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SET-X

UG-4Yr.-EE-June, 2026

SUBJECT : B. Sc.-Mathematics

10005

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

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SEAL

1. Which of the following is ***not*** a null set ?

   (1) $A = \{x : x^2 = 16, x \in N\}$

   (2) $A = \{x : x < 5, x > 6\}$

   (3) $A = \{x : |x| < -4; x \in N\}$

   (4) $A = \{x : x \in N, 2 < x < 3\}$

2. If $A = \{1, 2, 3, 4\}$ and $B = \{2, 3, 4, 5, 6\}$, then $A - B$ is :

   (1) $\{1, 5, 6\}$

   (2) Null set

   (3) $\{1\}$

   (4) $\{5, 6\}$

3. In a class of 60 boys, there are 45 boys who play cards and 30 boys play carrom. How many boys play both games ?

   (1) 30 (2) 15

   (3) 45 (4) 10

4. If $A = \{1, 3, 5, 7\}$ and $B = \{2, 5\}$, then the numbers of relations from A to B is :

   (1) 256 (2) 128

   (3) 64 (4) 32

5. The range of the function $y = \sqrt{x-3}$ is :

   (1) $(\infty, -\infty)$ (2) $(0, 3)$

   (3) $(-3, 3)$ (4) $[0, \infty)$

6. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then $\cos\theta - \sin\theta$ is given by :

(1) $\sqrt{2}\tan\theta$ (2) $\sqrt{2}\sin\theta$

(3) $\sqrt{2}\cos\theta$ (4) $\sqrt{2}\sec\theta$

7. $75°$ is equal to :

(1) 5π radians (2) $\frac{5\pi}{12}$ radians

(3) $\frac{12\pi}{5}$ radians (4) $\frac{7\pi}{5}$ radians

8. If $\sin\theta \sec\theta = -1$ and θ lies in the second quadrant, then $\sin\theta$ is equal to :

(1) $\sqrt{2}$ (2) 2

(3) $\frac{1}{\sqrt{2}}$ (4) $\frac{1}{2}$

9. If $\cot\alpha \cot\beta = 2$, then $\frac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}$ is equal to :

(1) $\frac{1}{4}$ (2) $\frac{1}{2}$

(3) $\frac{1}{6}$ (4) $\frac{1}{3}$

10. If a statement $P(n)$ is true for $n = 1$, and whenever $P(k)$ is true, then $P(k + 1)$ is also true, then according to PMI :

(1) $P(n)$ is true only for $n = 1$

(2) $P(n)$ is false for all natural numbers

(3) $P(n)$ is true for all natural numbers

(4) $P(n)$ is true only for even numbers

11. The smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n$ is equal to 1 :

(1) 8 (2) 12

(3) 16 (4) None of these

12. If $\omega(\neq 1)$ is a cube root of unity and $(1+\omega^2)^n = (1+\omega^4)^n$, then the least positive value of n is :

(1) 6 (2) 5

(3) 2 (4) 3

13. If $\arg(z) < 0$, then $\arg(-z) - \arg(z)$ is equal to :

(1) π (2) $-\pi$

(3) $-\frac{\pi}{2}$ (4) $\frac{\pi}{2}$

14. The roots of $x^{2/3} + x^{1/3} - 2 = 0$ are :

(1) $-1, 6$

(2) $-1, -8$

(3) $1, -6$

(4) $1, -8$

15. Let α, β be the roots of the equation $(x-a)(x-b) = c$, $c \neq 0$. Then the roots of the equation $(x-\alpha)(x-\beta) + c = 0$ are :

(1) a, c

(2) b, c

(3) a, b

(4) $\frac{1}{b}, \frac{1}{c}$

16. A five digit number is to be formed which is divisible by 3, using the numbers 0, 1, 2, 3, 4 and 5, without repeation. This can be done in how many numbers of ways ?

(1) 3125 (2) 600

(3) 240 (4) 216

17. The number of divisors of the form $(4n + 2)$, $n \geq 0$ of the integer 240 is :

(1) 3 (2) 4

(3) 8 (4) 10

18. If ${}^{2n}C_3 : {}^{n}C_2 = 12 : 1$, then n is equal to :

(1) 2 (2) 3

(3) 4 (4) 5

19. The number of diagonals that can be drawn by joining the angular points of octagon :

(1) 20 (2) 18

(3) 16 (4) 14

20. In the expansion of $\left(x+\frac{1}{x}\right)^6$, the third term from the end is :

(1) $\frac{1}{x^2}$ (2) $\frac{x^2}{15}$

(3) $\frac{15}{x^2}$ (4) $\frac{x^2}{3}$

21. ${}^{10}C_1 + {}^{10}C_2 + {}^{10}C_3 + \ldots\ldots\ldots + {}^{10}C_9$ is equal to :

(1) 128 (2) 256

(3) 512 (4) None of these

22. The term independent of x in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$ is :

(1) $\frac{5}{18}$ (2) $\frac{7}{18}$

(3) $\frac{9}{18}$ (4) $\frac{11}{18}$

23. If third term of a geometric progression is 4, then the product of the first five terms is :

(1) 4^5 (2) 4^4

(3) 4^3 (4) 4^2

24. In a triangle, the lengths of two larger sides are 10 and 9 respectively. If the angles are in A.P., then the length of the third side can be :

(1) $3\sqrt{3}$ (2) 5

(3) $\sqrt{84}$ (4) $\sqrt{91}$

25. If the sum of an A.P. is 2 and the sum of first five terms is equal to one fourth of the sum of the next five terms, then :

(1) $a = 2, d = -6$

(2) $a = -2, d = 6$

(3) $a = 2, d = 6$

(4) None of these

26. The sum of three numbers in G.P. is $\frac{13}{12}$ and their product is –1. The common ratio is :

(1) $-\frac{5}{4}, -\frac{4}{5}$ (2) $-\frac{2}{3}, -\frac{3}{2}$

(3) $-\frac{3}{4}, -\frac{4}{3}$ (4) None of these

27. The sum of $12 + 13 + 14 + 15 + \ldots\ldots\ldots + 37$ is equal to :

(1) 763 (2) 367

(3) 637 (4) None of these

28. A straight line passes through the point (2, 3) and the portion of the line intercepted between the axes is bisected at this point, the equation of line is :

(1) $3x + 2y - 12 = 0$ (2) $2x + 3y + 12 = 0$

(3) $3x - 2y + 12 = 0$ (4) None of these

29. The intercepts on the axes for the line $4x - 3y - 12 = 0$ are :

(1) x-intercept = 4, y-intercept = 3

(2) x-intercept = 3, y-intercept = –4

(3) x-intercept = –3, y-intercept = –4

(4) None of these

30. The angle between the lines joining the points (0, 0), (2, 3) and (2, –2), (3, 5) is :

(1) $\tan^{-1}\left(\frac{23}{11}\right)$ (2) $\tan^{-1}\left(\frac{11}{23}\right)$

(3) $\tan^{-1}\left(\frac{8}{23}\right)$ (4) $\tan^{-1}\left(\frac{9}{23}\right)$

31. The points $(-a, -b)$, $(0, 0)$, (a, b) and (a^2, ab) are :

(1) Vertices of a rectangle

(2) Vertices of a parallelogram

(3) Collinear

(4) None of these

32. The equation of parabola with vertex at the origin and passing through $(2, -3)$ and symmetric with respect to y-axis is :

(1) $4x^2 = -3y$

(2) $x^2 + y^2 = 13$

(3) $3x^2 = -4y$

(4) None of these

33. The eccentricity of $x^2 + 3y^2 = a^2$ is :

(1) $\frac{\sqrt{2}}{3}$

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

(3) $\frac{\sqrt{6}}{2}$

(4) $\frac{\sqrt{6}}{3}$

34. The equation of a hyperbola whose conjugate axis is 5 and the distance between the foci is 13 is :

(1) $25x^2 - 144y^2 = 900$

(2) $144x^2 - 25y^2 = 900$

(3) $52x^2 - 114y^2 = 900$

(4) $25x^2 - 441y^2 = 900$

35. If two statements are combined by using the logical connective 'and', then the resulting statement is called :

(1) Conjunction

(2) Disjunction

(3) Biconditional

(4) None of these

36. The variance for the data :

2, 4, 5, 6, 8, 17 is given by

(1) $\frac{7}{6}$ (2) $\frac{14}{6}$ (3) $\frac{28}{6}$ (4) $\frac{140}{6}$

37. A fair coin is tossed repeatedly. If tail appears on first four tosses, then the probability of head appearing on fifth toss is :

(1) $\frac{1}{2}$ (2) $\frac{1}{5}$

(3) $\frac{1}{32}$ (4) $\frac{31}{32}$

38. Three identical dice are rolled the probability that the same number will appear on each of them is :

(1) $\frac{1}{6}$ (2) $\frac{1}{36}$

(3) $\frac{3}{28}$ (4) $\frac{1}{18}$

39. The solution of a linear inequality in one variable is generally represented on :

(1) Pie chart (2) Bar graph

(3) Number line (4) Histogram

40. Which of the following points are 5 units apart ?

(1) (1, 1, 1) and (2, 2, 2)

(2) (0, 0, 0) and (3, 4, 0)

(3) (0, 0, 0) and (1, 1, 1)

(4) (2, 2, 2) and (4, 4, 4)

41. The greatest of $\tan 1$, $\tan^{-1} 1$, $\sin^{-1} 1$, $\sin 1$, $\cos 1$ is :

(1) $\sin 1$ (2) $\tan 1$

(3) $\tan^{-1} 1$ (4) None of these

42. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$ is equal to :

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

(3) $\frac{\pi}{6}$ (4) π

43. The value of $\tan^{-1} 1 + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ is equal to :

(1) $\frac{\pi}{4}$ (2) $\frac{5\pi}{12}$

(3) $\frac{3\pi}{4}$ (4) $\frac{13\pi}{12}$

44. The principal value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is :

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

(3) $-\frac{2\pi}{3}$ (4) None of these

45. If $\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$, then x, y, z and w are given by :

(1) 1, 3, 4, 5

(2) 1, 2, 4, 5

(3) 1, 3, 5, 7

(4) 1, 2, 4, 7

46. For any square matrix A with real number entries, $A + A'$ is :

(1) Symmetric Matrix (2) Skew-symmetric Matrix

(3) Doesn't Exist (4) None of these

47. If $3A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ and $AA' = I$, then $x + y$ is equal to :

(1) -5 (2) -4

(3) -3 (4) -2

48. If ω is one of the imaginary cube roots of unity, then the value of $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ is given by :

(1) ω (2) 1

(3) ω^2 (4) 0

49. The determinant $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix} = 0$, if :

(1) x, y, z are in A.P.

(2) x, y, z are in G.P.

(3) xy, yz, zx are in A.P.

(4) None of these

50. If A is a square matrix of order 3 such that $|adj.\ A| = 16$, then $|A|$ is equal to :

(1) ± 4 (2) ± 3

(3) $\pm\frac{1}{4}$ (4) $\pm\frac{1}{3}$

51. If $A=\begin{bmatrix} 3 & 5 \\ 2 & 7 \end{bmatrix}$, then A^{-1} is given by :

(1) $\begin{bmatrix} \frac{7}{11} & \frac{-5}{11} \\ \frac{-2}{11} & \frac{3}{11} \end{bmatrix}$ (2) $\frac{1}{11}\begin{bmatrix} 7 & 5 \\ 2 & -3 \end{bmatrix}$ (3) $\frac{1}{11}\begin{bmatrix} 7 & -5 \\ -2 & -3 \end{bmatrix}$ (4) None of these

52. If A is a non-singular matrix, then :

(1) $|A^{-1}|=|A|$ (2) $|A^{-1}|=\left|\frac{A}{2}\right|$

(3) $|A^{-1}|=|A|^{-1}$ (4) None of these

53. $\int\frac{dx}{2x-x^2}$ is equal to :

(1) $\cos^{-1}(x-1)+c$ (2) $\sec^{-1}(x-1)+c$

(3) $\tan^{-1}(x-1)+c$ (4) $\sin^{-1}(x-1)+c$

54. $\int\frac{e^x(x^2+1)}{(x+1)^2}dx$ is equal to :

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

(3) $\frac{x+1}{x-1}e^x+c$ (4) None of these

55. $\int_0^{\pi/4}\sin^3 2t\cos 2t\,dt$ is equal to :

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

(3) $\frac{1}{4}$ (4) $\frac{1}{8}$

56. $\int \frac{x}{1+x^4} dx$ is equal to :

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

(2) $\frac{1}{2}\tan\left(\frac{1}{x^2}\right)+c$

(3) $\frac{1}{2}\tan^{-1}(x^2)+c$

(4) None of these

57. $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$ is equal to :

(1) $\left(\frac{\pi}{2}-1\right)$

(2) 1

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

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

58. The area of the region bounded by the curve $y=x^2$ and the line $y=4$ is :

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

(2) $\frac{8}{3}$

(3) $\frac{16}{3}$

(4) $\frac{32}{3}$

59. The area of the region bounded by the parabolas $y=x^2$ and $y^2=x$ is given by :

(1) $\frac{1}{3}$

(2) 1

(3) $\frac{5}{3}$

(4) None of these

60. $\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\frac{x}{a}+c$ is equal to :

(1) $\int\sqrt{x^2+a^2}dx$

(2) $\int\sqrt{a^2-x^2}dx$

(3) $\int\sqrt{x^2-a^2}dx$

(4) None of these

61. The degree of differential equation $y''' + y^2 + e^{y'} = 0$ is :

(1) 1 (2) Zero

(3) 3 (4) Not defined

62. The differential equation representing the family of curves $y = mx$, where m is arbitrary constant is given by :

(1) $x - \frac{dy}{dx} = 0$ (2) $x\frac{dy}{dx} - y = 0$

(3) $\frac{dy}{dx} + xy = 0$ (4) None of these

63. The differential equation representing the family of parabolas having vertex at origin and axis along positive direction of x-axis is given by :

(1) $y^2 - 2xy\frac{dy}{dx} = 0$ (2) $x^2 - 2xy\frac{dy}{dx} = 0$

(3) $y^2 + 2xy\frac{dy}{dx} = 0$ (4) None of these

64. If $y = y(x)$ and $\frac{2+\sin x}{y+1}\left(\frac{dy}{dx}\right) = -\cos x$, $y(0) = 1$, then $y\left(\frac{\pi}{2}\right)$ equals :

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

(3) $\frac{1}{3}$ (4) 1

65. The general solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 (x \neq 0)$ is given by :

(1) $y = \frac{x^2}{4} + \frac{c}{x^2}$ (2) $y = x^2 + \frac{c}{2x}$

(3) $y = \frac{4}{x^2} + \frac{c}{x^2}$ (4) None of these

66. Ten cards numbered 1 to 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the number on the drawn card is more than 3, what is the probability that it is an even number ?

