SET–"X" (Total No. of printed pages : 21)

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UG-EE-June, 2025 (Mathematics 4 year)

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

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CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. **All questions are compulsory.**
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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.
4. Question Booklet along-with answer key of all the A,B,C and 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 book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
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 BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

Question No.	Questions
1.	If $\cos\theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$, then $\frac{1}{2}\left(x^2 + \frac{1}{x^2}\right)$ is equal to : (1) $\sin 2\theta$ (2) $\cos 2\theta$ (3) $\tan 2\theta$ (4) $\cot 2\theta$
2.	If $\frac{3\pi}{4} < \alpha < \pi$, then $\sqrt{\text{cosec}^2\alpha + 2\cot\alpha}$ is equal to : (1) $-1 - \cot\alpha$ (2) $1 + \cot\alpha$ (3) $1 - \cot\alpha$ (4) $-1 + \cot\alpha$
3.	If $\tan 2\theta \tan\theta = 1$, then the general value of θ is : (1) $\left(n + \frac{1}{2}\right)\pi$ (2) $\left(2n \pm \frac{1}{2}\right)\frac{\pi}{3}$ (3) $\left(n + \frac{1}{2}\right)\frac{\pi}{3}$ (4) None of these
4.	If $(w \neq 1)$ is a cube root of unity and $(1 + w)^7 = A + Bw$, then A and B are given by : (1) 0, 1 (2) 1, 0 (3) $-1, 1$ (4) 1, 1
5.	If $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5$, then : (1) $\text{Im}(z) = 0$ (2) $\text{Re}(z) = 0$ (3) $\text{Re}(z) > 0, \text{Im}(z) > 0$ (4) None of these

Question No.	Questions
6.	The number of real roots of $3^{2x^2-7x+7} = 9$ is : (1) 2 (2) 1 (3) Zero (4) 4
7.	If the roots of the equation $qx^2 + px + q = 0$ are complex, where p, q are real, then the roots of the equation $x^2 - 4qx + p^2 = 0$ are : (1) Imaginary (2) Real and equal (3) Real and unequal (4) None of these
8.	If $2 + i\sqrt{3}$ is a root of the equation $x^2 + px + q = 0$ where p and q are real, then (p, q) is equal to : (1) $(4, -7)$ (2) $(4, 7)$ (3) $(-4, 7)$ (4) $(-4, -7)$
9.	If eleven members of a Committee at a round table, so that the Chairman and Secretary always sit together, then the number of arrangements is : (1) $\lfloor 10$ (2) $\lfloor 9$ (3) $\lfloor 10 \times 2$ (4) $\lfloor 9 \times 2$
10.	A man has 7 friends. In how many ways, he can invite one or more of them to a tea party : (1) 127 (2) 128 (3) 256 (4) 130

Question No.	Questions
11.	How many words can be made from the letters of the word DELHI, if L comes in the middle of every word? (1) 24 (2) 12 (3) 6 (4) 60
12.	The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes is empty, is : (1) 5 (2) 3^8 (3) 21 (4) ${}^8C_3$
13.	If the 4^{th} term in the expansion of $\left(\frac{2}{3}x - \frac{3}{2x}\right)^n$ is independent of x, then n is equal to : (1) 5 (2) 6 (3) 9 (4) None of these
14.	The coefficient of x^n in the expansion of $(1 + x + x^2 + \text{------})^{-n}$ is : (1) $n + 1$ (2) n (3) 1 (4) $(-1)^n$
15.	The middle term in the expansion of $\left(x^2 + \frac{1}{x^2} + 2\right)^n$ is : (1) $\frac{\lfloor n}{\lfloor 2n}$ (2) $\frac{\lfloor 2n}{(\lfloor n)(\lfloor n)}$ (3) $\lfloor 2n$ (4) $\frac{\lfloor 2n}{\lfloor n-1}$

Question No.	Questions
16.	The sum of n terms of the series $1.4 + 3.04 + 5.004 +$-------- is : (1) $n^2 + \frac{4}{9}\left(1 - \frac{1}{10^n}\right)$ (2) $\frac{4}{9} + n^2\left(1 - \frac{1}{10^n}\right)$ (3) $n^2 + \frac{9}{4}\left(\frac{1}{10^n} - 1\right)$ (4) $n^2 + \frac{4}{3}\left(1 - \frac{1}{10^n}\right)$
17.	If the pth term of an A.P. is q, qth term is p, then its rth term is : (1) $p+q+r$ (2) $p+q-r$ (3) $p+r-q$ (4) $p-q-r$
18.	Fifth term of a G.P. is 2, then the product of its nine term is : (1) 1024 (2) 256 (3) 512 (4) None of these
19.	Let a_n be nth term of a G.P. of positive numbers. If $\sum_{n=1}^{100} a_{2n} = \alpha$ and $\sum_{n=1}^{100} a_{2n-1} = \beta$, then the common ratio of G.P. is : (1) $\sqrt{\frac{\alpha}{\beta}}$ (2) $\sqrt{\frac{\beta}{\alpha}}$ (3) $\frac{\beta}{\alpha}$ (4) $\frac{\alpha}{\beta}$
20.	The sum of cubes of n natural numbers is : (1) $(\Sigma n)^2$ (2) $(\Sigma n)^3$ (3) $(\Sigma n^2)^3$ (4) None of these

Question No.	Questions
21.	The value of λ for which the lines $3x + 4y = 5, 5x + 4y = 4$ and $\lambda x + 4y = 6$ meet at a point is : (1) 4 (2) 3 (3) 2 (4) 1
22.	A straight line through $P(1,2)$ is such that its intercept between the axes is bisected at P. Its equation is : (1) $x + y = -1$ (2) $2x + y = 4$ (3) $x + y = 3$ (4) $x + 2y = 5$
23.	Equation of a straight line perpendicular to the line $3x - y + 7 = 0$ and passing through (5,2) is : (1) $3x + y - 11 = 0$ (2) $x - 3y - 11 = 0$ (3) $x + 3y - 11 = 0$ (4) $x - 3y + 11 = 0$
24.	For what value of K, the points $(K, 2-2K), (-K+1, 2K)$ and $(-4-K, 6-2K)$ are collinear? (1) $K = -1$ (2) $K = -2$ (3) $K = 1$ (4) $K = 2$
25.	The point of the parabola $y^2 = 18x$ for which the ordinate is three times the abscissa, is : (1) (2,6) (2) (6,2) (3) (3,18) (4) (−2,−6)

Question No.	Questions
26.	In an ellipse, length of minor axis is 8 and eccentricity is $\frac{\sqrt{5}}{3}$. The length of major axis is : (1) 6 (2) 12 (3) 10 (4) 16
27.	The eccentricity of a rectangular hyperbola is : (1) $\frac{1}{\sqrt{2}}$ (2) $-\sqrt{2}$ (3) $\sqrt{2}$ (4) $-\frac{1}{\sqrt{2}}$
28.	The equation of circle whose centre is $(0,0)$ and area of the circle is 154 sq unit is given by : (1) $x^2+y^2=7$ (2) $x^2+y^2=22$ (3) $x^2+y^2=11$ (4) $x^2+y^2=49$
29.	$\lim\limits_{x\to\infty}\frac{\sin x}{x}$ is equal to : (1) 0 (2) 1 (3) ∞ (4) Doesn't exist
30.	$\lim\limits_{x\to 2}\left(\frac{3^{x/2}-3}{3^x-9}\right)$ is equal to : (1) 0 (2) $\frac{1}{6}$ (3) $\frac{1}{3}$ (4) $\log 3$

Question No.	Questions
31.	If $f(x)=\begin{cases}\frac{x^2-9}{x-3}, & \text{if } x\neq 3\\ 2x+k, & \text{otherwise}\end{cases}$ is continuous at $x=3$, then k is equal to : (1) 3 (2) $\frac{1}{6}$ (3) 0 (4) -6
32.	A set contains n elements. Then the number of elements in Power Set are : (1) n^2 (2) n (3) (2^n-1) (4) 2^n
33.	Two sets A and B are called Disjoint sets, if $A\cap B$ is : (1) ϕ (2) 0 (3) 1 (4) None of these
34.	If $A=\{1,2,3,4\}$ and $B=\{4,5,6,7\}$, then $B-A$ is given by : (1) ϕ (2) $\{5,6,7\}$ (3) $\{1,2,3\}$ (4) None of these
35.	In a city 20% of the population travels by Metro, 50% by Taxi and 10% travels by both Metro and Taxi. Then persons travelling by Metro or Taxi is : (1) 60% (2) 70% (3) 40% (4) 80%

Question No.	Questions
36.	(2)$4^{2n+1} + 3^{3n+1}$ is divisible by which of the following for all $n \in N$: (1) 2 (2) 9 (3) 3 (4) 11
37.	If $\cos^{-1} x - \sin^{-1} x = 0$, then x is equal to : (1) $\frac{1}{\sqrt{2}}$ (2) $-\frac{1}{\sqrt{2}}$ (3) $\sqrt{2}$ (4) $-\sqrt{2}$
38.	The value of $\sin(\cot^{-1} x)$ is equal to : (1) $\sqrt{1+x^2}$ (2) $(1+x^2)^{-1/2}$ (3) x (4) $\frac{1}{x}$
39.	The value of $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$ is equal to : (1) 0 (2) $\frac{1}{2}$ (3) 1 (4) -1
40.	$\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8}$ is equal to : (1) π (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$
41.	If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then the value of α and β is : (1) $\alpha = a^2 + b^2, \beta = 2ab$ (2) $\alpha = \frac{a^2}{b^2}, \beta = \frac{2}{3}ab$ (3) $\alpha = a^2 b^2, \beta = 2ab$ (4) $\alpha = a^2 - b^2, \beta = \frac{ab}{2}$

Question No.	Questions
42.	Each diagonal element of a skew-symmetric matrix is : (1) Always zero (2) Always imaginary (3) Always one (4) None of these
43.	The matrix A which satisfies the condition $\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$ is given by : (1) $\begin{bmatrix} 1 & 0 \\ 4 & -1 \end{bmatrix}$ (2) $\begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$ (3) $\begin{bmatrix} 1 & 0 \\ -1 & 4 \end{bmatrix}$ (4) None of these
44.	If a square matrix A is such that $AA' = I = A'A$, then $\lvert A \rvert$ is equal to : (1) ± 2 (2) 0 (3) ± 1 (4) None of these
45.	$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ is equal to : (1) abc (2) $a+b+c$ (3) 1 (4) 0
46.	If -9 is a root of the equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then the other two roots are : (1) $2, -7$ (2) $2, 7$ (3) $-2, -7$ (4) $-2, 7$

Question No.	Questions
47.	If $A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$, then adj A is given by : (1) $\begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$ (3) $\begin{bmatrix} -5 & 2 \\ 3 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix}$
48.	If $A = \begin{bmatrix} \lambda & 2 \\ 2 & \lambda \end{bmatrix}$ and $\lvert A^3 \rvert = 125$, then the value of λ is : (1) ± 3 (2) ± 5 (3) ± 1 (4) ± 2
49.	If $xy = e^{x-y}$, then $\frac{dy}{dx}$ is equal to : (1) $\frac{y}{x(1+y)}$ (2) $\frac{(x-1)y}{x(1+y)}$ (3) $\frac{(x-1)}{x(1+y)}$ (4) $\frac{(x+1)y}{x(1-y)}$
50.	If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x \_\_\_\_\_ \infty}}}$, then $\frac{dy}{dx}$ is equal to : (1) $\frac{\sin x}{2y-1}$ (2) $\frac{\cos x}{2y-1}$ (3) $\frac{\sin x}{1-2y}$ (4) $\frac{\cos x}{1-2y}$
51.	If $x = at^2$, $y = 2at$, then $\frac{d^2y}{dx^2}$ at $t = 2$ is : (1) $16a$ (2) $\frac{1}{16a}$ (3) $-\frac{1}{16a}$ (4) None of these

