is continuous at :

(A) $x = 2$

(B) $x = 3$

(C) $x = 1$

(D) $x = 1.1$

76. $f(x) = \begin{cases} \frac{\sin x}{x} & x \neq 0 \\ 1 & x = 0 \end{cases}$ is :

(A) Continuous at $x = 0$

(B) Not continuous at $x = 0$

(C) Not defined at $x = 0$

(D) None of these

77. $f(x) = \begin{cases} 1 & x \in Q \\ -1 & x \in Q^c \end{cases}$ then $F(x)$ is :

(A) Continuous every where

(B) Continuous nowhere

(C) Continuous at $x = 0$

(D) Continuous at $x = 1$

78. If $[x]$ is greatest integer in x, then $\lim_{x \to -1}[x + 1]$ is :

(A) -1

(B) 0

(C) 1

(D) Does not exist

79. $\lim_{x \to 0} \frac{|x|}{x}$ is :

(A) 0

(B) ∞

(C) Does not exist

(D) -1

80. Rolle's theorem is not applicable for f(x) in $[0, \pi]$:

(A) $f(x) = \sin x$

(B) $f(x) = x(x - \pi)$

(C) $f(x) = x^2(x - \pi)$

(D) $f(x) = \tan x$

81. Value of c in Rolle's theorem for $f(x) = \cos\frac{x}{2}$ on $[\pi, 3\pi]$ is :

(A) 1

(B) 2π

(C) $\frac{\pi}{2}$

(D) $\frac{3\pi}{2}$

82. Lagrange mean value theorem is extension of :

(A) Rolle's theorem

(B) Newton's theorem

(C) Cauchy's theorem

(D) None of these

83. If f(x) is continuous and differentiable in given interval then Lagrange Mean value theorem is applicable in $[a, b]$ if :

(A) $f(a) = f(b)$

(B) $f(a) + f(b) = 0$

(C) $f(a) \neq f(b)$

(D) $f(a) = -f(b)$

84. $\lim_{x\to 0} \frac{\sin 3x}{\sin 4x}$ is :

(A) 1

(B) $\frac{4}{3}$

(C) $\frac{3}{4}$

(D) 0

85. $\lim_{x \to 0} \sin \frac{1}{x}$ is :

(A) ∞

(B) 0

(C) Does not exist

(D) None of these

86. Rolle's theorem is applicable for continuously differentiable function in $[a, b]$ if :

(A) $f(a) \neq f(b)$

(B) $f(a) = f(b)$

(C) $f(a) = -f(b)$

(D) None

87. If $f(x) = \begin{cases} \frac{x^2-4}{x-2} & x \neq 2 \\ 4 & x = 2 \end{cases}$ then $f(x)$ is :

(A) Continuous at $x = 2$

(B) Not continuous at $x = 2$

(C) $\lim\limits_{x \to 2} f(x)$ does not exist

(D) None

88. If $f(x) = \begin{cases} \frac{\sin 2x}{x} & x \neq 0 \\ k & x = 0 \end{cases}$ is continuous at $x = 0$, then value of k is :

(A) $k = 1$

(B) $k = 0$

(C) $k = -2$

(D) $k = 2$

89. $\lim_{x \to 1} x^2 + 3x - 1$ is :

(A) 3

(B) -3

(C) 2

(D) 1

90. $\lim_{x \to 0} \left(\tan x + \sec x + x \sin \frac{1}{x} \right)$ is :

(A) 2

(B) 0

(C) 1

(D) -1

91. If $y = \sqrt{3 - 2x}$, then $\frac{dy}{dx}$ is :

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

(B) $\frac{-1}{\sqrt{3-2x}}$

(C) $\frac{-1}{3-2x}$

(D) $\frac{2}{3}(3 - 2x)^{\frac{3}{2}}$

92. If $\sin(xy) = x$ then $\frac{dx}{dy}$ is :

(A) $\sec(xy)$

(B) $\frac{\sec(xy)}{x}$

(C) $\frac{\sec(xy)-y}{x}$

(D) $\sec(xy) - 1$

93. If $f(a) = f(b) = 0$ and $f(x)$ is continuous on $[a, b]$ and differentiable in (a, b) then :

(A) $f(x)$ must be identically equal to zero

(B) $f'(x)$ may be different from zero for all x on $[a, b]$

(C) There exist at least one number $c \in (a, b)$ s.t. $f'(c) = 0$

(D) None of these

94. The slope of the curve $y^3 - xy^2 = 4$ at the point, where $y = 2$ and $x = 1$ is :

(A) -2

(B) $\frac{1}{4}$

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

(D) $\frac{1}{2}$

95. The minimum value of $(x - 2)(x - 9)$ is :

(A) $^{49}/_{4}$

(B) 0

(C) $^{-49}/_{4}$

(D) $^{11}/_{4}$

96. Maximum value of $(x + 8)(7 - x)$ is :

(A) $^{240}/_{4}$

(B) $^{210}/_{4}$

(C) $^{255}/_{4}$

(D) $^{225}/_{4}$

97. Saddle point is the point where :

(A) Function has maximum value

(B) Function has neither maximum value nor minimum value

(C) Function has minimum value

(D) Function has zero value

98. Function $y = f(x)$ have minimum value at $x = a$ if :

(A) $f'(a) = 0$ and $f''(a) < 0$

(B) $f'(a) = 0$ and $f''(a) > 0$

(C) $f'(a) = 0$ and $f''(a) = 0$

(D) None of these

99. For which value of x, $f(x) = (x - 1)(-x + 3)$ have its maximum ?

(A) 0

(B) 1

(C) 2

(D) -2

100. Stationary points of $f(x) = x^2 - 2x + 1$ are :

(A) 1, 1

(B) 1, - 1

(C) -1, -1

(D) None of these

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