(1) $\frac{2}{7}$ (2) $\frac{3}{7}$

(3) $\frac{4}{7}$ (4) $\frac{5}{7}$

67. If A and B are two events associated with the same random experiment, then A and B are said to be independent, if :

(1) $P(A \cap B) = \frac{P(A)}{P(B)}$ (2) $P(A \cap B) = P(A) . P(B)$

(3) $P(A \cap B) = P(A) + P(B)$ (4) None of these

68. A random variable is a real valued function whose domain is :

(1) The sample space of a random experiment

(2) Difficult to calculate

(3) Independent of the sample space of a random experiment and may not exist

(4) None of these

69. The variance of the number obtained on a throw of unbiased die is given by :

(1) $\frac{5}{12}$ (2) $\frac{7}{12}$

(3) $\frac{9}{12}$ (4) $\frac{35}{12}$

70. Six balls are drawn successively from an urn containing 7 red and 9 black balls. The trials of drawing balls are Bernoulli trials when after each draw :

(1) The ball drawn is replaced (2) The ball drawn is not replaced

(3) The ball drawn is red (4) None of these

71. Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. The probability that there is at least one defective egg is :

(1) $1-\frac{10^{10}}{9^{10}}$ (2) $1-\frac{9^{10}}{10^{10}}$

(3) $1-\frac{10^{9}}{9^{10}}$ (4) $\frac{9^{10}}{10^{10}}$

72. Let $\vec{u}, \vec{v}, \vec{w}$ be vectors such that $\vec{u}+\vec{v}+\vec{w}=\vec{0}$. If $|\vec{u}|=3, |\vec{v}|=4$ and $|\vec{w}|=5$, then $\vec{u}.\vec{v}+\vec{v}.\vec{w}+\vec{w}.\vec{u}$ is equal to :

(1) 0 (2) 25

(3) –25 (4) 45

73. For any two vectors $\vec{a}$ and $\vec{b}$, $|\vec{a}.\vec{b}| \leq |\vec{a}||\vec{b}|$ is called :

(1) Cauchy-Schwartz Inequality (2) Triangle Inequality

(3) Newton Inequality (4) None of these

74. If $\vec{a}$ and $\vec{b}$ represent the adjacent sides of a parallelogram, then its area is given by :

(1) $\frac{1}{2}|\vec{a}\times\vec{b}|$ (2) $|\vec{a}\times\vec{b}|$

(3) $\frac{|\vec{a}\times\vec{b}|}{4}$ (4) None of these

75. If $\vec{p}$ is the unit vector along a line l, then the projection of a vector $\vec{a}$ on the line l is given by :

(1) $\vec{a}+\hat{p}$ (2) $\frac{\vec{a}}{|\hat{p}|}$

(3) $\vec{a}.\hat{p}$ (4) $\vec{a}\times\hat{p}$

76. The vector equation of a line $\frac{x+3}{2}=\frac{y-5}{4}=\frac{z+6}{2}$ is :

(1) $\vec{r}=(-3\hat{i}+5\hat{j}-6\hat{k})+\lambda(2\hat{i}+4\hat{j}+2\hat{k})$

(2) $\vec{r}=(3\hat{i}-5\hat{j}-6\hat{k})+\lambda(2\hat{i}+4\hat{j}+2\hat{k})$

(3) $\vec{r}=(-3\hat{i}+5\hat{j}+6\hat{k})+\lambda(2\hat{i}-4\hat{j}-2\hat{k})$

(4) $\vec{r}=(-3\hat{i}+5\hat{j}-8\hat{k})+\lambda(2\hat{i}-4\hat{j}-2\hat{k})$

77. The angle between the pair of lines $\frac{x+3}{3}=\frac{y-1}{5}=\frac{z+3}{4}$ and $\frac{x+1}{1}=\frac{y-4}{1}=\frac{z-5}{2}$ is given by :

(1) $\cos^{-1}\left(\frac{\sqrt{3}}{15}\right)$ (2) $\cos^{-1}\left(\frac{8\sqrt{3}}{15}\right)$ (3) $\cos^{-1}\left(\frac{15}{\sqrt{3}}\right)$ (4) $\cos^{-1}\left(\frac{\sqrt{3}}{8}\right)$

78. Two lines $\vec{r}=\vec{a}_1+\lambda\vec{b}_1$, $\vec{r}=\vec{a}_2+\mu\vec{b}_2$ are collinear if :

(1) $(\vec{a}_1-\vec{b}_1).(\vec{a}_2\times\vec{b}_2)=0$ (2) $(\vec{a}_2-\vec{a}_1)\times(\vec{b}_1\times\vec{b}_2)=\vec{0}$

(3) $(\vec{a}_2-\vec{a}_1).(\vec{b}_1\times\vec{b}_2)=0$ (4) None of these

79. Which of the following statement is ***true*** ?

(1) Skew lines are lines in space which are neither parallel nor intersecting. They are in different planes

(2) Skew lines are lines in a plane which are intersecting at two points only

(3) Skew lines are lines in space which may be parallel or intersecting

(4) None of these

80. The angle between the line $\frac{x+1}{2}=\frac{y}{3}=\frac{z-3}{6}$ and the plane $10x+2y-11z=3$ is given by :

(1) $\tan^{-1}\left(\frac{8}{21}\right)$ (2) $\cos^{-1}\left(\frac{21}{8}\right)$ (3) $\sin^{-1}\left(\frac{1}{21}\right)$ (4) $\sin^{-1}\left(\frac{8}{21}\right)$

81. If $y = x + \sqrt{x^2 - 1}$, then $(y - x)\frac{dy}{dx} - y$ is equal to :

(1) -1 (2) 1

(3) 0 (4) None of these

82. The derivative of $\log_2 \frac{e^{3x}(x+5)^3}{(x-3)^2}$ with respect to x is :

(1) $\log_2 e$ (2) $\left(3 + \frac{3}{x+5} - \frac{2}{x-3}\right)$

(3) $\left(3 - \frac{2}{x-3}\right)\log_2 e$ (4) $\left(3 + \frac{3}{x+5} - \frac{2}{x-3}\right)\log_2 e$

83. The derivative of x^x w.r.t. $x \log x$ is :

(1) $\log x$ (2) x^x

(3) $\frac{x^x}{\log x}$ (4) None of these

84. The function $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ is not defined at $x = 0$. The function $f(x)$ is continuous at $x = 0$, if $f(0)$ is given by :

(1) $(a - b)$

(2) $\log a + \log b$

(3) $(a + b)$

(4) None of these

85. A circular disc of radius 3 cm is being heated. Due to expansion, its radius increases at the rate of 0.05 cm/s. Find the rate at which its area is increasing when radius is 3.2 cm :

(1) $3.2\ \pi\ cm^2/sec$ (2) $0.23\ \pi\ cm^2/sec$

(3) $0.32\ \pi\ cm^2/sec$ (4) None of these

86. $f(x) = x\sqrt{32 - x^2}$ has local maxima at :

(1) $x = 4$

(2) $x = -4$

(3) $x = \sqrt{32}$

(4) None of these

87. The area of the largest rectangle having the perimeter 200 meters is :

(1) 2500 sq. mt.

(2) 3000 sq. mt.

(3) 3200 sq. mt.

(4) None of these

88. If $y = \sin^{-1} x$, then $(1 - x^2)y_2$ is equal to :

(1) $\frac{x}{y_1}$ (2) $\frac{y_1}{x}$

(3) xy_1 (4) None of these

89. The equation of common tangent to the curves $y^2 = 8x$ and $xy = -1$ is :

(1) $3y = 9x + 2$

(2) $y = 2x + 1$

(3) $2y = x + 8$

(4) $y = x + 2$

90. If the normal to the curve $y = f(x)$ at the point (3, 4) makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then $f'(3)$ is equal to :

(1) $-\frac{3}{4}$ (2) $\frac{4}{3}$

(3) 1 (4) None of these

91. The domain of definition of the function $f(x)=\sqrt{\sin^{-1}(2x)+\frac{\pi}{6}}$ for real valued x is :

(1) $\left[-\frac{1}{4},\frac{1}{2}\right]$ (2) $\left[-\frac{1}{2},\frac{1}{2}\right]$

(3) $\left(-\frac{1}{2},\frac{1}{9}\right)$ (4) $\left[-\frac{1}{4},\frac{1}{4}\right]$

92. If $f(x)=3x-5$, then $f^{-1}(x)$:

(1) is given by $\frac{x+5}{3}$

(2) is given by $\frac{1}{3x-5}$

(3) doesn't exist because f is not one-one

(4) None of these

93. A Linear Programming Problem must have :

(1) Non-linear equations

(2) Only one variable

(3) Linear objective function and constraints

(4) Infinite solutions only

94. Restrictions in a Linear Programming Problem are called :

(1) Objectives (2) Constraints

(3) Variables (4) Constants

95. Which of the following is the main objective of Linear Programming ?

(1) To calculate probability only (2) To solve historical problems

(3) To study geometry only (4) To optimize a linear objective function

96. The value of K for which the system of equations $\begin{matrix}(K+1)x+8y=4K \\ Kx+(K+3)y=3K-1\end{matrix}$ has infinitely many solutions, is/are :

(1) 2 (2) ∞

(3) 1 (4) None of these

97. If $A=\begin{bmatrix}\lambda & 0 \\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0 \\ 5 & 1\end{bmatrix}$, then the value of λ for which $A^2=B$, is given by :

(1) $\lambda=1$ (2) $\lambda=-1$

(3) $\lambda=4$ (4) No real values of λ exist

98. If $x^2+y^2=1$, then :

(1) $yy_2-2(y_1)^2+1=0$

(2) $1+yy_2+(y_1)^2=0$

(3) $yy_2+(y_1)^2-1=0$

(4) None of these

99. The distance between two skew lines given by $\vec{r}=\vec{a}_1+\lambda\vec{b}_1$ and $\vec{r}=\vec{a}_2+\mu\vec{b}_2$ is :

(1) $\left|\dfrac{\vec{b}_1\times\vec{a}_1}{(a_1\vec{b}_2-a_2\vec{b}_1)}\right|$ (2) $\left|\dfrac{(\vec{b}_1\times\vec{b}_2)\times(\vec{a}_2-\vec{a}_1)}{|\vec{b}_1\times\vec{b}_2|}\right|$

(3) $\left|\dfrac{(\vec{b}_1\times\vec{b}_2).(\vec{a}_2-\vec{a}_1)}{|\vec{b}_1\times\vec{b}_2|}\right|$ (4) None of these

100. The differential equation $(x-y)\dfrac{dy}{dx}=x+2y$ is :

(1) Homogeneous (2) Heterogeneous

(3) Of second order (4) None of these

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B

SET-X

UG-4Yr.-EE-June, 2026

SUBJECT : B. Sc.-Mathematics

Sr. No. 10326

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name _____

Date of Examination _____

(Signature of the Candidate) (Signature of the Invigilator)

SEAL

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3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
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6. ***There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
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8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

1. The smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n$ is equal to 1 :

(1) 8 (2) 12

(3) 16 (4) None of these

2. If $\omega(\neq 1)$ is a cube root of unity and $(1+\omega^2)^n = (1+\omega^4)^n$, then the least positive value of n is :

(1) 6 (2) 5

(3) 2 (4) 3

3. If $\arg(z) < 0$, then $\arg(-z) - \arg(z)$ is equal to :

(1) π (2) $-\pi$

(3) $-\frac{\pi}{2}$ (4) $\frac{\pi}{2}$

4. The roots of $x^{2/3} + x^{1/3} - 2 = 0$ are :

(1) $-1, 6$

(2) $-1, -8$

(3) $1, -6$

(4) $1, -8$

5. Let α, β be the roots of the equation $(x-a)(x-b) = c$, $c \neq 0$. Then the roots of the equation $(x-\alpha)(x-\beta) + c = 0$ are :

(1) a, c

(2) b, c

(3) a, b

(4) $\frac{1}{b}, \frac{1}{c}$

6. A five digit number is to be formed which is divisible by 3, using the numbers 0, 1, 2, 3, 4 and 5, without repeation. This can be done in how many numbers of ways ?