Question No.	Questions
52.	The derivative of $\log \sqrt{\frac{1+\cos x}{1-\cos x}}$ is : (1) $-\operatorname{cosec} x$ (2) $\operatorname{cosec} x$ (3) $\cot x$ (4) $-\cot x$
53.	The interval in which the function $y = x^3 + 5x^2 - 1$ is decreasing is given by : (1) $\frac{10}{3} < x < 0$ (2) $0 < x < \frac{10}{3}$ (3) $10 < 3x < 0$ (4) $-\frac{10}{3} < x < 0$
54.	The minimum value of $x^2 + \frac{1}{1+x^2}$ is, at : (1) $x = 1$ (2) $x = 0$ (3) $x = -1$ (4) None of these
55.	The point on the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at which the normal is parallel to the x-axis, is : (1) $(0, a)$ (2) $(a, 0)$ (3) (a, a) (4) $(0, 0)$
56.	For the curve $y = e^{2x}$, the equation of tangent at $(0, 1)$ is : (1) $y = -2x + 1$ (2) $y = -1 + 2x$ (3) $y = 2x + 1$ (4) $y = -\frac{2}{3}x - 1$

Question No.	Questions
57.	$\int \frac{e^x(1+\sin x)}{(1+\cos x)}dx$ is given by : (1) $e^x \tan\frac{x}{2}+c$ (2) $e^x \cot\frac{x}{2}+c$ (3) $e^x \cos\frac{x}{2}+c$ (4) $e^x \sin\frac{x}{2}+c$
58.	$\int \frac{dx}{x+\sqrt{x}}$ is given by : (1) $\log(\sqrt{x}+1)+c$ (2) $2\log(\sqrt{x}+1)+c$ (3) $\frac{1}{2}\log(\sqrt{x}+1)+c$ (4) $\log(x+1)+c$
59.	$\int \frac{e^x}{(2+e^x)(1+e^x)}dx$ is equal to : (1) $\log\left(\frac{1-e^x}{2+e^x}\right)+c$ (2) $\log\left(\frac{1+e^x}{2-e^x}\right)+c$ (3) $\log\left(\frac{1-e^x}{2-e^x}\right)+c$ (4) $\log\left(\frac{1+e^x}{2+e^x}\right)+c$
60.	$\int \frac{x^2}{x^2+4}dx$ is equal to : (1) $x-2\tan^{-1}\frac{x}{2}+c$ (2) $x+2\tan^{-1}\frac{x}{2}+c$ (3) $\frac{x}{2}-\tan^{-1}\frac{x}{2}+c$ (4) $\frac{x}{2}+\tan^{-1}\frac{x}{2}+c$
61.	$\int \frac{1+\tan^2 x}{1-\tan^2 x}dx$ is given by : (1) $\frac{1}{2}\log\left\lvert\frac{1+\tan x}{1+\cot x}\right\rvert+c$ (2) $\log\left\lvert\frac{1+\tan x}{1-\tan x}\right\rvert+c$ (3) $\frac{1}{2}\log\left\lvert\frac{1+\tan x}{1-\tan x}\right\rvert+c$ (4) $\log\left\lvert\frac{1+\cot x}{1-\tan x}\right\rvert+c$

Question No.	Questions
62.	The order of the differential equation $\frac{d^2y}{dx^2}+\left(\frac{dy}{dx}\right)^3=0$ is : (1) 1 (2) 2 (3) 3 (4) 0
63.	The solution of the differential equation $\frac{dy}{dx}=\frac{x(2\log x+1)}{\sin y+y\cos y}$ is : (1) $y=x^2\log x+c$ (2) $y=x^2\sin x+c$ (3) $y\sin y=x^2\log x+c$ (4) $y\sin y=\log x+c$
64.	The integrating factor for solving the differential equation $\frac{dy}{dx}-\frac{y}{x}=2x^2+3x+4$ is : (1) $\frac{1}{x^2}$ (2) $-\frac{1}{x}$ (3) x (4) $\frac{1}{x}$
65.	$\frac{x\,dy-y\,dx}{x^2}$ is equal to : (1) $d\left(\frac{x}{y}\right)$ (2) $d(xy)$ (3) $d(x+y)$ (4) $d\left(\frac{y}{x}\right)$
66.	If $\vec{u}$, $\vec{v}$ and $\vec{w}$ are three vectors such that $\vec{u}+\vec{v}+\vec{w}=\vec{0}$, then find $\vec{u}.\vec{v}+\vec{v}.\vec{w}+\vec{w}.\vec{u}$, if $\lvert\vec{u}\rvert=3$, $\lvert\vec{v}\rvert=4$ and $\lvert\vec{w}\rvert=5$: (1) 5^2 (2) -5^2 (3) 2^5 (4) 5^3

Question No.	Questions
67.	If $\|\vec{a}\| = \|\vec{b}\|$, then $(\vec{a}+\vec{b}).(\vec{a}-\vec{b})$ is : (1) Positive (2) Negative (3) Zero (4) None of these
68.	If θ is the angle between the vectors $\vec{a} = 2\hat{i}+2\hat{j}-\hat{k}$ and $\vec{b} = 6\hat{i}-3\hat{j}+2\hat{k}$, then : (1) $\cos\theta = \frac{4}{21}$ (2) $\cos\theta = \frac{3}{19}$ (3) $\cos\theta = \frac{2}{19}$ (4) $\cos\theta = \frac{2}{21}$
69.	If $\vec{a}$ is any vector, then $(\vec{a}\times i)^2 + (\vec{a}\times j)^2 + (\vec{a}\times\vec{k})^2$ is : (1) $2\vec{a}^2$ (2) $\frac{\vec{a}^2}{2}$ (3) $\vec{a}^2+2$ (4) $\vec{a}^2-2$
70.	If a line makes angles α,β,γ with coordinate axes, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ is : (1) 3 (2) -1 (3) -2 (4) 2
71.	The equation of the plane passing through the intersection of the planes $x+2y+3z+4=0$ and $4x+3y+2z+1=0$ and the origin is : (1) $2x+3y+z=0$ (2) $3x+2y+z=0$ (3) $x+y+z=0$ (4) $3x+2y+z+1=0$

Question No.	Questions
72.	The triangle formed by the points $(0,7,10),(-1,6,6),(-4,9,6)$ is : (1) Right angled (2) Equilateral (3) Isosceles (4) Right angled isosceles
73.	The distance of the point $(2,3,-5)$ from the plane $x+2y-2z=9$ is : (1) 3 (2) 4 (3) 1 (4) 2
74.	If R is a relation on a set A such that $R = R^{-1}$, then R is : (1) Transitive (2) Symmetric (3) Reflexive (4) None of these
75.	The function $f(x) = \log\left(x+\sqrt{x^2+1}\right)$ is : (1) A periodic function (2) An even function (3) An odd function (4) None of these
76.	Let R be a relation on N defined by $x+2y=8$. The domain of R is : (1) $\{2,4,8\}$ (2) $\{1,2,3,4\}$ (3) $\{2,4,6\}$ (4) $\{2,4,6,8\}$
77.	R is called a symmetric relation on A, if : (1) $(x,y)\in R \Rightarrow (y,x)\notin R$ (2) $(x,y)\in R \Rightarrow \left(\frac{1}{x},\frac{1}{y}\right)\in R$ (3) $(x,y)\in R \Rightarrow (y,x)\in R$ (4) None of these
78.	Five boys and three girls are seated at random in a row. The probability that no boy sits between two girls is : (1) 28 (2) $\frac{1}{28}$ (3) $\frac{2}{28}$ (4) $\frac{3}{28}$

Question No.	Questions
79.	Two cards are drawn at random from a pack of 52 cards. The probability that these two being aces is : (1) $\frac{1}{221}$ (2) $\frac{1}{122}$ (3) $\frac{1}{212}$ (4) $\frac{1}{222}$
80.	A bag contains 8 red and 5 white balls. Three balls are drawn at random. The probability that one ball is red and two balls are white is : (1) $\frac{40}{139}$ (2) $\frac{40}{143}$ (3) $\frac{4}{139}$ (4) $\frac{4}{143}$
81.	A coin is tossed and a die is rolled. The probability that the coin shows a head and the die shows 3 is : (1) $\frac{1}{3}$ (2) $\frac{1}{6}$ (3) $\frac{1}{12}$ (4) $\frac{1}{24}$
82.	The probability that at least one of the events A and B occurs is $\frac{3}{5}$. If A and B occur simultaneously with probability $\frac{1}{5}$, then $P(A') + P(B')$ is : (1) $\frac{6}{5}$ (2) $\frac{4}{5}$ (3) $\frac{7}{5}$ (4) $\frac{2}{5}$

Question No.	Questions
83.	If two coins are tossed 5 times, then the probability of getting 5 heads and 5 tails is : (1) $\frac{9}{64}$ (2) $\frac{2}{205}$ (3) $\frac{1}{1024}$ (4) $\frac{63}{256}$
84.	A Coin is tossed 10 times. The probability of getting exactly six heads is : (1) $\frac{100}{153}$ (2) ${}^{10}C_6$ (3) $\frac{105}{512}$ (4) ${}^{10}C_4$
85.	A box contains 3 white and 2 red balls. If we draw one ball and without replacing the first ball, the probability of drawing red ball in second draw is : (1) $\frac{8}{25}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{21}{25}$
86.	If $3 < \|x\| < 6$, then x belongs to : (1) $(-6,-3) \cup (3,6)$ (2) $(-6,6)$ (3) $(-3,-3) \cup (3,6)$ (4) None of these
87.	If $ab = 4$ and $a, b \in R^+$, then : (1) $a+b \leq 4$ (2) $(a+b) = 4$ (3) $a+b \geq 4$ (4) None of these

Question No.	Questions
88.	Area lying between parabola $y^2 = 4ax$ and its latus rectum is : (1) $\frac{4}{3}a^2$sq. unit (2) $\frac{8}{3}a^2$sq. unit (3) $\frac{16}{3}a^2$sq. unit (4) None of these
89.	$\int_{-1}^{0} \frac{dx}{x^2+2x+2}$ is equal to : (1) $\frac{\pi}{4}$ (2) $-\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) 0
90.	The value of $\int_{-\pi/4}^{\pi/4} x^3 \sin^4 x \, dx$ is equal to : (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{8}$ (4) 0
91.	Area bounded by the curves $y^2 = x$ and $y = x^2$ is : (1) $\frac{2}{3}$ sq. unit (2) 1 sq. unit (3) $\frac{1}{2}$ sq. unit (4) None of these
92.	A linear programming problem is concerned with finding the : (1) Any value of a linear function (2) Unsatisfactorily value of a linear function (3) Optimal value of a linear function (4) None of these

Question No.	Questions
93.	In the formula of mode given by $l + h\left(\frac{f_1-f_0}{2f_1-f_0-f_2}\right)$, frequency of the modal class is : (1) f_2 (2) f_1 (3) f_0 (4) h
94.	In the formula of median given by $l + \left(\frac{\frac{n}{2}-cf}{f}\right) \times h$, the class size is : (1) cf (2) l (3) h (4) n
95.	The empirical relation between the three measures of central tendency is : (1) Median = Mode + 2 Mean (2) Mode = 3 Median + Mean (3) 3 Median = 2 Mode + Mean (4) 3 Median = Mode + 2 Mean
96.	Standard deviation is a measure which shows how much variation from the : (1) Mean exists (2) Mode exists (3) Variance exists (4) None of these
97.	The angle between the planes $\vec{r}.(2\hat{i}-\hat{j}+\hat{k}) = 6$ and $\vec{r}.(\hat{i}+\hat{j}+2\hat{k}) = 5$ is : (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$

Question No.	Questions
98.	If equation of a line is $\vec{r} = \vec{a} + \lambda\vec{b}$ and equation of plane is $\vec{r}.\vec{n} = q$, then angle between line and plane is given by : (1) $\cos\theta = \frac{\vec{b}\,.\,\vec{n}}{\lvert\vec{b}\rvert\,\lvert\vec{n}\rvert}$ (2) $\sin\theta = \frac{\vec{b}\,.\,\vec{n}}{\lvert\vec{b}\rvert\,\lvert\vec{n}\rvert}$ (3) $\cos\theta = \frac{\vec{b}\times\vec{n}}{\lvert\vec{b}\times\vec{n}\rvert}$ (4) None of these
99.	A statement is a sentence which is : (1) Always True (2) Always False (3) Either True or False, but not both simultaneously (4) None of these
100.	Negation of negation of a statement is : (1) Not defined (2) True and False (3) The statement ifself (4) None of these

SET–"X" (Total No. of printed pages : 21)

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UG-EE-June, 2025 (Mathematics 4 year)

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Sr. No. 10042

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

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

Name : _____ Date of Birth : _____

Father's Name : _____ Mother's Name : _____

Date of Examination : _____

(Signature of the candidate) (Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. **All questions are compulsory.**
2. The candidates must return the Question book-let 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 and 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 book-let itself. Answers MUST NOT be ticked in the Question book-let.
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 <u>BALL POINT PEN</u> of good quality in the OMR Answer-Sheet.
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Question No.	Questions
1.	The equation of the plane passing through the intersection of the planes $x + 2y + 3z + 4 = 0$ and $4x + 3y + 2z + 1 = 0$ and the origin is : (1) $2x + 3y + z = 0$ (2) $3x + 2y + z = 0$ (3) $x + y + z = 0$ (4) $3x + 2y + z + 1 = 0$
2.	The triangle formed by the points $(0, 7, 10), (-1, 6, 6), (-4, 9, 6)$ is : (1) Right angled (2) Equilateral (3) Isosceles (4) Right angled isosceles
3.	The distance of the point $(2, 3, -5)$ from the plane $x + 2y - 2z = 9$ is : (1) 3 (2) 4 (3) 1 (4) 2
4.	If R is a relation on a set A such that $R = R^{-1}$, then R is : (1) Transitive (2) Symmetric (3) Reflexive (4) None of these
5.	The function $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$ is : (1) A periodic function (2) An even function (3) An odd function (4) None of these
6.	Let R be a relation on N defined by $x + 2y = 8$. The domain of R is : (1) $\{2, 4, 8\}$ (2) $\{1, 2, 3, 4\}$ (3) $\{2, 4, 6\}$ (4) $\{2, 4, 6, 8\}$
7.	R is called a symmetric relation on A, if : (1) $(x, y) \in R \Rightarrow (y, x) \notin R$ (2) $(x, y) \in R \Rightarrow \left(\frac{1}{x}, \frac{1}{y}\right) \in R$ (3) $(x, y) \in R \Rightarrow (y, x) \in R$ (4) None of these

Question No.	Questions
8.	Five boys and three girls are seated at random in a row. The probability that no boy sits between two girls is : (1) 28 (2) $\frac{1}{28}$ (3) $\frac{2}{28}$ (4) $\frac{3}{28}$
9.	Two cards are drawn at random from a pack of 52 cards. The probability that these two being aces is : (1) $\frac{1}{221}$ (2) $\frac{1}{122}$ (3) $\frac{1}{212}$ (4) $\frac{1}{222}$
10.	A bag contains 8 red and 5 white balls. Three balls are drawn at random. The probability that one ball is red and two balls are white is : (1) $\frac{40}{139}$ (2) $\frac{40}{143}$ (3) $\frac{4}{139}$ (4) $\frac{4}{143}$
11.	If $x = at^2, y = 2at$, then $\frac{d^2y}{dx^2}$ at $t = 2$ is : (1) $16a$ (2) $\frac{1}{16a}$ (3) $-\frac{1}{16a}$ (4) None of these
12.	The derivative of $\log\sqrt{\frac{1+\cos x}{1-\cos x}}$ is : (1) $-\operatorname{cosec} x$ (2) $\operatorname{cosec} x$ (3) $\cot x$ (4) $-\cot x$

Question No.	Questions
13.	The interval in which the function $y = x^3 + 5x^2 - 1$ is decreasing is given by : (1) $\frac{10}{3} < x < 0$ (2) $0 < x < \frac{10}{3}$ (3) $10 < 3x < 0$ (4) $-\frac{10}{3} < x < 0$
14.	The minimum value of $x^2 + \frac{1}{1+x^2}$ is, at : (1) $x = 1$ (2) $x = 0$ (3) $x = -1$ (4) None of these
15.	The point on the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at which the normal is parallel to the x-axis, is : (1) $(0, a)$ (2) $(a, 0)$ (3) (a, a) (4) $(0, 0)$
16.	For the curve $y = e^{2x}$, the equation of tangent at $(0, 1)$ is : (1) $y = -2x + 1$ (2) $y = -1 + 2x$ (3) $y = 2x + 1$ (4) $y = -\frac{2}{3}x - 1$
17.	$\int \frac{e^x(1+\sin x)}{(1+\cos x)} dx$ is given by : (1) $e^x \tan\frac{x}{2} + c$ (2) $e^x \cot\frac{x}{2} + c$ (3) $e^x \cos\frac{x}{2} + c$ (4) $e^x \sin\frac{x}{2} + c$

Question No.	Questions
18.	$\int \frac{dx}{x+\sqrt{x}}$ is given by : (1) $\log(\sqrt{x}+1)+c$ (2) $2\log(\sqrt{x}+1)+c$ (3) $\frac{1}{2}\log(\sqrt{x}+1)+c$ (4) $\log(x+1)+c$
19.	$\int \frac{e^x}{(2+e^x)(1+e^x)}dx$ is equal to : (1) $\log\left(\frac{1-e^x}{2+e^x}\right)+c$ (2) $\log\left(\frac{1+e^x}{2-e^x}\right)+c$ (3) $\log\left(\frac{1-e^x}{2-e^x}\right)+c$ (4) $\log\left(\frac{1+e^x}{2+e^x}\right)+c$
20.	$\int \frac{x^2}{x^2+4}dx$ is equal to : (1) $x-2\tan^{-1}\frac{x}{2}+c$ (2) $x+2\tan^{-1}\frac{x}{2}+c$ (3) $\frac{x}{2}-\tan^{-1}\frac{x}{2}+c$ (4) $\frac{x}{2}+\tan^{-1}\frac{x}{2}+c$
21.	If $f(x)=\begin{cases}\frac{x^2-9}{x-3}, & \text{if } x\neq 3\\ 2x+k, & \text{otherwise}\end{cases}$ is continuous at $x=3$, then k is equal to : (1) 3 (2) $\frac{1}{6}$ (3) 0 (4) -6
22.	A set contains n elements. Then the number of elements in Power Set are : (1) n^2 (2) n (3) (2^n-1) (4) 2^n

Question No.	Questions
23.	Two sets A and B are called Disjoint sets, if $A \cap B$ is : (1) ϕ (2) 0 (3) 1 (4) None of these
24.	If $A=\{1,2,3,4\}$ and $B=\{4,5,6,7\}$, then $B-A$ is given by : (1) ϕ (2) $\{5,6,7\}$ (3) $\{1,2,3\}$ (4) None of these
25.	In a city 20% of the population travels by Metro, 50% by Taxi and 10% travels by both Metro and Taxi. Then persons travelling by Metro or Taxi is : (1) 60% (2) 70% (3) 40% (4) 80%
26.	(2)$4^{2n+1}+3^{3n+1}$ is divisible by which of the following for all $n \in N$: (1) 2 (2) 9 (3) 3 (4) 11
27.	If $\cos^{-1}x-\sin^{-1}x=0$, then x is equal to : (1) $\frac{1}{\sqrt{2}}$ (2) $-\frac{1}{\sqrt{2}}$ (3) $\sqrt{2}$ (4) $-\sqrt{2}$
28.	The value of $\sin(\cot^{-1}x)$ is equal to : (1) $\sqrt{1+x^2}$ (2) $(1+x^2)^{-1/2}$ (3) x (4) $\frac{1}{x}$

Question No.	Questions
29.	The value of $\sin\left[\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right]$ is equal to : (1) 0 (2) $\frac{1}{2}$ (3) 1 (4) -1
30.	$\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{8}$ is equal to : (1) π (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$
31.	How many words can be made from the letters of the word DELHI, if L comes in the middle of every word? (1) 24 (2) 12 (3) 6 (4) 60
32.	The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes is empty, is : (1) 5 (2) 3^8 (3) 21 (4) ${}^8C_3$
33.	If the 4^{th} term in the expansion of $\left(\frac{2}{3}x-\frac{3}{2x}\right)^n$ is independent of x, then n is equal to : (1) 5 (2) 6 (3) 9 (4) None of these

Question No.	Questions
34.	The coefficient of x^n in the expansion of $(1+x+x^2+\text{------})^{-n}$ is : (1) $n+1$ (2) n (3) 1 (4) $(-1)^n$
35.	The middle term in the expansion of $\left(x^2+\frac{1}{x^2}+2\right)^n$ is : (1) $\frac{\lfloor n}{\lfloor 2n}$ (2) $\frac{\lfloor 2n}{(\lfloor n)(\lfloor n)}$ (3) $\lfloor 2n$ (4) $\frac{\lfloor 2n}{\lfloor n-1}$
36.	The sum of n terms of the series $1.4+3.04+5.004+\text{--------}$ is : (1) $n^2+\frac{4}{9}\left(1-\frac{1}{10^n}\right)$ (2) $\frac{4}{9}+n^2\left(1-\frac{1}{10^n}\right)$ (3) $n^2+\frac{9}{4}\left(\frac{1}{10^n}-1\right)$ (4) $n^2+\frac{4}{3}\left(1-\frac{1}{10^n}\right)$
37.	If the pth term of an A.P. is q, qth term is p, then its rth term is : (1) $p+q+r$ (2) $p+q-r$ (3) $p+r-q$ (4) $p-q-r$
38.	Fifth term of a G.P. is 2, then the product of its nine term is : (1) 1024 (2) 256 (3) 512 (4) None of these

Question No.	Questions
39.	Let a_n be nth term of a G.P. of positive numbers. If $\sum_{n=1}^{100} a_{2n} = \alpha$ and $\sum_{n=1}^{100} a_{2n-1} = \beta$, then the common ratio of G.P. is : (1) $\sqrt{\frac{\alpha}{\beta}}$ (2) $\sqrt{\frac{\beta}{\alpha}}$ (3) $\frac{\beta}{\alpha}$ (4) $\frac{\alpha}{\beta}$
40.	The sum of cubes of n natural numbers is : (1) $(\sum n)^2$ (2) $(\sum n)^3$ (3) $(\sum n^2)^3$ (4) None of these
41.	Area bounded by the curves $y^2 = x$ and $y = x^2$ is : (1) $\frac{2}{3}$ sq. unit (2) 1 sq. unit (3) $\frac{1}{2}$ sq. unit (4) None of these
42.	A linear programming problem is concerned with finding the : (1) Any value of a linear function (2) Unsatisfactorily value of a linear function (3) Optimal value of a linear function (4) None of these
43.	In the formula of mode given by $l + h\left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)$, frequency of the modal class is : (1) f_2 (2) f_1 (3) f_0 (4) h