(1) 3125 (2) 600

(3) 240 (4) 216

7. The number of divisors of the form $(4n + 2)$, $n \geq 0$ of the integer 240 is :

(1) 3 (2) 4

(3) 8 (4) 10

8. If ${}^{2n}C_3 : {}^{n}C_2 = 12 : 1$, then n is equal to :

(1) 2 (2) 3

(3) 4 (4) 5

9. The number of diagonals that can be drawn by joining the angular points of octagon :

(1) 20 (2) 18

(3) 16 (4) 14

10. In the expansion of $\left(x+\frac{1}{x}\right)^6$, the third term from the end is :

(1) $\frac{1}{x^2}$ (2) $\frac{x^2}{15}$

(3) $\frac{15}{x^2}$ (4) $\frac{x^2}{3}$

11. The domain of definition of the function $f(x)=\sqrt{\sin^{-1}(2x)+\frac{\pi}{6}}$ for real valued x is :

(1) $\left[-\frac{1}{4},\frac{1}{2}\right]$ (2) $\left[-\frac{1}{2},\frac{1}{2}\right]$

(3) $\left(-\frac{1}{2},\frac{1}{9}\right)$ (4) $\left[-\frac{1}{4},\frac{1}{4}\right]$

12. If $f(x)=3x-5$, then $f^{-1}(x)$:

(1) is given by $\frac{x+5}{3}$

(2) is given by $\frac{1}{3x-5}$

(3) doesn't exist because f is not one-one

(4) None of these

13. A Linear Programming Problem must have :

(1) Non-linear equations

(2) Only one variable

(3) Linear objective function and constraints

(4) Infinite solutions only

14. Restrictions in a Linear Programming Problem are called :

(1) Objectives (2) Constraints

(3) Variables (4) Constants

15. Which of the following is the main objective of Linear Programming ?

(1) To calculate probability only (2) To solve historical problems

(3) To study geometry only (4) To optimize a linear objective function

16. The value of K for which the system of equations $\begin{matrix}(K+1)x+8y=4K \\ Kx+(K+3)y=3K-1\end{matrix}$ has infinitely many solutions, is/are :

(1) 2 (2) ∞

(3) 1 (4) None of these

17. If $A=\begin{bmatrix}\lambda & 0 \\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0 \\ 5 & 1\end{bmatrix}$, then the value of λ for which $A^2=B$, is given by :

(1) $\lambda=1$ (2) $\lambda=-1$

(3) $\lambda=4$ (4) No real values of λ exist

18. If $x^2+y^2=1$, then :

(1) $yy_2-2(y_1)^2+1=0$

(2) $1+yy_2+(y_1)^2=0$

(3) $yy_2+(y_1)^2-1=0$

(4) None of these

19. The distance between two skew lines given by $\vec{r}=\vec{a}_1+\lambda\vec{b}_1$ and $\vec{r}=\vec{a}_2+\mu\vec{b}_2$ is :

(1) $\left|\dfrac{\vec{b}_1\times\vec{a}_1}{(a_1\vec{b}_2-a_2\vec{b}_1)}\right|$ (2) $\left|\dfrac{(\vec{b}_1\times\vec{b}_2)\times(\vec{a}_2-\vec{a}_1)}{|\vec{b}_1\times\vec{b}_2|}\right|$

(3) $\left|\dfrac{(\vec{b}_1\times\vec{b}_2).(\vec{a}_2-\vec{a}_1)}{|\vec{b}_1\times\vec{b}_2|}\right|$ (4) None of these

20. The differential equation $(x-y)\dfrac{dy}{dx}=x+2y$ is :

(1) Homogeneous (2) Heterogeneous

(3) Of second order (4) None of these

21. Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. The probability that there is at least one defective egg is :

(1) $1-\frac{10^{10}}{9^{10}}$ (2) $1-\frac{9^{10}}{10^{10}}$

(3) $1-\frac{10^{9}}{9^{10}}$ (4) $\frac{9^{10}}{10^{10}}$

22. Let $\vec{u}, \vec{v}, \vec{w}$ be vectors such that $\vec{u}+\vec{v}+\vec{w}=\vec{0}$. If $|\vec{u}|=3, |\vec{v}|=4$ and $|\vec{w}|=5$, then $\vec{u}.\vec{v}+\vec{v}.\vec{w}+\vec{w}.\vec{u}$ is equal to :

(1) 0 (2) 25

(3) –25 (4) 45

23. For any two vectors $\vec{a}$ and $\vec{b}$, $|\vec{a}.\vec{b}| \leq |\vec{a}||\vec{b}|$ is called :

(1) Cauchy-Schwartz Inequality (2) Triangle Inequality

(3) Newton Inequality (4) None of these

24. If $\vec{a}$ and $\vec{b}$ represent the adjacent sides of a parallelogram, then its area is given by :

(1) $\frac{1}{2}|\vec{a}\times\vec{b}|$ (2) $|\vec{a}\times\vec{b}|$

(3) $\frac{|\vec{a}\times\vec{b}|}{4}$ (4) None of these

25. If $\vec{p}$ is the unit vector along a line l, then the projection of a vector $\vec{a}$ on the line l is given by :

(1) $\vec{a}+\hat{p}$ (2) $\frac{\vec{a}}{|\hat{p}|}$

(3) $\vec{a}.\hat{p}$ (4) $\vec{a}\times\hat{p}$

26. The vector equation of a line $\frac{x+3}{2}=\frac{y-5}{4}=\frac{z+6}{2}$ is :

(1) $\vec{r}=(-3\hat{i}+5\hat{j}-6\hat{k})+\lambda(2\hat{i}+4\hat{j}+2\hat{k})$

(2) $\vec{r}=(3\hat{i}-5\hat{j}-6\hat{k})+\lambda(2\hat{i}+4\hat{j}+2\hat{k})$

(3) $\vec{r}=(-3\hat{i}+5\hat{j}+6\hat{k})+\lambda(2\hat{i}-4\hat{j}-2\hat{k})$

(4) $\vec{r}=(-3\hat{i}+5\hat{j}-8\hat{k})+\lambda(2\hat{i}-4\hat{j}-2\hat{k})$

27. The angle between the pair of lines $\frac{x+3}{3}=\frac{y-1}{5}=\frac{z+3}{4}$ and $\frac{x+1}{1}=\frac{y-4}{1}=\frac{z-5}{2}$ is given by :

(1) $\cos^{-1}\left(\frac{\sqrt{3}}{15}\right)$ (2) $\cos^{-1}\left(\frac{8\sqrt{3}}{15}\right)$ (3) $\cos^{-1}\left(\frac{15}{\sqrt{3}}\right)$ (4) $\cos^{-1}\left(\frac{\sqrt{3}}{8}\right)$

28. Two lines $\vec{r}=\vec{a}_1+\lambda\vec{b}_1, \vec{r}=\vec{a}_2+\mu\vec{b}_2$ are collinear if :

(1) $(\vec{a}_1-\vec{b}_1).(\vec{a}_2\times\vec{b}_2)=0$ (2) $(\vec{a}_2-\vec{a}_1)\times(\vec{b}_1\times\vec{b}_2)=\vec{0}$

(3) $(\vec{a}_2-\vec{a}_1).(\vec{b}_1\times\vec{b}_2)=0$ (4) None of these

29. Which of the following statement is ***true*** ?

(1) Skew lines are lines in space which are neither parallel nor intersecting. They are in different planes

(2) Skew lines are lines in a plane which are intersecting at two points only

(3) Skew lines are lines in space which may be parallel or intersecting

(4) None of these

30. The angle between the line $\frac{x+1}{2}=\frac{y}{3}=\frac{z-3}{6}$ and the plane $10x+2y-11z=3$ is given by :

(1) $\tan^{-1}\left(\frac{8}{21}\right)$ (2) $\cos^{-1}\left(\frac{21}{8}\right)$ (3) $\sin^{-1}\left(\frac{1}{21}\right)$ (4) $\sin^{-1}\left(\frac{8}{21}\right)$

31. If $A=\begin{bmatrix} 3 & 5 \\ 2 & 7 \end{bmatrix}$, then A^{-1} is given by :

(1) $\begin{bmatrix} \frac{7}{11} & \frac{-5}{11} \\ \frac{-2}{11} & \frac{3}{11} \end{bmatrix}$ (2) $\frac{1}{11}\begin{bmatrix} 7 & 5 \\ 2 & -3 \end{bmatrix}$ (3) $\frac{1}{11}\begin{bmatrix} 7 & -5 \\ -2 & -3 \end{bmatrix}$ (4) None of these

32. If A is a non-singular matrix, then :

(1) $|A^{-1}|=|A|$ (2) $|A^{-1}|=\left|\frac{A}{2}\right|$

(3) $|A^{-1}|=|A|^{-1}$ (4) None of these

33. $\int\frac{dx}{2x-x^2}$ is equal to :

(1) $\cos^{-1}(x-1)+c$ (2) $\sec^{-1}(x-1)+c$

(3) $\tan^{-1}(x-1)+c$ (4) $\sin^{-1}(x-1)+c$

34. $\int\frac{e^x(x^2+1)}{(x+1)^2}dx$ is equal to :

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

(3) $\frac{x+1}{x-1}e^x+c$ (4) None of these

35. $\int_0^{\pi/4}\sin^3 2t\cos 2t\,dt$ is equal to :

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

(3) $\frac{1}{4}$ (4) $\frac{1}{8}$

36. $\int \frac{x}{1+x^4} dx$ is equal to :

(1) $\frac{1}{2}\tan(x^2)+c$ (2) $\frac{1}{2}\tan\left(\frac{1}{x^2}\right)+c$

(3) $\frac{1}{2}\tan^{-1}(x^2)+c$ (4) None of these

37. $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$ is equal to :

(1) $\left(\frac{\pi}{2}-1\right)$ (2) 1

(3) $\frac{\pi}{2}$ (4) $\frac{2}{\pi}$

38. The area of the region bounded by the curve $y=x^2$ and the line $y=4$ is :

(1) $\frac{4}{3}$ (2) $\frac{8}{3}$

(3) $\frac{16}{3}$ (4) $\frac{32}{3}$

39. The area of the region bounded by the parabolas $y=x^2$ and $y^2=x$ is given by :

(1) $\frac{1}{3}$ (2) 1

(3) $\frac{5}{3}$ (4) None of these

40. $\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\frac{x}{a}+c$ is equal to :

(1) $\int\sqrt{x^2+a^2}dx$ (2) $\int\sqrt{a^2-x^2}dx$

(3) $\int\sqrt{x^2-a^2}dx$ (4) None of these

41. The points $(-a, -b)$, $(0, 0)$, (a, b) and (a^2, ab) are :

(1) Vertices of a rectangle
(2) Vertices of a parallelogram
(3) Collinear
(4) None of these

42. The equation of parabola with vertex at the origin and passing through $(2, -3)$ and symmetric with respect to y-axis is :

(1) $4x^2 = -3y$
(2) $x^2 + y^2 = 13$
(3) $3x^2 = -4y$
(4) None of these

43. The eccentricity of $x^2 + 3y^2 = a^2$ is :

(1) $\frac{\sqrt{2}}{3}$
(2) $\frac{3}{\sqrt{2}}$
(3) $\frac{\sqrt{6}}{2}$
(4) $\frac{\sqrt{6}}{3}$

44. The equation of a hyperbola whose conjugate axis is 5 and the distance between the foci is 13 is :

(1) $25x^2 - 144y^2 = 900$
(2) $144x^2 - 25y^2 = 900$
(3) $52x^2 - 114y^2 = 900$
(4) $25x^2 - 441y^2 = 900$

45. If two statements are combined by using the logical connective 'and', then the resulting statement is called :

(1) Conjunction
(2) Disjunction
(3) Biconditional
(4) None of these

46. The variance for the data :

2, 4, 5, 6, 8, 17 is given by

(1) $\frac{7}{6}$ (2) $\frac{14}{6}$ (3) $\frac{28}{6}$ (4) $\frac{140}{6}$

47. A fair coin is tossed repeatedly. If tail appears on first four tosses, then the probability of head appearing on fifth toss is :

(1) $\frac{1}{2}$ (2) $\frac{1}{5}$

(3) $\frac{1}{32}$ (4) $\frac{31}{32}$

48. Three identical dice are rolled the probability that the same number will appear on each of them is :

(1) $\frac{1}{6}$ (2) $\frac{1}{36}$

(3) $\frac{3}{28}$ (4) $\frac{1}{18}$

49. The solution of a linear inequality in one variable is generally represented on :

(1) Pie chart (2) Bar graph

(3) Number line (4) Histogram

50. Which of the following points are 5 units apart ?

(1) (1, 1, 1) and (2, 2, 2)