Question No.	Questions
44.	In the formula of median given by $l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$, the class size is : (1) cf (2) l (3) h (4) n
45.	The empirical relation between the three measures of central tendency is : (1) Median = Mode + 2 Mean (2) Mode = 3 Median + Mean (3) 3 Median = 2 Mode + Mean (4) 3 Median = Mode + 2 Mean
46.	Standard deviation is a measure which shows how much variation from the : (1) Mean exists (2) Mode exists (3) Variance exists (4) None of these
47.	The angle between the planes $\vec{r}.(2\hat{i} - \hat{j} + \hat{k}) = 6$ and $\vec{r}.(\hat{i} + \hat{j} + 2\hat{k}) = 5$ is : (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$
48.	If equation of a line is $\vec{r} = \vec{a} + \lambda\vec{b}$ and equation of plane is $\vec{r}.\vec{n} = q$, then angle between line and plane is given by : (1) $\cos\theta = \frac{\vec{b}.\vec{n}}{\lvert\vec{b}\rvert\lvert\vec{n}\rvert}$ (2) $\sin\theta = \frac{\vec{b}.\vec{n}}{\lvert\vec{b}\rvert\lvert\vec{n}\rvert}$ (3) $\cos\theta = \frac{\vec{b}\times\vec{n}}{\lvert\vec{b}\times\vec{n}\rvert}$ (4) None of these

Question No.	Questions
49.	A statement is a sentence which is : (1) Always True (2) Always False (3) Either True or False, but not both simultaneously (4) None of these
50.	Negation of negation of a statement is : (1) Not defined (2) True and False (3) The statement ifself (4) None of these
51.	$\int \frac{1+\tan^2 x}{1-\tan^2 x} dx$ is given by : (1) $\frac{1}{2}\log\left\|\frac{1+\tan x}{1+\cot x}\right\| + c$ (2) $\log\left\|\frac{1+\tan x}{1-\tan x}\right\| + c$ (3) $\frac{1}{2}\log\left\|\frac{1+\tan x}{1-\tan x}\right\| + c$ (4) $\log\left\|\frac{1+\cot x}{1-\tan x}\right\| + c$
52.	The order of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = 0$ is : (1) 1 (2) 2 (3) 3 (4) 0
53.	The solution of the differential equation $\frac{dy}{dx} = \frac{x(2\log x+1)}{\sin y + y\cos y}$ is : (1) $y = x^2 \log x + c$ (2) $y = x^2 \sin x + c$ (3) $y \sin y = x^2 \log x + c$ (4) $y \sin y = \log x + c$

Question No.	Questions
54.	The integrating factor for solving the differential equation $\frac{dy}{dx} - \frac{y}{x} = 2x^2 + 3x + 4$ is : (1) $\frac{1}{x^2}$ (2) $-\frac{1}{x}$ (3) x (4) $\frac{1}{x}$
55.	$\frac{x\,dy - y\,dx}{x^2}$ is equal to : (1) $d\left(\frac{x}{y}\right)$ (2) $d(xy)$ (3) $d(x+y)$ (4) $d\left(\frac{y}{x}\right)$
56.	If $\vec{u}$, $\vec{v}$ and $\vec{w}$ are three vectors such that $\vec{u} + \vec{v} + \vec{w} = \vec{0}$, then find $\vec{u}.\vec{v} + \vec{v}.\vec{w} + \vec{w}.\vec{u}$, if $\|\vec{u}\| = 3$, $\|\vec{v}\| = 4$ and $\|\vec{w}\| = 5$: (1) 5^2 (2) -5^2 (3) 2^5 (4) 5^3
57.	If $\|\vec{a}\| = \|\vec{b}\|$, then $(\vec{a} + \vec{b}).(\vec{a} - \vec{b})$ is : (1) Positive (2) Negative (3) Zero (4) None of these
58.	If θ is the angle between the vectors $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$ and $\vec{b} = 6\hat{i} - 3\hat{j} + 2\hat{k}$, then : (1) $\cos\theta = \frac{4}{21}$ (2) $\cos\theta = \frac{3}{19}$ (3) $\cos\theta = \frac{2}{19}$ (4) $\cos\theta = \frac{2}{21}$

Question No.	Questions
59.	If $\vec{a}$ is any vector, then $(\vec{a}\times i)^2+(\vec{a}\times j)^2+(\vec{a}\times k)^2$ is : (1) $2\vec{a}^2$ (2) $\frac{\vec{a}^2}{2}$ (3) $\vec{a}^2+2$ (4) $\vec{a}^2-2$
60.	If a line makes angles α,β,γ with coordinate axes, then $\cos 2\alpha+\cos 2\beta+\cos 2\gamma$ is : (1) 3 (2) -1 (3) -2 (4) 2
61.	A coin is tossed and a die is rolled. The probability that the coin shows a head and the die shows 3 is : (1) $\frac{1}{3}$ (2) $\frac{1}{6}$ (3) $\frac{1}{12}$ (4) $\frac{1}{24}$
62.	The probability that at least one of the events A and B occurs is $\frac{3}{5}$. If A and B occur simultaneously with probability $\frac{1}{5}$, then $P(A')+P(B')$ is : (1) $\frac{6}{5}$ (2) $\frac{4}{5}$ (3) $\frac{7}{5}$ (4) $\frac{2}{5}$

Question No.	Questions
63.	If two coins are tossed 5 times, then the probability of getting 5 heads and 5 tails is : (1) $\frac{9}{64}$ (2) $\frac{2}{205}$ (3) $\frac{1}{1024}$ (4) $\frac{63}{256}$
64.	A Coin is tossed 10 times. The probability of getting exactly six heads is : (1) $\frac{100}{153}$ (2) ${}^{10}C_6$ (3) $\frac{105}{512}$ (4) ${}^{10}C_4$
65.	A box contains 3 white and 2 red balls. If we draw one ball and without replacing the first ball, the probability of drawing red ball in second draw is : (1) $\frac{8}{25}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{21}{25}$
66.	If $3<\lvert x\rvert<6$, then x belongs to : (1) $(-6,-3)\cup(3,6)$ (2) $(-6,6)$ (3) $(-3,-3)\cup(3,6)$ (4) None of these
67.	If $ab=4$ and $a,b\in R^+$, then : (1) $a+b\le 4$ (2) $(a+b)=4$ (3) $a+b\ge 4$ (4) None of these

Question No.	Questions
68.	Area lying between parabola $y^2 = 4ax$ and its latus rectum is : (1) $\frac{4}{3}a^2$sq. unit (2) $\frac{8}{3}a^2$sq. unit (3) $\frac{16}{3}a^2$sq. unit (4) None of these
69.	$\int_{-1}^{0} \frac{dx}{x^2+2x+2}$ is equal to : (1) $\frac{\pi}{4}$ (2) $-\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) 0
70.	The value of $\int_{-\pi/4}^{\pi/4} x^3 \sin^4 x \, dx$ is equal to : (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{8}$ (4) 0
71.	If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then the value of α and β is : (1) $\alpha = a^2 + b^2, \beta = 2ab$ (2) $\alpha = \frac{a^2}{b^2}, \beta = \frac{2}{3}ab$ (3) $\alpha = a^2 b^2, \beta = 2ab$ (4) $\alpha = a^2 - b^2, \beta = \frac{ab}{2}$
72.	Each diagonal element of a skew-symmetric matrix is : (1) Always zero (2) Always imaginary (3) Always one (4) None of these

Question No.	Questions
73.	The matrix A which satisfies the condition $\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$ is given by : (1) $\begin{bmatrix} 1 & 0 \\ 4 & -1 \end{bmatrix}$ (2) $\begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$ (3) $\begin{bmatrix} 1 & 0 \\ -1 & 4 \end{bmatrix}$ (4) None of these
74.	If a square matrix A is such that $AA' = I = A'A$, then $\lvert A \rvert$ is equal to : (1) ± 2 (2) 0 (3) ± 1 (4) None of these
75.	$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ is equal to : (1) abc (2) $a+b+c$ (3) 1 (4) 0
76.	If -9 is a root of the equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then the other two roots are : (1) $2, -7$ (2) $2, 7$ (3) $-2, -7$ (4) $-2, 7$
77.	If $A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$, then adj A is given by : (1) $\begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$ (3) $\begin{bmatrix} -5 & 2 \\ 3 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix}$

Question No.	Questions
78.	If $A = \begin{bmatrix} \lambda & 2 \\ 2 & \lambda \end{bmatrix}$ and $\lvert A^3 \rvert = 125$, then the value of λ is : (1) ± 3 (2) ± 5 (3) ± 1 (4) ± 2
79.	If $xy = e^{x-y}$, then $\frac{dy}{dx}$ is equal to : (1) $\frac{y}{x(1+y)}$ (2) $\frac{(x-1)y}{x(1+y)}$ (3) $\frac{(x-1)}{x(1+y)}$ (4) $\frac{(x+1)y}{x(1-y)}$
80.	If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x \_\_\_\_\_ \infty}}}$, then $\frac{dy}{dx}$ is equal to : (1) $\frac{\sin x}{2y-1}$ (2) $\frac{\cos x}{2y-1}$ (3) $\frac{\sin x}{1-2y}$ (4) $\frac{\cos x}{1-2y}$
81.	The value of λ for which the lines $3x + 4y = 5, 5x + 4y = 4$ and $\lambda x + 4y = 6$ meet at a point is : (1) 4 (2) 3 (3) 2 (4) 1
82.	A straight line through $P(1,2)$ is such that its intercept between the axes is bisected at P. Its equation is : (1) $x + y = -1$ (2) $2x + y = 4$ (3) $x + y = 3$ (4) $x + 2y = 5$

Question No.	Questions
83.	Equation of a straight line perpendicular to the line $3x - y + 7 = 0$ and passing through (5,2) is : (1) $3x + y - 11 = 0$ (2) $x - 3y - 11 = 0$ (3) $x + 3y - 11 = 0$ (4) $x - 3y + 11 = 0$
84.	For what value of K, the points $(K, 2-2K), (-K+1, 2K)$ and $(-4-K, 6-2K)$ are collinear? (1) $K = -1$ (2) $K = -2$ (3) $K = 1$ (4) $K = 2$
85.	The point of the parabola $y^2 = 18x$ for which the ordinate is three times the abscissa, is : (1) (2,6) (2) (6,2) (3) (3,18) (4) (−2,−6)
86.	In an ellipse, length of minor axis is 8 and eccentricity is $\frac{\sqrt{5}}{3}$. The length of major axis is : (1) 6 (2) 12 (3) 10 (4) 16
87.	The eccentricity of a rectangular hyperbola is : (1) $\frac{1}{\sqrt{2}}$ (2) $-\sqrt{2}$ (3) $\sqrt{2}$ (4) $-\frac{1}{\sqrt{2}}$

Question No.	Questions
88.	The equation of circle whose centre is $(0,0)$ and area of the circle is 154 sq unit is given by : (1) $x^2+y^2=7$ (2) $x^2+y^2=22$ (3) $x^2+y^2=11$ (4) $x^2+y^2=49$
89.	$\lim\limits_{x\to\infty}\frac{\sin x}{x}$ is equal to : (1) 0 (2) 1 (3) ∞ (4) Doesn't exist
90.	$\lim\limits_{x\to 2}\left(\frac{3^{x/2}-3}{3^x-9}\right)$ is equal to : (1) 0 (2) $\frac{1}{6}$ (3) $\frac{1}{3}$ (4) $\log 3$
91.	If $\cos\theta=\frac{1}{2}\left(x+\frac{1}{x}\right)$, then $\frac{1}{2}\left(x^2+\frac{1}{x^2}\right)$ is equal to : (1) $\sin 2\theta$ (2) $\cos 2\theta$ (3) $\tan 2\theta$ (4) $\cot 2\theta$
92.	If $\frac{3\pi}{4}<\alpha<\pi$, then $\sqrt{\operatorname{cosec}^2\alpha+2\cot\alpha}$ is equal to : (1) $-1-\cot\alpha$ (2) $1+\cot\alpha$ (3) $1-\cot\alpha$ (4) $-1+\cot\alpha$

Question No.	Questions
93.	If $\tan 2\theta\ \tan\theta=1$, then the general value of θ is : (1) $\left(n+\frac{1}{2}\right)\pi$ (2) $\left(2n\pm\frac{1}{2}\right)\frac{\pi}{3}$ (3) $\left(n+\frac{1}{2}\right)\frac{\pi}{3}$ (4) None of these
94.	If $(w\neq 1)$ is a cube root of unity and $(1+w)^7=A+Bw$, then A and B are given by : (1) 0, 1 (2) 1, 0 (3) -1, 1 (4) 1, 1
95.	If $z=\left(\frac{\sqrt{3}}{2}+\frac{i}{2}\right)^5+\left(\frac{\sqrt{3}}{2}-\frac{i}{2}\right)^5$, then : (1) $\operatorname{Im}(z)=0$ (2) $\operatorname{Re}(z)=0$ (3) $\operatorname{Re}(z)>0, \operatorname{Im}(z)>0$ (4) None of these
96.	The number of real roots of $3^{2x^2-7x+7}=9$ is : (1) 2 (2) 1 (3) Zero (4) 4
97.	If the roots of the equation $qx^2+px+q=0$ are complex, where p, q are real, then the roots of the equation $x^2-4qx+p^2=0$ are : (1) Imaginary (2) Real and equal (3) Real and unequal (4) None of these

Question No.	Questions
98.	If $2 + i\sqrt{3}$ is a root of the equation $x^2 + px + q = 0$ where p and q are real, then (p, q) is equal to : (1) $(4, -7)$ (2) $(4, 7)$ (3) $(-4, 7)$ (4) $(-4, -7)$
99.	If eleven members of a Committee at a round table, so that the Chairman and Secretary always sit together, then the number of arrangements is : (1) $\lfloor 10$ (2) $\lfloor 9$ (3) $\lfloor 10 \times 2$ (4) $\lfloor 9 \times 2$
100.	A man has 7 friends. In how many ways, he can invite one or more of them to a tea party : (1) 127 (2) 128 (3) 256 (4) 130

SET–"X" (Total No. of printed pages : 21)

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UG-EE-June, 2025 (Mathematics 4 year)

Opened for scanning purpose at 11:25 AM on 20/6/25

Code C Sr. No. 10023

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

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

Name : _____ Date of Birth : _____

Father's Name : _____ Mother's Name : _____

Date of Examination : _____

(Signature of the candidate) (Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. **All questions are compulsory.**
2. The candidates must return the Question book-let 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 and 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 book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
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 <u>BALL POINT PEN</u> 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 BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

Question No.	Questions
1.	If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then the value of α and β is : (1) $\alpha = a^2 + b^2, \beta = 2ab$ (2) $\alpha = \frac{a^2}{b^2}, \beta = \frac{2}{3}ab$ (3) $\alpha = a^2 b^2, \beta = 2ab$ (4) $\alpha = a^2 - b^2, \beta = \frac{ab}{2}$
2.	Each diagonal element of a skew-symmetric matrix is : (1) Always zero (2) Always imaginary (3) Always one (4) None of these
3.	The matrix A which satisfies the condition $\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$ is given by : (1) $\begin{bmatrix} 1 & 0 \\ 4 & -1 \end{bmatrix}$ (2) $\begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$ (3) $\begin{bmatrix} 1 & 0 \\ -1 & 4 \end{bmatrix}$ (4) None of these
4.	If a square matrix A is such that $AA' = I = A'A$, then $\lvert A \rvert$ is equal to : (1) ± 2 (2) 0 (3) ± 1 (4) None of these
5.	$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ is equal to : (1) abc (2) $a+b+c$ (3) 1 (4) 0

Question No.	Questions
6.	If -9 is a root of the equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then the other two roots are : (1) $2, -7$ (2) $2, 7$ (3) $-2, -7$ (4) $-2, 7$
7.	If $A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$, then adj A is given by : (1) $\begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$ (3) $\begin{bmatrix} -5 & 2 \\ 3 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix}$
8.	If $A = \begin{bmatrix} \lambda & 2 \\ 2 & \lambda \end{bmatrix}$ and $\lvert A^3 \rvert = 125$, then the value of λ is : (1) ± 3 (2) ± 5 (3) ± 1 (4) ± 2
9.	If $xy = e^{x-y}$, then $\frac{dy}{dx}$ is equal to : (1) $\frac{y}{x(1+y)}$ (2) $\frac{(x-1)y}{x(1+y)}$ (3) $\frac{(x-1)}{x(1+y)}$ (4) $\frac{(x+1)y}{x(1-y)}$
10.	If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x \_\_\_\_\_ \infty}}}$, then $\frac{dy}{dx}$ is equal to : (1) $\frac{\sin x}{2y-1}$ (2) $\frac{\cos x}{2y-1}$ (3) $\frac{\sin x}{1-2y}$ (4) $\frac{\cos x}{1-2y}$

Question No.	Questions
11.	The value of λ for which the lines $3x+4y=5, 5x+4y=4$ and $\lambda x+4y=6$ meet at a point is : (1) 4 (2) 3 (3) 2 (4) 1
12.	A straight line through $P(1,2)$ is such that its intercept between the axes is bisected at P. Its equation is : (1) $x+y=-1$ (2) $2x+y=4$ (3) $x+y=3$ (4) $x+2y=5$
13.	Equation of a straight line perpendicular to the line $3x-y+7=0$ and passing through (5,2) is : (1) $3x+y-11=0$ (2) $x-3y-11=0$ (3) $x+3y-11=0$ (4) $x-3y+11=0$
14.	For what value of K, the points $(K, 2-2K), (-K+1, 2K)$ and $(-4-K, 6-2K)$ are collinear? (1) $K=-1$ (2) $K=-2$ (3) $K=1$ (4) $K=2$
15.	The point of the parabola $y^2=18x$ for which the ordinate is three times the abscissa, is : (1) (2,6) (2) (6,2) (3) (3,18) (4) (−2,−6)

Question No.	Questions
16.	In an ellipse, length of minor axis is 8 and eccentricity is $\frac{\sqrt{5}}{3}$. The length of major axis is : (1) 6 (2) 12 (3) 10 (4) 16
17.	The eccentricity of a rectangular hyperbola is : (1) $\frac{1}{\sqrt{2}}$ (2) $-\sqrt{2}$ (3) $\sqrt{2}$ (4) $-\frac{1}{\sqrt{2}}$
18.	The equation of circle whose centre is $(0, 0)$ and area of the circle is 154 sq unit is given by : (1) $x^2 + y^2 = 7$ (2) $x^2 + y^2 = 22$ (3) $x^2 + y^2 = 11$ (4) $x^2 + y^2 = 49$
19.	$\lim_{x \to \infty} \frac{\sin x}{x}$ is equal to : (1) 0 (2) 1 (3) ∞ (4) Doesn't exist
20.	$\lim_{x \to 2} \left(\frac{3^{x/2} - 3}{3^x - 9} \right)$ is equal to : (1) 0 (2) $\frac{1}{6}$ (3) $\frac{1}{3}$ (4) log 3

Question No.	Questions
21.	If $\cos\theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$, then $\frac{1}{2}\left(x^2 + \frac{1}{x^2}\right)$ is equal to : (1) $\sin 2\theta$ (2) $\cos 2\theta$ (3) $\tan 2\theta$ (4) $\cot 2\theta$
22.	If $\frac{3\pi}{4} < \alpha < \pi$, then $\sqrt{\text{cosec}^2\,\alpha + 2\cot\alpha}$ is equal to : (1) $-1 - \cot\alpha$ (2) $1 + \cot\alpha$ (3) $1 - \cot\alpha$ (4) $-1 + \cot\alpha$
23.	If $\tan 2\theta\ \tan\theta = 1$, then the general value of θ is : (1) $\left(n + \frac{1}{2}\right)\pi$ (2) $\left(2n \pm \frac{1}{2}\right)\frac{\pi}{3}$ (3) $\left(n + \frac{1}{2}\right)\frac{\pi}{3}$ (4) None of these
24.	If $(w \neq 1)$ is a cube root of unity and $(1 + w)^7 = A + Bw$, then A and B are given by : (1) 0, 1 (2) 1, 0 (3) −1, 1 (4) 1, 1
25.	If $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5$, then : (1) $\text{Im}(z) = 0$ (2) $\text{Re}(z) = 0$ (3) $\text{Re}(z) > 0, \text{Im}(z) > 0$ (4) None of these

Question No.	Questions
26.	The number of real roots of $3^{2x^2-7x+7} = 9$ is : (1) 2 (2) 1 (3) Zero (4) 4
27.	If the roots of the equation $qx^2 + px + q = 0$ are complex, where p, q are real, then the roots of the equation $x^2 - 4qx + p^2 = 0$ are : (1) Imaginary (2) Real and equal (3) Real and unequal (4) None of these
28.	If $2 + i\sqrt{3}$ is a root of the equation $x^2 + px + q = 0$ where p and q are real, then (p, q) is equal to : (1) $(4, -7)$ (2) $(4, 7)$ (3) $(-4, 7)$ (4) $(-4, -7)$
29.	If eleven members of a Committee at a round table, so that the Chairman and Secretary always sit together, then the number of arrangements is : (1) $\lfloor 10$ (2) $\lfloor 9$ (3) $\lfloor 10 \times 2$ (4) $\lfloor 9 \times 2$
30.	A man has 7 friends. In how many ways, he can invite one or more of them to a tea party : (1) 127 (2) 128 (3) 256 (4) 130

Question No.	Questions
31.	Area bounded by the curves $y^2 = x$ and $y = x^2$ is : (1) $\frac{2}{3}$ sq. unit (2) 1 sq. unit (3) $\frac{1}{2}$ sq. unit (4) None of these
32.	A linear programming problem is concerned with finding the : (1) Any value of a linear function (2) Unsatisfactorily value of a linear function (3) Optimal value of a linear function (4) None of these
33.	In the formula of mode given by $l + h\left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)$, frequency of the modal class is : (1) f_2 (2) f_1 (3) f_0 (4) h
34.	In the formula of median given by $l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$, the class size is : (1) cf (2) l (3) h (4) n
35.	The empirical relation between the three measures of central tendency is : (1) Median = Mode + 2 Mean (2) Mode = 3 Median + Mean (3) 3 Median = 2 Mode + Mean (4) 3 Median = Mode + 2 Mean

Question No.	Questions
36.	Standard deviation is a measure which shows how much variation from the : (1) Mean exists (2) Mode exists (3) Variance exists (4) None of these
37.	The angle between the planes $\vec{r}.(2\hat{\imath}-\hat{\jmath}+\hat{k})=6$ and $\vec{r}.(\hat{\imath}+\hat{\jmath}+2\hat{k})=5$ is : (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$
38.	If equation of a line is $\vec{r}=\vec{a}+\lambda\vec{b}$ and equation of plane is $\vec{r}.\vec{n}=q$, then angle between line and plane is given by : (1) $\cos\theta=\frac{\vec{b}.\vec{n}}{\lvert\vec{b}\rvert\lvert\vec{n}\rvert}$ (2) $\sin\theta=\frac{\vec{b}.\vec{n}}{\lvert\vec{b}\rvert\lvert\vec{n}\rvert}$ (3) $\cos\theta=\frac{\vec{b}\times\vec{n}}{\lvert\vec{b}\times\vec{n}\rvert}$ (4) None of these
39.	A statement is a sentence which is : (1) Always True (2) Always False (3) Either True or False, but not both simultaneously (4) None of these

Question No.	Questions
40.	Negation of negation of a statement is : (1) Not defined (2) True and False (3) The statement ifself (4) None of these
41.	$\int \frac{1+\tan^2 x}{1-\tan^2 x}\,dx$ is given by : (1) $\frac{1}{2}\log\left\lvert\frac{1+\tan x}{1+\cot x}\right\rvert + c$ (2) $\log\left\lvert\frac{1+\tan x}{1-\tan x}\right\rvert + c$ (3) $\frac{1}{2}\log\left\lvert\frac{1+\tan x}{1-\tan x}\right\rvert + c$ (4) $\log\left\lvert\frac{1+\cot x}{1-\tan x}\right\rvert + c$
42.	The order of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = 0$ is : (1) 1 (2) 2 (3) 3 (4) 0
43.	The solution of the differential equation $\frac{dy}{dx} = \frac{x(2\log x+1)}{\sin y + y\cos y}$ is : (1) $y = x^2\log x + c$ (2) $y = x^2\sin x + c$ (3) $y\sin y = x^2\log x + c$ (4) $y\sin y = \log x + c$
44.	The integrating factor for solving the differential equation $\frac{dy}{dx} - \frac{y}{x} = 2x^2 + 3x + 4$ is : (1) $\frac{1}{x^2}$ (2) $-\frac{1}{x}$ (3) x (4) $\frac{1}{x}$