(2) (0, 0, 0) and (3, 4, 0)

(3) (0, 0, 0) and (1, 1, 1)

(4) (2, 2, 2) and (4, 4, 4)

51. ${}^{10}C_1 + {}^{10}C_2 + {}^{10}C_3 + \ldots\ldots\ldots + {}^{10}C_9$ is equal to :

(1) 128 (2) 256

(3) 512 (4) None of these

52. The term independent of x in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$ is :

(1) $\frac{5}{18}$ (2) $\frac{7}{18}$

(3) $\frac{9}{18}$ (4) $\frac{11}{18}$

53. If third term of a geometric progression is 4, then the product of the first five terms is :

(1) 4^5 (2) 4^4

(3) 4^3 (4) 4^2

54. In a triangle, the lengths of two larger sides are 10 and 9 respectively. If the angles are in A.P., then the length of the third side can be :

(1) $3\sqrt{3}$ (2) 5

(3) $\sqrt{84}$ (4) $\sqrt{91}$

55. If the sum of an A.P. is 2 and the sum of first five terms is equal to one fourth of the sum of the next five terms, then :

(1) $a = 2, d = -6$

(2) $a = -2, d = 6$

(3) $a = 2, d = 6$

(4) None of these

56. The sum of three numbers in G.P. is $\frac{13}{12}$ and their product is -1. The common ratio is :

(1) $-\frac{5}{4}, -\frac{4}{5}$ (2) $-\frac{2}{3}, -\frac{3}{2}$

(3) $-\frac{3}{4}, -\frac{4}{3}$ (4) None of these

57. The sum of $12 + 13 + 14 + 15 + \ldots\ldots\ldots + 37$ is equal to :

(1) 763 (2) 367

(3) 637 (4) None of these

58. A straight line passes through the point (2, 3) and the portion of the line intercepted between the axes is bisected at this point, the equation of line is :

(1) $3x + 2y - 12 = 0$ (2) $2x + 3y + 12 = 0$

(3) $3x - 2y + 12 = 0$ (4) None of these

59. The intercepts on the axes for the line $4x - 3y - 12 = 0$ are :

(1) x-intercept = 4, y-intercept = 3

(2) x-intercept = 3, y-intercept = -4

(3) x-intercept = -3, y-intercept = -4

(4) None of these

60. The angle between the lines joining the points (0, 0), (2, 3) and (2, -2), (3, 5) is :

(1) $\tan^{-1}\left(\frac{23}{11}\right)$ (2) $\tan^{-1}\left(\frac{11}{23}\right)$

(3) $\tan^{-1}\left(\frac{8}{23}\right)$ (4) $\tan^{-1}\left(\frac{9}{23}\right)$

61. The greatest of $\tan 1$, $\tan^{-1} 1$, $\sin^{-1} 1$, $\sin 1$, $\cos 1$ is :

(1) $\sin 1$ (2) $\tan 1$

(3) $\tan^{-1} 1$ (4) None of these

62. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$ is equal to :

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

(3) $\frac{\pi}{6}$ (4) π

63. The value of $\tan^{-1} 1 + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ is equal to :

(1) $\frac{\pi}{4}$ (2) $\frac{5\pi}{12}$

(3) $\frac{3\pi}{4}$ (4) $\frac{13\pi}{12}$

64. The principal value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is :

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

(3) $-\frac{2\pi}{3}$ (4) None of these

65. If $\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$, then x, y, z and w are given by :

(1) 1, 3, 4, 5

(2) 1, 2, 4, 5

(3) 1, 3, 5, 7

(4) 1, 2, 4, 7

66. For any square matrix A with real number entries, $A + A'$ is :

(1) Symmetric Matrix (2) Skew-symmetric Matrix

(3) Doesn't Exist (4) None of these

67. If $3A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ and $AA' = I$, then $x + y$ is equal to :

(1) –5 (2) –4

(3) –3 (4) –2

68. If ω is one of the imaginary cube roots of unity, then the value of $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ is given by :

(1) ω (2) 1

(3) ω^2 (4) 0

69. The determinant $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix} = 0$, if :

(1) x, y, z are in A.P.

(2) x, y, z are in G.P.

(3) xy, yz, zx are in A.P.

(4) None of these

70. If A is a square matrix of order 3 such that $|adj.\ A| = 16$, then $|A|$ is equal to :

(1) ±4 (2) ±3

(3) $\pm\frac{1}{4}$ (4) $\pm\frac{1}{3}$

71. The degree of differential equation $y''' + y^2 + e^{y'} = 0$ is :

(1) 1 (2) Zero

(3) 3 (4) Not defined

72. The differential equation representing the family of curves $y = mx$, where m is arbitrary constant is given by :

(1) $x - \frac{dy}{dx} = 0$ (2) $x\frac{dy}{dx} - y = 0$

(3) $\frac{dy}{dx} + xy = 0$ (4) None of these

73. The differential equation representing the family of parabolas having vertex at origin and axis along positive direction of x-axis is given by :

(1) $y^2 - 2xy\frac{dy}{dx} = 0$ (2) $x^2 - 2xy\frac{dy}{dx} = 0$

(3) $y^2 + 2xy\frac{dy}{dx} = 0$ (4) None of these

74. If $y = y(x)$ and $\frac{2+\sin x}{y+1}\left(\frac{dy}{dx}\right) = -\cos x$, $y(0) = 1$, then $y\left(\frac{\pi}{2}\right)$ equals :

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

(3) $\frac{1}{3}$ (4) 1

75. The general solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 (x \neq 0)$ is given by :

(1) $y = \frac{x^2}{4} + \frac{c}{x^2}$ (2) $y = x^2 + \frac{c}{2x}$

(3) $y = \frac{4}{x^2} + \frac{c}{x^2}$ (4) None of these

76. Ten cards numbered 1 to 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the number on the drawn card is more than 3, what is the probability that it is an even number ?

(1) $\frac{2}{7}$ (2) $\frac{3}{7}$

(3) $\frac{4}{7}$ (4) $\frac{5}{7}$

77. If A and B are two events associated with the same random experiment, then A and B are said to be independent, if :

(1) $P(A \cap B) = \frac{P(A)}{P(B)}$ (2) $P(A \cap B) = P(A) . P(B)$

(3) $P(A \cap B) = P(A) + P(B)$ (4) None of these

78. A random variable is a real valued function whose domain is :

(1) The sample space of a random experiment

(2) Difficult to calculate

(3) Independent of the sample space of a random experiment and may not exist

(4) None of these

79. The variance of the number obtained on a throw of unbiased die is given by :

(1) $\frac{5}{12}$ (2) $\frac{7}{12}$

(3) $\frac{9}{12}$ (4) $\frac{35}{12}$

80. Six balls are drawn successively from an urn containing 7 red and 9 black balls. The trials of drawing balls are Bernoulli trials when after each draw :

(1) The ball drawn is replaced (2) The ball drawn is not replaced

(3) The ball drawn is red (4) None of these

81. Which of the following is ***not*** a null set ?

(1) $A = \{x : x^2 = 16, x \in N\}$

(2) $A = \{x : x < 5, x > 6\}$

(3) $A = \{x : |x| < -4, x \in N\}$

(4) $A = \{x : x \in N, 2 < x < 3\}$

82. If $A = \{1, 2, 3, 4\}$ and $B = \{2, 3, 4, 5, 6\}$, then $A - B$ is :

(1) $\{1, 5, 6\}$

(2) Null set

(3) $\{1\}$

(4) $\{5, 6\}$

83. In a class of 60 boys, there are 45 boys who play cards and 30 boys play carrom. How many boys play both games ?

(1) 30 (2) 15

(3) 45 (4) 10

84. If $A = \{1, 3, 5, 7\}$ and $B = \{2, 5\}$, then the numbers of relations from A to B is :

(1) 256 (2) 128

(3) 64 (4) 32

85. The range of the function $y = \sqrt{x-3}$ is :

(1) $(\infty, -\infty)$ (2) $(0, 3)$

(3) $(-3, 3)$ (4) $[0, \infty)$

86. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then $\cos\theta - \sin\theta$ is given by :

(1) $\sqrt{2}\tan\theta$ (2) $\sqrt{2}\sin\theta$

(3) $\sqrt{2}\cos\theta$ (4) $\sqrt{2}\sec\theta$

87. $75°$ is equal to :

(1) 5π radians (2) $\frac{5\pi}{12}$ radians

(3) $\frac{12\pi}{5}$ radians (4) $\frac{7\pi}{5}$ radians

88. If $\sin\theta \sec\theta = -1$ and θ lies in the second quadrant, then $\sin\theta$ is equal to :

(1) $\sqrt{2}$ (2) 2

(3) $\frac{1}{\sqrt{2}}$ (4) $\frac{1}{2}$

89. If $\cot\alpha \cot\beta = 2$, then $\frac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}$ is equal to :

(1) $\frac{1}{4}$ (2) $\frac{1}{2}$

(3) $\frac{1}{6}$ (4) $\frac{1}{3}$

90. If a statement $P(n)$ is true for $n = 1$, and whenever $P(k)$ is true, then $P(k + 1)$ is also true, then according to PMI :

(1) $P(n)$ is true only for $n = 1$

(2) $P(n)$ is false for all natural numbers

(3) $P(n)$ is true for all natural numbers

(4) $P(n)$ is true only for even numbers

91. If $y = x + \sqrt{x^2 - 1}$, then $(y - x)\frac{dy}{dx} - y$ is equal to :

(1) -1

(2) 1

(3) 0

(4) None of these

92. The derivative of $\log_2 \frac{e^{3x}(x+5)^3}{(x-3)^2}$ with respect to x is :

(1) $\log_2 e$

(2) $\left(3 + \frac{3}{x+5} - \frac{2}{x-3}\right)$

(3) $\left(3 - \frac{2}{x-3}\right)\log_2 e$

(4) $\left(3 + \frac{3}{x+5} - \frac{2}{x-3}\right)\log_2 e$

93. The derivative of x^x w.r.t. $x \log x$ is :

(1) $\log x$

(2) x^x

(3) $\frac{x^x}{\log x}$

(4) None of these

94. The function $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ is not defined at $x = 0$. The function $f(x)$ is continuous at $x = 0$, if $f(0)$ is given by :

(1) $(a - b)$

(2) $\log a + \log b$

(3) $(a + b)$

(4) None of these

95. A circular disc of radius 3 cm is being heated. Due to expansion, its radius increases at the rate of 0.05 cm/s. Find the rate at which its area is increasing when radius is 3.2 cm :

(1) $3.2\ \pi\ cm^2/sec$

(2) $0.23\ \pi\ cm^2/sec$

(3) $0.32\ \pi\ cm^2/sec$

(4) None of these

96. $f(x) = x\sqrt{32 - x^2}$ has local maxima at :

(1) $x = 4$

(2) $x = -4$

(3) $x = \sqrt{32}$

(4) None of these

97. The area of the largest rectangle having the perimeter 200 meters is :

(1) 2500 sq. mt.

(2) 3000 sq. mt.

(3) 3200 sq. mt.

(4) None of these

98. If $y = \sin^{-1} x$, then $(1 - x^2)y_2$ is equal to :

(1) $\frac{x}{y_1}$ (2) $\frac{y_1}{x}$

(3) xy_1 (4) None of these

99. The equation of common tangent to the curves $y^2 = 8x$ and $xy = -1$ is :

(1) $3y = 9x + 2$

(2) $y = 2x + 1$

(3) $2y = x + 8$

(4) $y = x + 2$

100. If the normal to the curve $y = f(x)$ at the point (3, 4) makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then $f'(3)$ is equal to :

(1) $-\frac{3}{4}$ (2) $\frac{4}{3}$

(3) 1 (4) None of these

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Neha Phogat 11/06/2026 11/06/2026 J. Rathi 11/06/2026

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C

SET-X

UG-4Yr.-EE-June, 2026

SUBJECT : B. Sc.-Mathematics

10323

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name_____

Date of Examination_____

(Signature of the Candidate) (Signature of the Invigilator)

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2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
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SEAL

1. The greatest of $\tan 1$, $\tan^{-1} 1$, $\sin^{-1} 1$, $\sin 1$, $\cos 1$ is :

   (1) $\sin 1$ (2) $\tan 1$

   (3) $\tan^{-1} 1$ (4) None of these

2. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$ is equal to :

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

   (3) $\frac{\pi}{6}$ (4) π

3. The value of $\tan^{-1} 1 + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ is equal to :

   (1) $\frac{\pi}{4}$ (2) $\frac{5\pi}{12}$

   (3) $\frac{3\pi}{4}$ (4) $\frac{13\pi}{12}$

4. The principal value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is :

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

   (3) $-\frac{2\pi}{3}$ (4) None of these

5. If $\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$, then x, y, z and w are given by :

   (1) 1, 3, 4, 5

   (2) 1, 2, 4, 5

   (3) 1, 3, 5, 7

   (4) 1, 2, 4, 7

6. For any square matrix A with real number entries, $A + A'$ is :

(1) Symmetric Matrix (2) Skew-symmetric Matrix

(3) Doesn't Exist (4) None of these

7. If $3A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ and $AA' = I$, then $x + y$ is equal to :

(1) –5 (2) –4

(3) –3 (4) –2

8. If ω is one of the imaginary cube roots of unity, then the value of $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ is given by :

(1) ω (2) 1

(3) ω^2 (4) 0

9. The determinant $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix} = 0$, if :

(1) x, y, z are in A.P.