Question No.	Questions
45.	$\frac{x\,dy-y\,dx}{x^2}$ is equal to : (1) $d\left(\frac{x}{y}\right)$ (2) $d(xy)$ (3) $d(x+y)$ (4) $d\left(\frac{y}{x}\right)$
46.	If $\vec{u}$, $\vec{v}$ and $\vec{w}$ are three vectors such that $\vec{u}+\vec{v}+\vec{w}=\vec{0}$, then find $\vec{u}.\vec{v}+\vec{v}.\vec{w}+\vec{w}.\vec{u}$, if $\lvert\vec{u}\rvert=3$, $\lvert\vec{v}\rvert=4$ and $\lvert\vec{w}\rvert=5$: (1) 5^2 (2) -5^2 (3) 2^5 (4) 5^3
47.	If $\lvert\vec{a}\rvert=\lvert\vec{b}\rvert$, then $(\vec{a}+\vec{b}).(\vec{a}-\vec{b})$ is : (1) Positive (2) Negative (3) Zero (4) None of these
48.	If θ is the angle between the vectors $\vec{a}=2\hat{\imath}+2\hat{\jmath}-\hat{k}$ and $\vec{b}=6\hat{\imath}-3\hat{\jmath}+2\hat{k}$, then : (1) $\cos\theta=\frac{4}{21}$ (2) $\cos\theta=\frac{3}{19}$ (3) $\cos\theta=\frac{2}{19}$ (4) $\cos\theta=\frac{2}{21}$
49.	If $\vec{a}$ is any vector, then $(\vec{a}\times i)^2+(\vec{a}\times\vec{\jmath})^2+\left(\vec{a}\times\vec{k}\right)^2$ is : (1) $2\vec{a}^2$ (2) $\frac{\vec{a}^2}{2}$ (3) $\vec{a}^2+2$ (4) $\vec{a}^2-2$

Question No.	Questions
50.	If a line makes angles α, β, γ with coordinate axes, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ is : (1) 3 (2) -1 (3) -2 (4) 2
51.	If $f(x) = \begin{cases} \frac{x^2-9}{x-3}, & \text{if } x \neq 3 \\ 2x + k, & \text{otherwise} \end{cases}$ is continuous at $x = 3$, then k is equal to : (1) 3 (2) $\frac{1}{6}$ (3) 0 (4) -6
52.	A set contains n elements. Then the number of elements in Power Set are : (1) n^2 (2) n (3) $(2^n - 1)$ (4) 2^n
53.	Two sets A and B are called Disjoint sets, if $A \cap B$ is : (1) ϕ (2) 0 (3) 1 (4) None of these
54.	If $A = \{1, 2, 3, 4\}$ and $B = \{4, 5, 6, 7\}$, then $B - A$ is given by : (1) ϕ (2) $\{5, 6, 7\}$ (3) $\{1, 2, 3\}$ (4) None of these

Question No.	Questions
55.	In a city 20% of the population travels by Metro, 50% by Taxi and 10% travels by both Metro and Taxi. Then persons travelling by Metro or Taxi is : (1) 60% (2) 70% (3) 40% (4) 80%
56.	(2)$4^{2n+1} + 3^{3n+1}$ is divisible by which of the following for all $n \in N$: (1) 2 (2) 9 (3) 3 (4) 11
57.	If $\cos^{-1} x - \sin^{-1} x = 0$, then x is equal to : (1) $\frac{1}{\sqrt{2}}$ (2) $-\frac{1}{\sqrt{2}}$ (3) $\sqrt{2}$ (4) $-\sqrt{2}$
58.	The value of $\sin(\cot^{-1} x)$ is equal to : (1) $\sqrt{1+x^2}$ (2) $(1+x^2)^{-1/2}$ (3) x (4) $\frac{1}{x}$
59.	The value of $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$ is equal to : (1) 0 (2) $\frac{1}{2}$ (3) 1 (4) -1
60.	$\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8}$ is equal to : (1) π (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$

Question No.	Questions
61.	The equation of the plane passing through the intersection of the planes $x + 2y + 3z + 4 = 0$ and $4x + 3y + 2z + 1 = 0$ and the origin is : (1) $2x + 3y + z = 0$ (2) $3x + 2y + z = 0$ (3) $x + y + z = 0$ (4) $3x + 2y + z + 1 = 0$
62.	The triangle formed by the points $(0, 7, 10), (-1, 6, 6), (-4, 9, 6)$ is : (1) Right angled (2) Equilateral (3) Isosceles (4) Right angled isosceles
63.	The distance of the point $(2, 3, -5)$ from the plane $x + 2y - 2z = 9$ is : (1) 3 (2) 4 (3) 1 (4) 2
64.	If R is a relation on a set A such that $R = R^{-1}$, then R is : (1) Transitive (2) Symmetric (3) Reflexive (4) None of these
65.	The function $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$ is : (1) A periodic function (2) An even function (3) An odd function (4) None of these
66.	Let R be a relation on N defined by $x + 2y = 8$. The domain of R is : (1) $\{2, 4, 8\}$ (2) $\{1, 2, 3, 4\}$ (3) $\{2, 4, 6\}$ (4) $\{2, 4, 6, 8\}$
67.	R is called a symmetric relation on A, if : (1) $(x, y) \in R \Rightarrow (y, x) \notin R$ (2) $(x, y) \in R \Rightarrow \left(\frac{1}{x}, \frac{1}{y}\right) \in R$ (3) $(x, y) \in R \Rightarrow (y, x) \in R$ (4) None of these

Question No.	Questions
68.	Five boys and three girls are seated at random in a row. The probability that no boy sits between two girls is : (1) 28 (2) $\frac{1}{28}$ (3) $\frac{2}{28}$ (4) $\frac{3}{28}$
69.	Two cards are drawn at random from a pack of 52 cards. The probability that these two being aces is : (1) $\frac{1}{221}$ (2) $\frac{1}{122}$ (3) $\frac{1}{212}$ (4) $\frac{1}{222}$
70.	A bag contains 8 red and 5 white balls. Three balls are drawn at random. The probability that one ball is red and two balls are white is : (1) $\frac{40}{139}$ (2) $\frac{40}{143}$ (3) $\frac{4}{139}$ (4) $\frac{4}{143}$
71.	A coin is tossed and a die is rolled. The probability that the coin shows a head and the die shows 3 is : (1) $\frac{1}{3}$ (2) $\frac{1}{6}$ (3) $\frac{1}{12}$ (4) $\frac{1}{24}$

Question No.	Questions
72.	The probability that at least one of the events A and B occurs is $\frac{3}{5}$. If A and B occur simultaneously with probability $\frac{1}{5}$, then $P(A') + P(B')$ is : (1) $\frac{6}{5}$ (2) $\frac{4}{5}$ (3) $\frac{7}{5}$ (4) $\frac{2}{5}$
73.	If two coins are tossed 5 times, then the probability of getting 5 heads and 5 tails is : (1) $\frac{9}{64}$ (2) $\frac{2}{205}$ (3) $\frac{1}{1024}$ (4) $\frac{63}{256}$
74.	A Coin is tossed 10 times. The probability of getting exactly six heads is : (1) $\frac{100}{153}$ (2) ${}^{10}C_6$ (3) $\frac{105}{512}$ (4) ${}^{10}C_4$
75.	A box contains 3 white and 2 red balls. If we draw one ball and without replacing the first ball, the probability of drawing red ball in second draw is : (1) $\frac{8}{25}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{21}{25}$

Question No.	Questions
76.	If $3 < \|x\| < 6$, then x belongs to : (1) $(-6,-3) \cup (3,6)$ (2) $(-6,6)$ (3) $(-3,-3) \cup (3,6)$ (4) None of these
77.	If $ab = 4$ and $a, b \in R^+$, then : (1) $a + b \leq 4$ (2) $(a + b) = 4$ (3) $a + b \geq 4$ (4) None of these
78.	Area lying between parabola $y^2 = 4ax$ and its latus rectum is : (1) $\frac{4}{3}a^2$ sq. unit (2) $\frac{8}{3}a^2$ sq. unit (3) $\frac{16}{3}a^2$ sq. unit (4) None of these
79.	$\int_{-1}^{0} \frac{dx}{x^2+2x+2}$ is equal to : (1) $\frac{\pi}{4}$ (2) $-\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) 0
80.	The value of $\int_{-\pi/4}^{\pi/4} x^3 \sin^4 x \, dx$ is equal to : (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{8}$ (4) 0
81.	How many words can be made from the letters of the word DELHI, if L comes in the middle of every word? (1) 24 (2) 12 (3) 6 (4) 60

Question No.	Questions
82.	The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes is empty, is : (1) 5 (2) 3^8 (3) 21 (4) ${}^8C_3$
83.	If the 4th term in the expansion of $\left(\frac{2}{3}x - \frac{3}{2x}\right)^n$ is independent of x, then n is equal to : (1) 5 (2) 6 (3) 9 (4) None of these
84.	The coefficient of x^n in the expansion of $(1 + x + x^2 + \text{------})^{-n}$ is : (1) $n+1$ (2) n (3) 1 (4) $(-1)^n$
85.	The middle term in the expansion of $\left(x^2 + \frac{1}{x^2} + 2\right)^n$ is : (1) $\frac{\lfloor n}{\lfloor 2n}$ (2) $\frac{\lfloor 2n}{(\lfloor n)(\lfloor n)}$ (3) $\lfloor 2n$ (4) $\frac{\lfloor 2n}{\lfloor n-1}$
86.	The sum of n terms of the series $1.4 + 3.04 + 5.004 + \text{--------}$ is : (1) $n^2 + \frac{4}{9}\left(1 - \frac{1}{10^n}\right)$ (2) $\frac{4}{9} + n^2\left(1 - \frac{1}{10^n}\right)$ (3) $n^2 + \frac{9}{4}\left(\frac{1}{10^n} - 1\right)$ (4) $n^2 + \frac{4}{3}\left(1 - \frac{1}{10^n}\right)$

Question No.	Questions
87.	If the pth term of an A.P. is q, qth term is p, then its rth term is : (1) $p+q+r$ (2) $p+q-r$ (3) $p+r-q$ (4) $p-q-r$
88.	Fifth term of a G.P. is 2, then the product of its nine term is : (1) 1024 (2) 256 (3) 512 (4) None of these
89.	Let a_n be nth term of a G.P. of positive numbers. If $\sum_{n=1}^{100} a_{2n} = \alpha$ and $\sum_{n=1}^{100} a_{2n-1} = \beta$, then the common ratio of G.P. is : (1) $\sqrt{\frac{\alpha}{\beta}}$ (2) $\sqrt{\frac{\beta}{\alpha}}$ (3) $\frac{\beta}{\alpha}$ (4) $\frac{\alpha}{\beta}$
90.	The sum of cubes of n natural numbers is : (1) $(\sum n)^2$ (2) $(\sum n)^3$ (3) $(\sum n^2)^3$ (4) None of these
91.	If $x = at^2$, $y = 2at$, then $\frac{d^2y}{dx^2}$ at $t = 2$ is : (1) $16a$ (2) $\frac{1}{16a}$ (3) $-\frac{1}{16a}$ (4) None of these

Question No.	Questions
92.	The derivative of $\log\sqrt{\frac{1+\cos x}{1-\cos x}}$ is : (1) $-\operatorname{cosec} x$ (2) $\operatorname{cosec} x$ (3) $\cot x$ (4) $-\cot x$
93.	The interval in which the function $y = x^3 + 5x^2 - 1$ is decreasing is given by : (1) $\frac{10}{3} < x < 0$ (2) $0 < x < \frac{10}{3}$ (3) $10 < 3x < 0$ (4) $-\frac{10}{3} < x < 0$
94.	The minimum value of $x^2 + \frac{1}{1+x^2}$ is, at : (1) $x = 1$ (2) $x = 0$ (3) $x = -1$ (4) None of these
95.	The point on the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at which the normal is parallel to the x-axis, is : (1) $(0, a)$ (2) $(a, 0)$ (3) (a, a) (4) $(0, 0)$
96.	For the curve $y = e^{2x}$, the equation of tangent at $(0, 1)$ is : (1) $y = -2x + 1$ (2) $y = -1 + 2x$ (3) $y = 2x + 1$ (4) $y = -\frac{2}{3}x - 1$

Question No.	Questions
97.	$\int \frac{e^x(1+\sin x)}{(1+\cos x)}dx$ is given by : (1) $e^x \tan\frac{x}{2}+c$ (2) $e^x \cot\frac{x}{2}+c$ (3) $e^x \cos\frac{x}{2}+c$ (4) $e^x \sin\frac{x}{2}+c$
98.	$\int \frac{dx}{x+\sqrt{x}}$ is given by : (1) $\log(\sqrt{x}+1)+c$ (2) $2\log(\sqrt{x}+1)+c$ (3) $\frac{1}{2}\log(\sqrt{x}+1)+c$ (4) $\log(x+1)+c$
99.	$\int \frac{e^x}{(2+e^x)(1+e^x)}dx$ is equal to : (1) $\log\left(\frac{1-e^x}{2+e^x}\right)+c$ (2) $\log\left(\frac{1+e^x}{2-e^x}\right)+c$ (3) $\log\left(\frac{1-e^x}{2-e^x}\right)+c$ (4) $\log\left(\frac{1+e^x}{2+e^x}\right)+c$
100.	$\int \frac{x^2}{x^2+4}dx$ is equal to : (1) $x-2\tan^{-1}\frac{x}{2}+c$ (2) $x+2\tan^{-1}\frac{x}{2}+c$ (3) $\frac{x}{2}-\tan^{-1}\frac{x}{2}+c$ (4) $\frac{x}{2}+\tan^{-1}\frac{x}{2}+c$

SET–"X" (Total No. of printed pages : 21)

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

UG-EE-June, 2025 (Mathematics 4 year)

opened for Scanning purpose at 11:25 AM on 20/6/25

Code **D**

Sr. No. 10040

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

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

Name : _____ Date of Birth : _____

Father's Name : _____ Mother's Name : _____

Date of Examination : _____

(Signature of the candidate) (Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. **All questions are compulsory.**
2. The candidates must return the Question book-let 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 and 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 book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
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 BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

Question No.	Questions
1.	How many words can be made from the letters of the word DELHI, if L comes in the middle of every word? (1) 24 (2) 12 (3) 6 (4) 60
2.	The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes is empty, is : (1) 5 (2) 3^8 (3) 21 (4) ${}^8C_3$
3.	If the 4^{th} term in the expansion of $\left(\frac{2}{3}x - \frac{3}{2x}\right)^n$ is independent of x, then n is equal to : (1) 5 (2) 6 (3) 9 (4) None of these
4.	The coefficient of x^n in the expansion of $(1 + x + x^2 + \text{------})^{-n}$ is : (1) $n + 1$ (2) n (3) 1 (4) $(-1)^n$
5.	The middle term in the expansion of $\left(x^2 + \frac{1}{x^2} + 2\right)^n$ is : (1) $\frac{\lfloor n}{\lfloor 2n}$ (2) $\frac{\lfloor 2n}{(\lfloor n)(\lfloor n)}$ (3) $\lfloor 2n$ (4) $\frac{\lfloor 2n}{\lfloor n-1}$

Question No.	Questions
6.	The sum of n terms of the series $1.4 + 3.04 + 5.004 + \cdots\cdots$ is : (1) $n^2 + \frac{4}{9}\left(1 - \frac{1}{10^n}\right)$ (2) $\frac{4}{9} + n^2\left(1 - \frac{1}{10^n}\right)$ (3) $n^2 + \frac{9}{4}\left(\frac{1}{10^n} - 1\right)$ (4) $n^2 + \frac{4}{3}\left(1 - \frac{1}{10^n}\right)$
7.	If the pth term of an A.P. is q, qth term is p, then its rth term is : (1) $p + q + r$ (2) $p + q - r$ (3) $p + r - q$ (4) $p - q - r$
8.	Fifth term of a G.P. is 2, then the product of its nine term is : (1) 1024 (2) 256 (3) 512 (4) None of these
9.	Let a_n be nth term of a G.P. of positive numbers. If $\sum_{n=1}^{100} a_{2n} = \alpha$ and $\sum_{n=1}^{100} a_{2n-1} = \beta$, then the common ratio of G.P. is : (1) $\sqrt{\frac{\alpha}{\beta}}$ (2) $\sqrt{\frac{\beta}{\alpha}}$ (3) $\frac{\beta}{\alpha}$ (4) $\frac{\alpha}{\beta}$
10.	The sum of cubes of n natural numbers is : (1) $(\Sigma n)^2$ (2) $(\Sigma n)^3$ (3) $(\Sigma n^2)^3$ (4) None of these

Question No.	Questions
11.	Area bounded by the curves $y^2 = x$ and $y = x^2$ is : (1) $\frac{2}{3}$ sq. unit (2) 1 sq. unit (3) $\frac{1}{2}$ sq. unit (4) None of these
12.	A linear programming problem is concerned with finding the : (1) Any value of a linear function (2) Unsatisfactorily value of a linear function (3) Optimal value of a linear function (4) None of these
13.	In the formula of mode given by $l + h\left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)$, frequency of the modal class is : (1) f_2 (2) f_1 (3) f_0 (4) h
14.	In the formula of median given by $l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$, the class size is : (1) cf (2) l (3) h (4) n
15.	The empirical relation between the three measures of central tendency is : (1) Median = Mode + 2 Mean (2) Mode = 3 Median + Mean (3) 3 Median = 2 Mode + Mean (4) 3 Median = Mode + 2 Mean

Question No.	Questions
16.	Standard deviation is a measure which shows how much variation from the : (1) Mean exists (2) Mode exists (3) Variance exists (4) None of these
17.	The angle between the planes $\vec{r}.(2\hat{i}-\hat{j}+\hat{k})=6$ and $\vec{r}.(\hat{i}+\hat{j}+2\hat{k})=5$ is : (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$
18.	If equation of a line is $\vec{r}=\vec{a}+\lambda\vec{b}$ and equation of plane is $\vec{r}.\vec{n}=q$, then angle between line and plane is given by : (1) $\cos\theta=\frac{\vec{b}.\vec{n}}{\lvert\vec{b}\rvert\lvert\vec{n}\rvert}$ (2) $\sin\theta=\frac{\vec{b}.\vec{n}}{\lvert\vec{b}\rvert\lvert\vec{n}\rvert}$ (3) $\cos\theta=\frac{\vec{b}\times\vec{n}}{\lvert\vec{b}\times\vec{n}\rvert}$ (4) None of these
19.	A statement is a sentence which is : (1) Always True (2) Always False (3) Either True or False, but not both simultaneously (4) None of these

Question No.	Questions
20.	Negation of negation of a statement is : (1) Not defined (2) True and False (3) The statement ifself (4) None of these
21.	The equation of the plane passing through the intersection of the planes $x + 2y + 3z + 4 = 0$ and $4x + 3y + 2z + 1 = 0$ and the origin is : (1) $2x + 3y + z = 0$ (2) $3x + 2y + z = 0$ (3) $x + y + z = 0$ (4) $3x + 2y + z + 1 = 0$
22.	The triangle formed by the points $(0, 7, 10), (-1, 6, 6), (-4, 9, 6)$ is : (1) Right angled (2) Equilateral (3) Isosceles (4) Right angled isosceles
23.	The distance of the point $(2, 3, -5)$ from the plane $x + 2y - 2z = 9$ is : (1) 3 (2) 4 (3) 1 (4) 2
24.	If R is a relation on a set A such that $R = R^{-1}$, then R is : (1) Transitive (2) Symmetric (3) Reflexive (4) None of these
25.	The function $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$ is : (1) A periodic function (2) An even function (3) An odd function (4) None of these
26.	Let R be a relation on N defined by $x + 2y = 8$. The domain of R is : (1) $\{2, 4, 8\}$ (2) $\{1, 2, 3, 4\}$ (3) $\{2, 4, 6\}$ (4) $\{2, 4, 6, 8\}$

Question No.	Questions
27.	R is called a symmetric relation on A, if : (1) $(x,y) \in R \Rightarrow (y,x) \notin R$ (2) $(x,y) \in R \Rightarrow \left(\frac{1}{x},\frac{1}{y}\right) \in R$ (3) $(x,y) \in R \Rightarrow (y,x) \in R$ (4) None of these
28.	Five boys and three girls are seated at random in a row. The probability that no boy sits between two girls is : (1) 28 (2) $\frac{1}{28}$ (3) $\frac{2}{28}$ (4) $\frac{3}{28}$
29.	Two cards are drawn at random from a pack of 52 cards. The probability that these two being aces is : (1) $\frac{1}{221}$ (2) $\frac{1}{122}$ (3) $\frac{1}{212}$ (4) $\frac{1}{222}$
30.	A bag contains 8 red and 5 white balls. Three balls are drawn at random. The probability that one ball is red and two balls are white is : (1) $\frac{40}{139}$ (2) $\frac{40}{143}$ (3) $\frac{4}{139}$ (4) $\frac{4}{143}$
31.	If $x = at^2, y = 2at$, then $\frac{d^2y}{dx^2}$ at $t = 2$ is : (1) $16a$ (2) $\frac{1}{16a}$ (3) $-\frac{1}{16a}$ (4) None of these

Question No.	Questions
32.	The derivative of $\log \sqrt{\frac{1+\cos x}{1-\cos x}}$ is : (1) $-\operatorname{cosec} x$ (2) $\operatorname{cosec} x$ (3) $\cot x$ (4) $-\cot x$
33.	The interval in which the function $y = x^3 + 5x^2 - 1$ is decreasing is given by : (1) $\frac{10}{3} < x < 0$ (2) $0 < x < \frac{10}{3}$ (3) $10 < 3x < 0$ (4) $-\frac{10}{3} < x < 0$
34.	The minimum value of $x^2 + \frac{1}{1+x^2}$ is, at : (1) $x = 1$ (2) $x = 0$ (3) $x = -1$ (4) None of these
35.	The point on the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at which the normal is parallel to the x-axis, is : (1) $(0, a)$ (2) $(a, 0)$ (3) (a, a) (4) $(0, 0)$
36.	For the curve $y = e^{2x}$, the equation of tangent at $(0, 1)$ is : (1) $y = -2x + 1$ (2) $y = -1 + 2x$ (3) $y = 2x + 1$ (4) $y = -\frac{2}{3}x - 1$