(2) x, y, z are in G.P.

(3) xy, yz, zx are in A.P.

(4) None of these

10. If A is a square matrix of order 3 such that $|adj.\ A| = 16$, then $|A|$ is equal to :

(1) ± 4 (2) ± 3

(3) $\pm\frac{1}{4}$ (4) $\pm\frac{1}{3}$

11. ${}^{10}C_1 + {}^{10}C_2 + {}^{10}C_3 + \ldots\ldots + {}^{10}C_9$ is equal to :

(1) 128 (2) 256

(3) 512 (4) None of these

12. The term independent of x in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$ is :

(1) $\frac{5}{18}$ (2) $\frac{7}{18}$

(3) $\frac{9}{18}$ (4) $\frac{11}{18}$

13. If third term of a geometric progression is 4, then the product of the first five terms is :

(1) 4^5 (2) 4^4

(3) 4^3 (4) 4^2

14. In a triangle, the lengths of two larger sides are 10 and 9 respectively. If the angles are in A.P., then the length of the third side can be :

(1) $3\sqrt{3}$ (2) 5

(3) $\sqrt{84}$ (4) $\sqrt{91}$

15. If the sum of an A.P. is 2 and the sum of first five terms is equal to one fourth of the sum of the next five terms, then :

(1) $a = 2, d = -6$

(2) $a = -2, d = 6$

(3) $a = 2, d = 6$

(4) None of these

16. The sum of three numbers in G.P. is $\frac{13}{12}$ and their product is -1. The common ratio is :

(1) $-\frac{5}{4}, -\frac{4}{5}$ (2) $-\frac{2}{3}, -\frac{3}{2}$

(3) $-\frac{3}{4}, -\frac{4}{3}$ (4) None of these

17. The sum of $12 + 13 + 14 + 15 + \ldots\ldots\ldots + 37$ is equal to :

(1) 763 (2) 367

(3) 637 (4) None of these

18. A straight line passes through the point (2, 3) and the portion of the line intercepted between the axes is bisected at this point, the equation of line is :

(1) $3x + 2y - 12 = 0$ (2) $2x + 3y + 12 = 0$

(3) $3x - 2y + 12 = 0$ (4) None of these

19. The intercepts on the axes for the line $4x - 3y - 12 = 0$ are :

(1) x-intercept = 4, y-intercept = 3

(2) x-intercept = 3, y-intercept = -4

(3) x-intercept = -3, y-intercept = -4

(4) None of these

20. The angle between the lines joining the points (0, 0), (2, 3) and (2, -2), (3, 5) is :

(1) $\tan^{-1}\left(\frac{23}{11}\right)$ (2) $\tan^{-1}\left(\frac{11}{23}\right)$

(3) $\tan^{-1}\left(\frac{8}{23}\right)$ (4) $\tan^{-1}\left(\frac{9}{23}\right)$

21. Which of the following is ***not*** a null set ?

(1) $A = \{x : x^2 = 16, x \in N\}$

(2) $A = \{x : x < 5, x > 6\}$

(3) $A = \{x : |x| < -4, x \in N\}$

(4) $A = \{x : x \in N, 2 < x < 3\}$

22. If $A = \{1, 2, 3, 4\}$ and $B = \{2, 3, 4, 5, 6\}$, then $A - B$ is :

(1) $\{1, 5, 6\}$

(2) Null set

(3) $\{1\}$

(4) $\{5, 6\}$

23. In a class of 60 boys, there are 45 boys who play cards and 30 boys play carrom. How many boys play both games ?

(1) 30 (2) 15

(3) 45 (4) 10

24. If $A = \{1, 3, 5, 7\}$ and $B = \{2, 5\}$, then the numbers of relations from A to B is :

(1) 256 (2) 128

(3) 64 (4) 32

25. The range of the function $y = \sqrt{x-3}$ is :

(1) $(\infty, -\infty)$ (2) $(0, 3)$

(3) $(-3, 3)$ (4) $[0, \infty)$

26. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then $\cos\theta - \sin\theta$ is given by :

(1) $\sqrt{2}\tan\theta$ (2) $\sqrt{2}\sin\theta$

(3) $\sqrt{2}\cos\theta$ (4) $\sqrt{2}\sec\theta$

27. $75°$ is equal to :

(1) 5π radians (2) $\frac{5\pi}{12}$ radians

(3) $\frac{12\pi}{5}$ radians (4) $\frac{7\pi}{5}$ radians

28. If $\sin\theta \sec\theta = -1$ and θ lies in the second quadrant, then $\sin\theta$ is equal to :

(1) $\sqrt{2}$ (2) 2

(3) $\frac{1}{\sqrt{2}}$ (4) $\frac{1}{2}$

29. If $\cot\alpha \cot\beta = 2$, then $\frac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}$ is equal to :

(1) $\frac{1}{4}$ (2) $\frac{1}{2}$

(3) $\frac{1}{6}$ (4) $\frac{1}{3}$

30. If a statement $P(n)$ is true for $n = 1$, and whenever $P(k)$ is true, then $P(k + 1)$ is also true, then according to PMI :

(1) $P(n)$ is true only for $n = 1$

(2) $P(n)$ is false for all natural numbers

(3) $P(n)$ is true for all natural numbers

(4) $P(n)$ is true only for even numbers

31. The domain of definition of the function $f(x)=\sqrt{\sin^{-1}(2x)+\frac{\pi}{6}}$ for real valued x is :

(1) $\left[-\frac{1}{4},\frac{1}{2}\right]$ (2) $\left[-\frac{1}{2},\frac{1}{2}\right]$

(3) $\left(-\frac{1}{2},\frac{1}{9}\right)$ (4) $\left[-\frac{1}{4},\frac{1}{4}\right]$

32. If $f(x)=3x-5$, then $f^{-1}(x)$:

(1) is given by $\frac{x+5}{3}$

(2) is given by $\frac{1}{3x-5}$

(3) doesn't exist because f is not one-one

(4) None of these

33. A Linear Programming Problem must have :

(1) Non-linear equations

(2) Only one variable

(3) Linear objective function and constraints

(4) Infinite solutions only

34. Restrictions in a Linear Programming Problem are called :

(1) Objectives (2) Constraints

(3) Variables (4) Constants

35. Which of the following is the main objective of Linear Programming ?

(1) To calculate probability only (2) To solve historical problems

(3) To study geometry only (4) To optimize a linear objective function

36. The value of K for which the system of equations $\begin{matrix}(K+1)x+8y=4K\\ Kx+(K+3)y=3K-1\end{matrix}$ has infinitely many solutions, is/are :

(1) 2

(2) ∞

(3) 1

(4) None of these

37. If $A=\begin{bmatrix}\lambda & 0\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0\\ 5 & 1\end{bmatrix}$, then the value of λ for which $A^2=B$, is given by :

(1) $\lambda=1$

(2) $\lambda=-1$

(3) $\lambda=4$

(4) No real values of λ exist

38. If $x^2+y^2=1$, then :

(1) $yy_2-2(y_1)^2+1=0$

(2) $1+yy_2+(y_1)^2=0$

(3) $yy_2+(y_1)^2-1=0$

(4) None of these

39. The distance between two skew lines given by $\vec{r}=\vec{a}_1+\lambda\vec{b}_1$ and $\vec{r}=\vec{a}_2+\mu\vec{b}_2$ is :

(1) $\left|\dfrac{\vec{b}_1\times\vec{a}_1}{(a_1\vec{b}_2-a_2\vec{b}_1)}\right|$

(2) $\left|\dfrac{(\vec{b}_1\times\vec{b}_2)\times(\vec{a}_2-\vec{a}_1)}{|\vec{b}_1\times\vec{b}_2|}\right|$

(3) $\left|\dfrac{(\vec{b}_1\times\vec{b}_2).(\vec{a}_2-\vec{a}_1)}{|\vec{b}_1\times\vec{b}_2|}\right|$

(4) None of these

40. The differential equation $(x-y)\dfrac{dy}{dx}=x+2y$ is :

(1) Homogeneous

(2) Heterogeneous

(3) Of second order

(4) None of these

41. The degree of differential equation $y''' + y^2 + e^{y'} = 0$ is :

(1) 1 (2) Zero

(3) 3 (4) Not defined

42. The differential equation representing the family of curves $y = mx$, where m is arbitrary constant is given by :

(1) $x - \frac{dy}{dx} = 0$ (2) $x\frac{dy}{dx} - y = 0$

(3) $\frac{dy}{dx} + xy = 0$ (4) None of these

43. The differential equation representing the family of parabolas having vertex at origin and axis along positive direction of x-axis is given by :

(1) $y^2 - 2xy\frac{dy}{dx} = 0$ (2) $x^2 - 2xy\frac{dy}{dx} = 0$

(3) $y^2 + 2xy\frac{dy}{dx} = 0$ (4) None of these

44. If $y = y(x)$ and $\frac{2+\sin x}{y+1}\left(\frac{dy}{dx}\right) = -\cos x$, $y(0) = 1$, then $y\left(\frac{\pi}{2}\right)$ equals :

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

(3) $\frac{1}{3}$ (4) 1

45. The general solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 (x \neq 0)$ is given by :

(1) $y = \frac{x^2}{4} + \frac{c}{x^2}$ (2) $y = x^2 + \frac{c}{2x}$

(3) $y = \frac{4}{x^2} + \frac{c}{x^2}$ (4) None of these

46. Ten cards numbered 1 to 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the number on the drawn card is more than 3, what is the probability that it is an even number ?

(1) $\frac{2}{7}$ (2) $\frac{3}{7}$

(3) $\frac{4}{7}$ (4) $\frac{5}{7}$

47. If A and B are two events associated with the same random experiment, then A and B are said to be independent, if :

(1) $P(A \cap B) = \frac{P(A)}{P(B)}$ (2) $P(A \cap B) = P(A) . P(B)$

(3) $P(A \cap B) = P(A) + P(B)$ (4) None of these

48. A random variable is a real valued function whose domain is :

(1) The sample space of a random experiment

(2) Difficult to calculate

(3) Independent of the sample space of a random experiment and may not exist

(4) None of these

49. The variance of the number obtained on a throw of unbiased die is given by :

(1) $\frac{5}{12}$ (2) $\frac{7}{12}$

(3) $\frac{9}{12}$ (4) $\frac{35}{12}$

50. Six balls are drawn successively from an urn containing 7 red and 9 black balls. The trials of drawing balls are Bernoulli trials when after each draw :

(1) The ball drawn is replaced (2) The ball drawn is not replaced

(3) The ball drawn is red (4) None of these

51. The points $(-a, -b)$, $(0, 0)$, (a, b) and (a^2, ab) are :

(1) Vertices of a rectangle
(2) Vertices of a parallelogram
(3) Collinear
(4) None of these

52. The equation of parabola with vertex at the origin and passing through $(2, -3)$ and symmetric with respect to y-axis is :

(1) $4x^2 = -3y$
(2) $x^2 + y^2 = 13$
(3) $3x^2 = -4y$
(4) None of these

53. The eccentricity of $x^2 + 3y^2 = a^2$ is :

(1) $\frac{\sqrt{2}}{3}$
(2) $\frac{3}{\sqrt{2}}$
(3) $\frac{\sqrt{6}}{2}$
(4) $\frac{\sqrt{6}}{3}$

54. The equation of a hyperbola whose conjugate axis is 5 and the distance between the foci is 13 is :

(1) $25x^2 - 144y^2 = 900$
(2) $144x^2 - 25y^2 = 900$
(3) $52x^2 - 114y^2 = 900$
(4) $25x^2 - 441y^2 = 900$

55. If two statements are combined by using the logical connective 'and', then the resulting statement is called :

(1) Conjunction
(2) Disjunction
(3) Biconditional
(4) None of these

56. The variance for the data :

2, 4, 5, 6, 8, 17 is given by

(1) $\frac{7}{6}$ (2) $\frac{14}{6}$ (3) $\frac{28}{6}$ (4) $\frac{140}{6}$

57. A fair coin is tossed repeatedly. If tail appears on first four tosses, then the probability of head appearing on fifth toss is :

(1) $\frac{1}{2}$ (2) $\frac{1}{5}$

(3) $\frac{1}{32}$ (4) $\frac{31}{32}$

58. Three identical dice are rolled the probability that the same number will appear on each of them is :

(1) $\frac{1}{6}$ (2) $\frac{1}{36}$

(3) $\frac{3}{28}$ (4) $\frac{1}{18}$

59. The solution of a linear inequality in one variable is generally represented on :

(1) Pie chart (2) Bar graph

(3) Number line (4) Histogram

60. Which of the following points are 5 units apart ?

(1) (1, 1, 1) and (2, 2, 2)

(2) (0, 0, 0) and (3, 4, 0)

(3) (0, 0, 0) and (1, 1, 1)

(4) (2, 2, 2) and (4, 4, 4)

61. Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. The probability that there is at least one defective egg is :

(1) $1-\frac{10^{10}}{9^{10}}$ (2) $1-\frac{9^{10}}{10^{10}}$

(3) $1-\frac{10^{9}}{9^{10}}$ (4) $\frac{9^{10}}{10^{10}}$

62. Let $\vec{u}, \vec{v}, \vec{w}$ be vectors such that $\vec{u}+\vec{v}+\vec{w}=\vec{0}$. If $|\vec{u}|=3, |\vec{v}|=4$ and $|\vec{w}|=5$, then $\vec{u}.\vec{v}+\vec{v}.\vec{w}+\vec{w}.\vec{u}$ is equal to :

(1) 0 (2) 25

(3) –25 (4) 45

63. For any two vectors $\vec{a}$ and $\vec{b}$, $|\vec{a}.\vec{b}| \leq |\vec{a}||\vec{b}|$ is called :

(1) Cauchy-Schwartz Inequality (2) Triangle Inequality

(3) Newton Inequality (4) None of these

64. If $\vec{a}$ and $\vec{b}$ represent the adjacent sides of a parallelogram, then its area is given by :

(1) $\frac{1}{2}|\vec{a}\times\vec{b}|$ (2) $|\vec{a}\times\vec{b}|$

(3) $\frac{|\vec{a}\times\vec{b}|}{4}$ (4) None of these

65. If $\vec{p}$ is the unit vector along a line l, then the projection of a vector $\vec{a}$ on the line l is given by :

(1) $\vec{a}+\hat{p}$ (2) $\frac{\vec{a}}{|\hat{p}|}$

(3) $\vec{a}.\hat{p}$ (4) $\vec{a}\times\hat{p}$

66. The vector equation of a line $\frac{x+3}{2}=\frac{y-5}{4}=\frac{z+6}{2}$ is :

(1) $\vec{r}=(-3\hat{i}+5\hat{j}-6\hat{k})+\lambda(2\hat{i}+4\hat{j}+2\hat{k})$

(2) $\vec{r}=(3\hat{i}-5\hat{j}-6\hat{k})+\lambda(2\hat{i}+4\hat{j}+2\hat{k})$

(3) $\vec{r}=(-3\hat{i}+5\hat{j}+6\hat{k})+\lambda(2\hat{i}-4\hat{j}-2\hat{k})$

(4) $\vec{r}=(-3\hat{i}+5\hat{j}-8\hat{k})+\lambda(2\hat{i}-4\hat{j}-2\hat{k})$

67. The angle between the pair of lines $\frac{x+3}{3}=\frac{y-1}{5}=\frac{z+3}{4}$ and $\frac{x+1}{1}=\frac{y-4}{1}=\frac{z-5}{2}$ is given by :

(1) $\cos^{-1}\left(\frac{\sqrt{3}}{15}\right)$ (2) $\cos^{-1}\left(\frac{8\sqrt{3}}{15}\right)$ (3) $\cos^{-1}\left(\frac{15}{\sqrt{3}}\right)$ (4) $\cos^{-1}\left(\frac{\sqrt{3}}{8}\right)$

68. Two lines $\vec{r}=\vec{a}_1+\lambda\vec{b}_1, \vec{r}=\vec{a}_2+\mu\vec{b}_2$ are collinear if :

(1) $(\vec{a}_1-\vec{b}_1).(\vec{a}_2\times\vec{b}_2)=0$ (2) $(\vec{a}_2-\vec{a}_1)\times(\vec{b}_1\times\vec{b}_2)=\vec{0}$

(3) $(\vec{a}_2-\vec{a}_1).(\vec{b}_1\times\vec{b}_2)=0$ (4) None of these

69. Which of the following statement is ***true*** ?

(1) Skew lines are lines in space which are neither parallel nor intersecting. They are in different planes

(2) Skew lines are lines in a plane which are intersecting at two points only

(3) Skew lines are lines in space which may be parallel or intersecting

(4) None of these

70. The angle between the line $\frac{x+1}{2}=\frac{y}{3}=\frac{z-3}{6}$ and the plane $10x+2y-11z=3$ is given by :

(1) $\tan^{-1}\left(\frac{8}{21}\right)$ (2) $\cos^{-1}\left(\frac{21}{8}\right)$ (3) $\sin^{-1}\left(\frac{1}{21}\right)$ (4) $\sin^{-1}\left(\frac{8}{21}\right)$

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71. If $y = x + \sqrt{x^2 - 1}$, then $(y - x)\frac{dy}{dx} - y$ is equal to :

(1) -1

(2) 1

(3) 0

(4) None of these

72. The derivative of $\log_2 \frac{e^{3x}(x+5)^3}{(x-3)^2}$ with respect to x is :

(1) $\log_2 e$

(2) $\left(3 + \frac{3}{x+5} - \frac{2}{x-3}\right)$

(3) $\left(3 - \frac{2}{x-3}\right)\log_2 e$

(4) $\left(3 + \frac{3}{x+5} - \frac{2}{x-3}\right)\log_2 e$

73. The derivative of x^x w.r.t. $x \log x$ is :

(1) $\log x$

(2) x^x

(3) $\frac{x^x}{\log x}$

(4) None of these

74. The function $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ is not defined at $x = 0$. The function $f(x)$ is continuous at $x = 0$, if $f(0)$ is given by :

(1) $(a - b)$

(2) $\log a + \log b$

(3) $(a + b)$

(4) None of these

75. A circular disc of radius 3 cm is being heated. Due to expansion, its radius increases at the rate of 0.05 cm/s. Find the rate at which its area is increasing when radius is 3.2 cm :

(1) $3.2\ \pi\ cm^2/sec$

(2) $0.23\ \pi\ cm^2/sec$

(3) $0.32\ \pi\ cm^2/sec$

(4) None of these

76. $f(x) = x\sqrt{32 - x^2}$ has local maxima at :

(1) $x = 4$

(2) $x = -4$

(3) $x = \sqrt{32}$

(4) None of these

77. The area of the largest rectangle having the perimeter 200 meters is :

(1) 2500 sq. mt.

(2) 3000 sq. mt.

(3) 3200 sq. mt.

(4) None of these

78. If $y = \sin^{-1} x$, then $(1 - x^2)y_2$ is equal to :

(1) $\frac{x}{y_1}$ (2) $\frac{y_1}{x}$

(3) xy_1 (4) None of these

79. The equation of common tangent to the curves $y^2 = 8x$ and $xy = -1$ is :

(1) $3y = 9x + 2$

(2) $y = 2x + 1$

(3) $2y = x + 8$

(4) $y = x + 2$

80. If the normal to the curve $y = f(x)$ at the point (3, 4) makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then $f'(3)$ is equal to :

(1) $-\frac{3}{4}$ (2) $\frac{4}{3}$

(3) 1 (4) None of these

81. The smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n$ is equal to 1 :

(1) 8 (2) 12

(3) 16 (4) None of these

82. If $\omega(\neq 1)$ is a cube root of unity and $(1+\omega^2)^n = (1+\omega^4)^n$, then the least positive value of n is :

(1) 6 (2) 5

(3) 2 (4) 3

83. If $\arg(z) < 0$, then $\arg(-z) - \arg(z)$ is equal to :

(1) π (2) $-\pi$

(3) $-\frac{\pi}{2}$ (4) $\frac{\pi}{2}$

84. The roots of $x^{2/3} + x^{1/3} - 2 = 0$ are :

(1) $-1, 6$

(2) $-1, -8$

(3) $1, -6$

(4) $1, -8$

85. Let α, β be the roots of the equation $(x-a)(x-b) = c$, $c \neq 0$. Then the roots of the equation $(x-\alpha)(x-\beta) + c = 0$ are :

(1) a, c

(2) b, c

(3) a, b

(4) $\frac{1}{b}, \frac{1}{c}$

86. A five digit number is to be formed which is divisible by 3, using the numbers 0, 1, 2, 3, 4 and 5, without repeation. This can be done in how many numbers of ways ?

(1) 3125 (2) 600

(3) 240 (4) 216

87. The number of divisors of the form $(4n + 2)$, $n \geq 0$ of the integer 240 is :

(1) 3 (2) 4

(3) 8 (4) 10

88. If ${}^{2n}C_3 : {}^{n}C_2 = 12 : 1$, then n is equal to :

(1) 2 (2) 3

(3) 4 (4) 5

89. The number of diagonals that can be drawn by joining the angular points of octagon :

(1) 20 (2) 18

(3) 16 (4) 14

90. In the expansion of $\left(x+\frac{1}{x}\right)^6$, the third term from the end is :

(1) $\frac{1}{x^2}$ (2) $\frac{x^2}{15}$

(3) $\frac{15}{x^2}$ (4) $\frac{x^2}{3}$

91. If $A=\begin{bmatrix}3 & 5\\ 2 & 7\end{bmatrix}$, then A^{-1} is given by :

(1) $\begin{bmatrix}\frac{7}{11} & \frac{-5}{11}\\ \frac{-2}{11} & \frac{3}{11}\end{bmatrix}$ (2) $\frac{1}{11}\begin{bmatrix}7 & 5\\ 2 & -3\end{bmatrix}$ (3) $\frac{1}{11}\begin{bmatrix}7 & -5\\ -2 & -3\end{bmatrix}$ (4) None of these

92. If A is a non-singular matrix, then :

(1) $|A^{-1}|=|A|$ (2) $|A^{-1}|=\left|\frac{A}{2}\right|$

(3) $|A^{-1}|=|A|^{-1}$ (4) None of these

93. $\int\frac{dx}{2x-x^2}$ is equal to :

(1) $\cos^{-1}(x-1)+c$ (2) $\sec^{-1}(x-1)+c$

(3) $\tan^{-1}(x-1)+c$ (4) $\sin^{-1}(x-1)+c$

94. $\int\frac{e^x(x^2+1)}{(x+1)^2}dx$ is equal to :

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

(3) $\frac{x+1}{x-1}e^x+c$ (4) None of these

95. $\int_0^{\pi/4}\sin^3 2t\cos 2t\,dt$ is equal to :

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

(3) $\frac{1}{4}$ (4) $\frac{1}{8}$

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96. $\int \frac{x}{1+x^4} dx$ is equal to :

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

(2) $\frac{1}{2}\tan\left(\frac{1}{x^2}\right)+c$

(3) $\frac{1}{2}\tan^{-1}(x^2)+c$

(4) None of these

97. $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$ is equal to :

(1) $\left(\frac{\pi}{2}-1\right)$

(2) 1

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

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

98. The area of the region bounded by the curve $y=x^2$ and the line $y=4$ is :

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

(2) $\frac{8}{3}$

(3) $\frac{16}{3}$

(4) $\frac{32}{3}$

99. The area of the region bounded by the parabolas $y=x^2$ and $y^2=x$ is given by :

(1) $\frac{1}{3}$

(2) 1

(3) $\frac{5}{3}$

(4) None of these

100. $\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\frac{x}{a}+c$ is equal to :

(1) $\int\sqrt{x^2+a^2}dx$

(2) $\int\sqrt{a^2-x^2}dx$

(3) $\int\sqrt{x^2-a^2}dx$

(4) None of these

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Neha Phogat 11/06/2026 11/06/2026 S. Patil 11/06/2026

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SET-X

UG-4Yr.-EE-June, 2026

SUBJECT : B. Sc.-Mathematics

Sr. No. 10324

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name_____

Date of Examination _____

(Signature of the Candidate) (Signature of the Invigilator)

SEAL

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1. ***All questions are compulsory.***
2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

1. Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. The probability that there is at least one defective egg is :

(1) $1-\frac{10^{10}}{9^{10}}$ (2) $1-\frac{9^{10}}{10^{10}}$

(3) $1-\frac{10^{9}}{9^{10}}$ (4) $\frac{9^{10}}{10^{10}}$

2. Let $\vec{u}, \vec{v}, \vec{w}$ be vectors such that $\vec{u}+\vec{v}+\vec{w}=\vec{0}$. If $|\vec{u}|=3, |\vec{v}|=4$ and $|\vec{w}|=5$, then $\vec{u}.\vec{v}+\vec{v}.\vec{w}+\vec{w}.\vec{u}$ is equal to :

(1) 0 (2) 25

(3) –25 (4) 45

3. For any two vectors $\vec{a}$ and $\vec{b}$, $|\vec{a}.\vec{b}| \leq |\vec{a}||\vec{b}|$ is called :

(1) Cauchy-Schwartz Inequality (2) Triangle Inequality

(3) Newton Inequality (4) None of these

4. If $\vec{a}$ and $\vec{b}$ represent the adjacent sides of a parallelogram, then its area is given by :

(1) $\frac{1}{2}|\vec{a}\times\vec{b}|$ (2) $|\vec{a}\times\vec{b}|$

(3) $\frac{|\vec{a}\times\vec{b}|}{4}$ (4) None of these

5. If $\vec{p}$ is the unit vector along a line l, then the projection of a vector $\vec{a}$ on the line l is given by :

(1) $\vec{a}+\hat{p}$ (2) $\frac{\vec{a}}{|\hat{p}|}$

(3) $\vec{a}.\hat{p}$ (4) $\vec{a}\times\hat{p}$

6. The vector equation of a line $\frac{x+3}{2}=\frac{y-5}{4}=\frac{z+6}{2}$ is :

(1) $\vec{r}=(-3\hat{i}+5\hat{j}-6\hat{k})+\lambda(2\hat{i}+4\hat{j}+2\hat{k})$

(2) $\vec{r}=(3\hat{i}-5\hat{j}-6\hat{k})+\lambda(2\hat{i}+4\hat{j}+2\hat{k})$

(3) $\vec{r}=(-3\hat{i}+5\hat{j}+6\hat{k})+\lambda(2\hat{i}-4\hat{j}-2\hat{k})$

(4) $\vec{r}=(-3\hat{i}+5\hat{j}-8\hat{k})+\lambda(2\hat{i}-4\hat{j}-2\hat{k})$

7. The angle between the pair of lines $\frac{x+3}{3}=\frac{y-1}{5}=\frac{z+3}{4}$ and $\frac{x+1}{1}=\frac{y-4}{1}=\frac{z-5}{2}$ is given by :

(1) $\cos^{-1}\left(\frac{\sqrt{3}}{15}\right)$ (2) $\cos^{-1}\left(\frac{8\sqrt{3}}{15}\right)$ (3) $\cos^{-1}\left(\frac{15}{\sqrt{3}}\right)$ (4) $\cos^{-1}\left(\frac{\sqrt{3}}{8}\right)$

8. Two lines $\vec{r}=\vec{a}_1+\lambda\vec{b}_1, \vec{r}=\vec{a}_2+\mu\vec{b}_2$ are collinear if :

(1) $(\vec{a}_1-\vec{b}_1).(\vec{a}_2\times\vec{b}_2)=0$ (2) $(\vec{a}_2-\vec{a}_1)\times(\vec{b}_1\times\vec{b}_2)=\vec{0}$

(3) $(\vec{a}_2-\vec{a}_1).(\vec{b}_1\times\vec{b}_2)=0$ (4) None of these

9. Which of the following statement is ***true*** ?

(1) Skew lines are lines in space which are neither parallel nor intersecting. They are in different planes

(2) Skew lines are lines in a plane which are intersecting at two points only

(3) Skew lines are lines in space which may be parallel or intersecting

(4) None of these

10. The angle between the line $\frac{x+1}{2}=\frac{y}{3}=\frac{z-3}{6}$ and the plane $10x+2y-11z=3$ is given by :

(1) $\tan^{-1}\left(\frac{8}{21}\right)$ (2) $\cos^{-1}\left(\frac{21}{8}\right)$ (3) $\sin^{-1}\left(\frac{1}{21}\right)$ (4) $\sin^{-1}\left(\frac{8}{21}\right)$

11. If $A=\begin{bmatrix}3 & 5\\ 2 & 7\end{bmatrix}$, then A^{-1} is given by :

(1) $\begin{bmatrix}\frac{7}{11} & \frac{-5}{11}\\ \frac{-2}{11} & \frac{3}{11}\end{bmatrix}$ (2) $\frac{1}{11}\begin{bmatrix}7 & 5\\ 2 & -3\end{bmatrix}$ (3) $\frac{1}{11}\begin{bmatrix}7 & -5\\ -2 & -3\end{bmatrix}$ (4) None of these

12. If A is a non-singular matrix, then :

(1) $|A^{-1}|=|A|$ (2) $|A^{-1}|=\left|\frac{A}{2}\right|$

(3) $|A^{-1}|=|A|^{-1}$ (4) None of these

13. $\int\frac{dx}{2x-x^2}$ is equal to :

(1) $\cos^{-1}(x-1)+c$ (2) $\sec^{-1}(x-1)+c$

(3) $\tan^{-1}(x-1)+c$ (4) $\sin^{-1}(x-1)+c$

14. $\int\frac{e^x(x^2+1)}{(x+1)^2}dx$ is equal to :

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

(3) $\frac{x+1}{x-1}e^x+c$ (4) None of these

15. $\int_0^{\pi/4}\sin^3 2t\cos 2t\,dt$ is equal to :

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

(3) $\frac{1}{4}$ (4) $\frac{1}{8}$

16. $\int \frac{x}{1+x^4} dx$ is equal to :

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

(2) $\frac{1}{2}\tan\left(\frac{1}{x^2}\right)+c$

(3) $\frac{1}{2}\tan^{-1}(x^2)+c$

(4) None of these

17. $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$ is equal to :

(1) $\left(\frac{\pi}{2}-1\right)$

(2) 1

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

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

18. The area of the region bounded by the curve $y=x^2$ and the line $y=4$ is :

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

(2) $\frac{8}{3}$

(3) $\frac{16}{3}$

(4) $\frac{32}{3}$

19. The area of the region bounded by the parabolas $y=x^2$ and $y^2=x$ is given by :

(1) $\frac{1}{3}$

(2) 1

(3) $\frac{5}{3}$

(4) None of these

20. $\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\frac{x}{a}+c$ is equal to :

(1) $\int\sqrt{x^2+a^2}dx$

(2) $\int\sqrt{a^2-x^2}dx$

(3) $\int\sqrt{x^2-a^2}dx$

(4) None of these

21. The points $(-a, -b)$, $(0, 0)$, (a, b) and (a^2, ab) are :

(1) Vertices of a rectangle
(2) Vertices of a parallelogram
(3) Collinear
(4) None of these

22. The equation of parabola with vertex at the origin and passing through $(2, -3)$ and symmetric with respect to y-axis is :

(1) $4x^2 = -3y$
(2) $x^2 + y^2 = 13$
(3) $3x^2 = -4y$
(4) None of these

23. The eccentricity of $x^2 + 3y^2 = a^2$ is :

(1) $\frac{\sqrt{2}}{3}$
(2) $\frac{3}{\sqrt{2}}$
(3) $\frac{\sqrt{6}}{2}$
(4) $\frac{\sqrt{6}}{3}$

24. The equation of a hyperbola whose conjugate axis is 5 and the distance between the foci is 13 is :

(1) $25x^2 - 144y^2 = 900$
(2) $144x^2 - 25y^2 = 900$
(3) $52x^2 - 114y^2 = 900$
(4) $25x^2 - 441y^2 = 900$

25. If two statements are combined by using the logical connective 'and', then the resulting statement is called :

(1) Conjunction
(2) Disjunction
(3) Biconditional
(4) None of these

26. The variance for the data :

2, 4, 5, 6, 8, 17 is given by

(1) $\frac{7}{6}$ (2) $\frac{14}{6}$ (3) $\frac{28}{6}$ (4) $\frac{140}{6}$

27. A fair coin is tossed repeatedly. If tail appears on first four tosses, then the probability of head appearing on fifth toss is :

(1) $\frac{1}{2}$ (2) $\frac{1}{5}$

(3) $\frac{1}{32}$ (4) $\frac{31}{32}$

28. Three identical dice are rolled the probability that the same number will appear on each of them is :

(1) $\frac{1}{6}$ (2) $\frac{1}{36}$

(3) $\frac{3}{28}$ (4) $\frac{1}{18}$

29. The solution of a linear inequality in one variable is generally represented on :

(1) Pie chart (2) Bar graph

(3) Number line (4) Histogram

30. Which of the following points are 5 units apart ?

(1) (1, 1, 1) and (2, 2, 2)

(2) (0, 0, 0) and (3, 4, 0)

(3) (0, 0, 0) and (1, 1, 1)

(4) (2, 2, 2) and (4, 4, 4)

31. The smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n$ is equal to 1 :

(1) 8 (2) 12

(3) 16 (4) None of these

32. If $\omega(\neq 1)$ is a cube root of unity and $(1+\omega^2)^n = (1+\omega^4)^n$, then the least positive value of n is :

(1) 6 (2) 5

(3) 2 (4) 3

33. If $\arg(z) < 0$, then $\arg(-z) - \arg(z)$ is equal to :

(1) π (2) $-\pi$

(3) $-\frac{\pi}{2}$ (4) $\frac{\pi}{2}$

34. The roots of $x^{2/3} + x^{1/3} - 2 = 0$ are :

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(2) b, c

(3) a, b

(4) $\frac{1}{b}, \frac{1}{c}$

36. A five digit number is to be formed which is divisible by 3, using the numbers 0, 1, 2, 3, 4 and 5, without repeation. This can be done in how many numbers of ways ?

(1) 3125 (2) 600

(3) 240 (4) 216

37. The number of divisors of the form $(4n + 2)$, $n \geq 0$ of the integer 240 is :

(1) 3 (2) 4

(3) 8 (4) 10

38. If ${}^{2n}C_3 : {}^{n}C_2 = 12 : 1$, then n is equal to :

(1) 2 (2) 3

(3) 4 (4) 5

39. The number of diagonals that can be drawn by joining the angular points of octagon :

(1) 20 (2) 18

(3) 16 (4) 14

40. In the expansion of $\left(x+\frac{1}{x}\right)^6$, the third term from the end is :

(1) $\frac{1}{x^2}$ (2) $\frac{x^2}{15}$

(3) $\frac{15}{x^2}$ (4) $\frac{x^2}{3}$

41. The domain of definition of the function $f(x)=\sqrt{\sin^{-1}(2x)+\frac{\pi}{6}}$ for real valued x is :

(1) $\left[-\frac{1}{4},\frac{1}{2}\right]$ (2) $\left[-\frac{1}{2},\frac{1}{2}\right]$

(3) $\left(-\frac{1}{2},\frac{1}{9}\right)$ (4) $\left[-\frac{1}{4},\frac{1}{4}\right]$

42. If $f(x)=3x-5$, then $f^{-1}(x)$:

(1) is given by $\frac{x+5}{3}$

(2) is given by $\frac{1}{3x-5}$

(3) doesn't exist because f is not one-one

(4) None of these

43. A Linear Programming Problem must have :

(1) Non-linear equations

(2) Only one variable

(3) Linear objective function and constraints

(4) Infinite solutions only

44. Restrictions in a Linear Programming Problem are called :

(1) Objectives (2) Constraints

(3) Variables (4) Constants

45. Which of the following is the main objective of Linear Programming ?

(1) To calculate probability only (2) To solve historical problems

(3) To study geometry only (4) To optimize a linear objective function

46. The value of K for which the system of equations $\begin{matrix}(K+1)x+8y=4K \\ Kx+(K+3)y=3K-1\end{matrix}$ has infinitely many solutions, is/are :

(1) 2 (2) ∞

(3) 1 (4) None of these

47. If $A=\begin{bmatrix}\lambda & 0 \\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0 \\ 5 & 1\end{bmatrix}$, then the value of λ for which $A^2=B$, is given by :

(1) $\lambda=1$ (2) $\lambda=-1$

(3) $\lambda=4$ (4) No real values of λ exist

48. If $x^2+y^2=1$, then :

(1) $yy_2-2(y_1)^2+1=0$

(2) $1+yy_2+(y_1)^2=0$

(3) $yy_2+(y_1)^2-1=0$

(4) None of these

49. The distance between two skew lines given by $\vec{r}=\vec{a}_1+\lambda\vec{b}_1$ and $\vec{r}=\vec{a}_2+\mu\vec{b}_2$ is :

(1) $\left|\dfrac{\vec{b}_1\times\vec{a}_1}{(a_1\vec{b}_2-a_2\vec{b}_1)}\right|$ (2) $\left|\dfrac{(\vec{b}_1\times\vec{b}_2)\times(\vec{a}_2-\vec{a}_1)}{|\vec{b}_1\times\vec{b}_2|}\right|$

(3) $\left|\dfrac{(\vec{b}_1\times\vec{b}_2).(\vec{a}_2-\vec{a}_1)}{|\vec{b}_1\times\vec{b}_2|}\right|$ (4) None of these

50. The differential equation $(x-y)\dfrac{dy}{dx}=x+2y$ is :

(1) Homogeneous (2) Heterogeneous

(3) Of second order (4) None of these

51. The degree of differential equation $y''' + y^2 + e^{y'} = 0$ is :

(1) 1

(2) Zero

(3) 3

(4) Not defined

52. The differential equation representing the family of curves $y = mx$, where m is arbitrary constant is given by :

(1) $x - \frac{dy}{dx} = 0$

(2) $x\frac{dy}{dx} - y = 0$

(3) $\frac{dy}{dx} + xy = 0$

(4) None of these

53. The differential equation representing the family of parabolas having vertex at origin and axis along positive direction of x-axis is given by :

(1) $y^2 - 2xy\frac{dy}{dx} = 0$

(2) $x^2 - 2xy\frac{dy}{dx} = 0$

(3) $y^2 + 2xy\frac{dy}{dx} = 0$

(4) None of these

54. If $y = y(x)$ and $\frac{2+\sin x}{y+1}\left(\frac{dy}{dx}\right) = -\cos x$, $y(0) = 1$, then $y\left(\frac{\pi}{2}\right)$ equals :

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

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

(3) $\frac{1}{3}$

(4) 1

55. The general solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 (x \neq 0)$ is given by :

(1) $y = \frac{x^2}{4} + \frac{c}{x^2}$

(2) $y = x^2 + \frac{c}{2x}$

(3) $y = \frac{4}{x^2} + \frac{c}{x^2}$

(4) None of these

56. Ten cards numbered 1 to 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the number on the drawn card is more than 3, what is the probability that it is an even number ?

(1) $\frac{2}{7}$ (2) $\frac{3}{7}$

(3) $\frac{4}{7}$ (4) $\frac{5}{7}$

57. If A and B are two events associated with the same random experiment, then A and B are said to be independent, if :

(1) $P(A \cap B) = \frac{P(A)}{P(B)}$ (2) $P(A \cap B) = P(A) . P(B)$

(3) $P(A \cap B) = P(A) + P(B)$ (4) None of these

58. A random variable is a real valued function whose domain is :

(1) The sample space of a random experiment

(2) Difficult to calculate

(3) Independent of the sample space of a random experiment and may not exist

(4) None of these

59. The variance of the number obtained on a throw of unbiased die is given by :

(1) $\frac{5}{12}$ (2) $\frac{7}{12}$

(3) $\frac{9}{12}$ (4) $\frac{35}{12}$

60. Six balls are drawn successively from an urn containing 7 red and 9 black balls. The trials of drawing balls are Bernoulli trials when after each draw :

(1) The ball drawn is replaced (2) The ball drawn is not replaced

(3) The ball drawn is red (4) None of these

61. If $y = x + \sqrt{x^2 - 1}$, then $(y - x)\frac{dy}{dx} - y$ is equal to :

(1) -1

(2) 1

(3) 0

(4) None of these

62. The derivative of $\log_2 \frac{e^{3x}(x+5)^3}{(x-3)^2}$ with respect to x is :

(1) $\log_2 e$

(2) $\left(3 + \frac{3}{x+5} - \frac{2}{x-3}\right)$

(3) $\left(3 - \frac{2}{x-3}\right)\log_2 e$

(4) $\left(3 + \frac{3}{x+5} - \frac{2}{x-3}\right)\log_2 e$

63. The derivative of x^x w.r.t. $x \log x$ is :

(1) $\log x$

(2) x^x

(3) $\frac{x^x}{\log x}$

(4) None of these

64. The function $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ is not defined at $x = 0$. The function $f(x)$ is continuous at $x = 0$, if $f(0)$ is given by :

(1) $(a - b)$

(2) $\log a + \log b$

(3) $(a + b)$

(4) None of these

65. A circular disc of radius 3 cm is being heated. Due to expansion, its radius increases at the rate of 0.05 cm/s. Find the rate at which its area is increasing when radius is 3.2 cm :

(1) $3.2\ \pi\ cm^2/sec$

(2) $0.23\ \pi\ cm^2/sec$

(3) $0.32\ \pi\ cm^2/sec$

(4) None of these

66. $f(x) = x\sqrt{32 - x^2}$ has local maxima at :

(1) $x = 4$

(2) $x = -4$

(3) $x = \sqrt{32}$

(4) None of these

67. The area of the largest rectangle having the perimeter 200 meters is :

(1) 2500 sq. mt.

(2) 3000 sq. mt.

(3) 3200 sq. mt.

(4) None of these

68. If $y = \sin^{-1} x$, then $(1 - x^2)y_2$ is equal to :

(1) $\frac{x}{y_1}$ (2) $\frac{y_1}{x}$

(3) xy_1 (4) None of these

69. The equation of common tangent to the curves $y^2 = 8x$ and $xy = -1$ is :

(1) $3y = 9x + 2$

(2) $y = 2x + 1$

(3) $2y = x + 8$

(4) $y = x + 2$

70. If the normal to the curve $y = f(x)$ at the point (3, 4) makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then $f'(3)$ is equal to :

(1) $-\frac{3}{4}$ (2) $\frac{4}{3}$

(3) 1 (4) None of these

71. The greatest of $\tan 1$, $\tan^{-1} 1$, $\sin^{-1} 1$, $\sin 1$, $\cos 1$ is :

(1) $\sin 1$ (2) $\tan 1$

(3) $\tan^{-1} 1$ (4) None of these

72. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$ is equal to :

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

(3) $\frac{\pi}{6}$ (4) π

73. The value of $\tan^{-1} 1 + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ is equal to :

(1) $\frac{\pi}{4}$ (2) $\frac{5\pi}{12}$

(3) $\frac{3\pi}{4}$ (4) $\frac{13\pi}{12}$

74. The principal value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is :

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

(3) $-\frac{2\pi}{3}$ (4) None of these

75. If $\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$, then x, y, z and w are given by :

(1) 1, 3, 4, 5

(2) 1, 2, 4, 5

(3) 1, 3, 5, 7

(4) 1, 2, 4, 7

76. For any square matrix A with real number entries, $A + A'$ is :

(1) Symmetric Matrix (2) Skew-symmetric Matrix

(3) Doesn't Exist (4) None of these

77. If $3A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ and $AA' = I$, then $x + y$ is equal to :

(1) -5 (2) -4

(3) -3 (4) -2

78. If ω is one of the imaginary cube roots of unity, then the value of $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ is given by :

(1) ω (2) 1

(3) ω^2 (4) 0

79. The determinant $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix} = 0$, if :

(1) x, y, z are in A.P.

(2) x, y, z are in G.P.

(3) xy, yz, zx are in A.P.

(4) None of these

80. If A is a square matrix of order 3 such that $|adj.\ A| = 16$, then $|A|$ is equal to :

(1) ± 4 (2) ± 3

(3) $\pm\frac{1}{4}$ (4) $\pm\frac{1}{3}$

81. ${}^{10}C_1 + {}^{10}C_2 + {}^{10}C_3 + \ldots\ldots + {}^{10}C_9$ is equal to :

(1) 128

(2) 256

(3) 512

(4) None of these

82. The term independent of x in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$ is :

(1) $\frac{5}{18}$

(2) $\frac{7}{18}$

(3) $\frac{9}{18}$

(4) $\frac{11}{18}$

83. If third term of a geometric progression is 4, then the product of the first five terms is :

(1) 4^5

(2) 4^4

(3) 4^3

(4) 4^2

84. In a triangle, the lengths of two larger sides are 10 and 9 respectively. If the angles are in A.P., then the length of the third side can be :

(1) $3\sqrt{3}$

(2) 5

(3) $\sqrt{84}$

(4) $\sqrt{91}$

85. If the sum of an A.P. is 2 and the sum of first five terms is equal to one fourth of the sum of the next five terms, then :

(1) $a = 2, d = -6$

(2) $a = -2, d = 6$

(3) $a = 2, d = 6$

(4) None of these

86. The sum of three numbers in G.P. is $\frac{13}{12}$ and their product is -1. The common ratio is :

(1) $-\frac{5}{4}, -\frac{4}{5}$

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

(3) $-\frac{3}{4}, -\frac{4}{3}$

(4) None of these

87. The sum of $12 + 13 + 14 + 15 + \ldots\ldots\ldots + 37$ is equal to :

(1) 763

(2) 367

(3) 637

(4) None of these

88. A straight line passes through the point (2, 3) and the portion of the line intercepted between the axes is bisected at this point, the equation of line is :

(1) $3x + 2y - 12 = 0$

(2) $2x + 3y + 12 = 0$

(3) $3x - 2y + 12 = 0$

(4) None of these

89. The intercepts on the axes for the line $4x - 3y - 12 = 0$ are :

(1) x-intercept = 4, y-intercept = 3

(2) x-intercept = 3, y-intercept = -4

(3) x-intercept = -3, y-intercept = -4

(4) None of these

90. The angle between the lines joining the points (0, 0), (2, 3) and (2, -2), (3, 5) is :

(1) $\tan^{-1}\left(\frac{23}{11}\right)$

(2) $\tan^{-1}\left(\frac{11}{23}\right)$

(3) $\tan^{-1}\left(\frac{8}{23}\right)$

(4) $\tan^{-1}\left(\frac{9}{23}\right)$

91. Which of the following is ***not*** a null set ?

(1) $A = \{x : x^2 = 16, x \in N\}$

(2) $A = \{x : x < 5, x > 6\}$

(3) $A = \{x : |x| < -4, x \in N\}$

(4) $A = \{x : x \in N, 2 < x < 3\}$

92. If $A = \{1, 2, 3, 4\}$ and $B = \{2, 3, 4, 5, 6\}$, then $A - B$ is :

(1) $\{1, 5, 6\}$

(2) Null set

(3) $\{1\}$

(4) $\{5, 6\}$

93. In a class of 60 boys, there are 45 boys who play cards and 30 boys play carrom. How many boys play both games ?

(1) 30 (2) 15

(3) 45 (4) 10

94. If $A = \{1, 3, 5, 7\}$ and $B = \{2, 5\}$, then the numbers of relations from A to B is :

(1) 256 (2) 128

(3) 64 (4) 32

95. The range of the function $y = \sqrt{x-3}$ is :

(1) $(\infty, -\infty)$ (2) $(0, 3)$

(3) $(-3, 3)$ (4) $[0, \infty)$

96. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then $\cos\theta - \sin\theta$ is given by :

(1) $\sqrt{2}\tan\theta$

(2) $\sqrt{2}\sin\theta$

(3) $\sqrt{2}\cos\theta$

(4) $\sqrt{2}\sec\theta$

97. $75°$ is equal to :

(1) 5π radians

(2) $\frac{5\pi}{12}$ radians

(3) $\frac{12\pi}{5}$ radians

(4) $\frac{7\pi}{5}$ radians

98. If $\sin\theta \sec\theta = -1$ and θ lies in the second quadrant, then $\sin\theta$ is equal to :

(1) $\sqrt{2}$

(2) 2

(3) $\frac{1}{\sqrt{2}}$

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

99. If $\cot\alpha \cot\beta = 2$, then $\frac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}$ is equal to :

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

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

(3) $\frac{1}{6}$

(4) $\frac{1}{3}$

100. If a statement $P(n)$ is true for $n = 1$, and whenever $P(k)$ is true, then $P(k + 1)$ is also true, then according to PMI :

(1) $P(n)$ is true only for $n = 1$

(2) $P(n)$ is false for all natural numbers

(3) $P(n)$ is true for all natural numbers

(4) $P(n)$ is true only for even numbers

Answer keys of Bachelor of Science (Mathematics) 4-year entrance test dated 11.06.2026				
Q. No.	A	B	C	D
1	1	4	4	2
2	3	4	2	3
3	2	1	3	1
4	1	4	1	2
5	4	3	2	3
6	2	4	1	1
7	2	2	3	2
8	3	4	4	3
9	4	1	2	1
10	3	3	1	4
11	4	1	3	1
12	4	1	2	3
13	1	3	1	4
14	4	2	4	2
15	3	4	1	4
16	4	1	3	3
17	2	4	3	1
18	4	2	1	4
19	1	3	2	1
20	3	1	2	2
21	3	2	1	3
22	2	3	3	3
23	1	1	2	4
24	4	2	1	1
25	1	3	4	1
26	3	1	2	4
27	3	2	2	1
28	1	3	3	2
29	2	1	4	3
30	2	4	3	2
31	3	1	1	4
32	3	3	1	4
33	4	4	3	1
34	1	2	2	4
35	1	4	4	3
36	4	3	1	4
37	1	1	4	2
38	2	4	2	4
39	3	1	3	1
40	2	2	1	3
41	4	3	4	1
42	2	3	2	1
43	3	4	1	3
44	1	1	3	2
45	2	1	1	4
46	1	4	3	1
47	3	1	2	4
48	4	2	1	2
49	2	3	4	3
50	1	2	1	1

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Answer keys of Bachelor of Science (Mathematics) 4-year entrance test dated 11.06.2026				
Q. No.	A	B	C	D
51	1	3	3	4
52	3	2	3	2
53	4	1	4	1
54	2	4	1	3
55	4	1	1	1
56	3	3	4	3
57	1	3	1	2
58	4	1	2	1
59	1	2	3	4
60	2	2	2	1
61	4	4	2	3
62	2	2	3	4
63	1	3	1	2
64	3	1	2	3
65	1	2	3	3
66	3	1	1	1
67	2	3	2	1
68	1	4	3	3
69	4	2	1	4
70	1	1	4	3
71	2	4	3	4
72	3	2	4	2
73	1	1	2	3
74	2	3	3	1
75	3	1	3	2
76	1	3	1	1
77	2	2	1	3
78	3	1	3	4
79	1	4	4	2
80	4	1	3	1
81	3	1	4	3
82	4	3	4	2
83	2	2	1	1
84	3	1	4	4
85	3	4	3	1
86	1	2	4	3
87	1	2	2	3
88	3	3	4	1
89	4	4	1	2
90	3	3	3	2
91	1	3	1	1
92	1	4	3	3
93	3	2	4	2
94	2	3	2	1
95	4	3	4	4
96	1	1	3	2
97	4	1	1	2
98	2	3	4	3
99	3	4	1	4
100	1	3	2	3

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