Question No.	Questions
37.	$\int \frac{e^x(1+\sin x)}{(1+\cos x)}dx$ is given by : (1) $e^x \tan\frac{x}{2}+c$ (2) $e^x \cot\frac{x}{2}+c$ (3) $e^x \cos\frac{x}{2}+c$ (4) $e^x \sin\frac{x}{2}+c$
38.	$\int \frac{dx}{x+\sqrt{x}}$ is given by : (1) $\log(\sqrt{x}+1)+c$ (2) $2\log(\sqrt{x}+1)+c$ (3) $\frac{1}{2}\log(\sqrt{x}+1)+c$ (4) $\log(x+1)+c$
39.	$\int \frac{e^x}{(2+e^x)(1+e^x)}dx$ is equal to : (1) $\log\left(\frac{1-e^x}{2+e^x}\right)+c$ (2) $\log\left(\frac{1+e^x}{2-e^x}\right)+c$ (3) $\log\left(\frac{1-e^x}{2-e^x}\right)+c$ (4) $\log\left(\frac{1+e^x}{2+e^x}\right)+c$
40.	$\int \frac{x^2}{x^2+4}dx$ is equal to : (1) $x-2\tan^{-1}\frac{x}{2}+c$ (2) $x+2\tan^{-1}\frac{x}{2}+c$ (3) $\frac{x}{2}-\tan^{-1}\frac{x}{2}+c$ (4) $\frac{x}{2}+\tan^{-1}\frac{x}{2}+c$
41.	If $f(x)=\begin{cases}\frac{x^2-9}{x-3}, & \text{if } x\neq 3\\ 2x+k, & \text{otherwise}\end{cases}$ is continuous at $x=3$, then k is equal to : (1) 3 (2) $\frac{1}{6}$ (3) 0 (4) -6

Question No.	Questions
42.	A set contains n elements. Then the number of elements in Power Set are : (1) n^2 (2) n (3) $(2^n - 1)$ (4) 2^n
43.	Two sets A and B are called Disjoint sets, if $A \cap B$ is : (1) ϕ (2) 0 (3) 1 (4) None of these
44.	If $A = \{1, 2, 3, 4\}$ and $B = \{4, 5, 6, 7\}$, then $B - A$ is given by : (1) ϕ (2) $\{5, 6, 7\}$ (3) $\{1, 2, 3\}$ (4) None of these
45.	In a city 20% of the population travels by Metro, 50% by Taxi and 10% travels by both Metro and Taxi. Then persons travelling by Metro or Taxi is : (1) 60% (2) 70% (3) 40% (4) 80%
46.	(2)$4^{2n+1} + 3^{3n+1}$ is divisible by which of the following for all $n \in N$: (1) 2 (2) 9 (3) 3 (4) 11
47.	If $\cos^{-1} x - \sin^{-1} x = 0$, then x is equal to : (1) $\frac{1}{\sqrt{2}}$ (2) $-\frac{1}{\sqrt{2}}$ (3) $\sqrt{2}$ (4) $-\sqrt{2}$

Question No.	Questions
48.	The value of $\sin(\cot^{-1} x)$ is equal to : (1) $\sqrt{1+x^2}$ (2) $(1+x^2)^{-1/2}$ (3) x (4) $\frac{1}{x}$
49.	The value of $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$ is equal to : (1) 0 (2) $\frac{1}{2}$ (3) 1 (4) -1
50.	$\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8}$ is equal to : (1) π (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$
51.	The value of λ for which the lines $3x + 4y = 5, 5x + 4y = 4$ and $\lambda x + 4y = 6$ meet at a point is : (1) 4 (2) 3 (3) 2 (4) 1
52.	A straight line through $P(1,2)$ is such that its intercept between the axes is bisected at P. Its equation is : (1) $x + y = -1$ (2) $2x + y = 4$ (3) $x + y = 3$ (4) $x + 2y = 5$
53.	Equation of a straight line perpendicular to the line $3x - y + 7 = 0$ and passing through (5,2) is : (1) $3x + y - 11 = 0$ (2) $x - 3y - 11 = 0$ (3) $x + 3y - 11 = 0$ (4) $x - 3y + 11 = 0$

Question No.	Questions
54.	For what value of K, the points $(K, 2-2K), (-K+1, 2K)$ and $(-4-K, 6-2K)$ are collinear? (1) $K=-1$ (2) $K=-2$ (3) $K=1$ (4) $K=2$
55.	The point of the parabola $y^2=18x$ for which the ordinate is three times the abscissa, is : (1) $(2,6)$ (2) $(6,2)$ (3) $(3,18)$ (4) $(-2,-6)$
56.	In an ellipse, length of minor axis is 8 and eccentricity is $\frac{\sqrt{5}}{3}$. The length of major axis is : (1) 6 (2) 12 (3) 10 (4) 16
57.	The eccentricity of a rectangular hyperbola is : (1) $\frac{1}{\sqrt{2}}$ (2) $-\sqrt{2}$ (3) $\sqrt{2}$ (4) $-\frac{1}{\sqrt{2}}$
58.	The equation of circle whose centre is $(0,0)$ and area of the circle is 154 sq unit is given by : (1) $x^2+y^2=7$ (2) $x^2+y^2=22$ (3) $x^2+y^2=11$ (4) $x^2+y^2=49$

Question No.	Questions
59.	$\lim_{x\to\infty} \frac{\sin x}{x}$ is equal to : (1) 0 (2) 1 (3) ∞ (4) Doesn't exist
60.	$\lim_{x\to 2} \left(\frac{3^{x/2}-3}{3^x-9}\right)$ is equal to : (1) 0 (2) $\frac{1}{6}$ (3) $\frac{1}{3}$ (4) $\log 3$
61.	If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then the value of α and β is : (1) $\alpha = a^2 + b^2, \beta = 2ab$ (2) $\alpha = \frac{a^2}{b^2}, \beta = \frac{2}{3}ab$ (3) $\alpha = a^2 b^2, \beta = 2ab$ (4) $\alpha = a^2 - b^2, \beta = \frac{ab}{2}$
62.	Each diagonal element of a skew-symmetric matrix is : (1) Always zero (2) Always imaginary (3) Always one (4) None of these
63.	The matrix A which satisfies the condition $\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$ is given by : (1) $\begin{bmatrix} 1 & 0 \\ 4 & -1 \end{bmatrix}$ (2) $\begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$ (3) $\begin{bmatrix} 1 & 0 \\ -1 & 4 \end{bmatrix}$ (4) None of these

Question No.	Questions
64.	If a square matrix A is such that $AA' = I = A'A$, then $\|A\|$ is equal to : (1) ± 2 (2) 0 (3) ± 1 (4) None of these
65.	$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ is equal to : (1) abc (2) $a+b+c$ (3) 1 (4) 0
66.	If -9 is a root of the equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then the other two roots are : (1) $2, -7$ (2) $2, 7$ (3) $-2, -7$ (4) $-2, 7$
67.	If $A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$, then adj A is given by : (1) $\begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$ (3) $\begin{bmatrix} -5 & 2 \\ 3 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix}$
68.	If $A = \begin{bmatrix} \lambda & 2 \\ 2 & \lambda \end{bmatrix}$ and $\|A^3\| = 125$, then the value of λ is : (1) ± 3 (2) ± 5 (3) ± 1 (4) ± 2

Question No.	Questions
69.	If $xy = e^{x-y}$, then $\frac{dy}{dx}$ is equal to : (1) $\frac{y}{x(1+y)}$ (2) $\frac{(x-1)y}{x(1+y)}$ (3) $\frac{(x-1)}{x(1+y)}$ (4) $\frac{(x+1)y}{x(1-y)}$
70.	If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x \_\_\_\_\_ \infty}}}$, then $\frac{dy}{dx}$ is equal to : (1) $\frac{\sin x}{2y-1}$ (2) $\frac{\cos x}{2y-1}$ (3) $\frac{\sin x}{1-2y}$ (4) $\frac{\cos x}{1-2y}$
71.	$\int \frac{1+\tan^2 x}{1-\tan^2 x} dx$ is given by : (1) $\frac{1}{2}\log\left\|\frac{1+\tan x}{1+\cot x}\right\| + c$ (2) $\log\left\|\frac{1+\tan x}{1-\tan x}\right\| + c$ (3) $\frac{1}{2}\log\left\|\frac{1+\tan x}{1-\tan x}\right\| + c$ (4) $\log\left\|\frac{1+\cot x}{1-\tan x}\right\| + c$
72.	The order of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = 0$ is : (1) 1 (2) 2 (3) 3 (4) 0
73.	The solution of the differential equation $\frac{dy}{dx} = \frac{x(2\log x+1)}{\sin y + y\cos y}$ is : (1) $y = x^2 \log x + c$ (2) $y = x^2 \sin x + c$ (3) $y \sin y = x^2 \log x + c$ (4) $y \sin y = \log x + c$

Question No.	Questions
74.	The integrating factor for solving the differential equation $\frac{dy}{dx} - \frac{y}{x} = 2x^2 + 3x + 4$ is : (1) $\frac{1}{x^2}$ (2) $-\frac{1}{x}$ (3) x (4) $\frac{1}{x}$
75.	$\frac{x\,dy - y\,dx}{x^2}$ is equal to : (1) $d\left(\frac{x}{y}\right)$ (2) $d(xy)$ (3) $d(x+y)$ (4) $d\left(\frac{y}{x}\right)$
76.	If $\vec{u}$, $\vec{v}$ and $\vec{w}$ are three vectors such that $\vec{u} + \vec{v} + \vec{w} = \vec{0}$, then find $\vec{u}.\vec{v} + \vec{v}.\vec{w} + \vec{w}.\vec{u}$, if $\lvert\vec{u}\rvert = 3$, $\lvert\vec{v}\rvert = 4$ and $\lvert\vec{w}\rvert = 5$: (1) 5^2 (2) -5^2 (3) 2^5 (4) 5^3
77.	If $\lvert\vec{a}\rvert = \lvert\vec{b}\rvert$, then $(\vec{a} + \vec{b}).(\vec{a} - \vec{b})$ is : (1) Positive (2) Negative (3) Zero (4) None of these
78.	If θ is the angle between the vectors $\vec{a} = 2\hat{\imath} + 2\hat{\jmath} - \hat{k}$ and $\vec{b} = 6\hat{\imath} - 3\hat{\jmath} + 2\hat{k}$, then : (1) $\cos\theta = \frac{4}{21}$ (2) $\cos\theta = \frac{3}{19}$ (3) $\cos\theta = \frac{2}{19}$ (4) $\cos\theta = \frac{2}{21}$

Question No.	Questions
79.	If $\vec{a}$ is any vector, then $(\vec{a} \times i)^2 + (\vec{a} \times j)^2 + (\vec{a} \times \vec{k})^2$ is : (1) $2\vec{a}^2$ (2) $\frac{\vec{a}^2}{2}$ (3) $\vec{a}^2 + 2$ (4) $\vec{a}^2 - 2$
80.	If a line makes angles α, β, γ with coordinate axes, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ is : (1) 3 (2) -1 (3) -2 (4) 2
81.	If $\cos\theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$, then $\frac{1}{2}\left(x^2 + \frac{1}{x^2}\right)$ is equal to : (1) $\sin 2\theta$ (2) $\cos 2\theta$ (3) $\tan 2\theta$ (4) $\cot 2\theta$
82.	If $\frac{3\pi}{4} < \alpha < \pi$, then $\sqrt{\operatorname{cosec}^2\alpha + 2\cot\alpha}$ is equal to : (1) $-1 - \cot\alpha$ (2) $1 + \cot\alpha$ (3) $1 - \cot\alpha$ (4) $-1 + \cot\alpha$
83.	If $\tan 2\theta \tan\theta = 1$, then the general value of θ is : (1) $\left(n + \frac{1}{2}\right)\pi$ (2) $\left(2n \pm \frac{1}{2}\right)\frac{\pi}{3}$ (3) $\left(n + \frac{1}{2}\right)\frac{\pi}{3}$ (4) None of these

Question No.	Questions
84.	If $(w \neq 1)$ is a cube root of unity and $(1+w)^7 = A + Bw$, then A and B are given by : (1) $0, 1$ (2) $1, 0$ (3) $-1, 1$ (4) $1, 1$
85.	If $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5$, then : (1) $\text{Im}(z) = 0$ (2) $\text{Re}(z) = 0$ (3) $\text{Re}(z) > 0, \text{Im}(z) > 0$ (4) None of these
86.	The number of real roots of $3^{2x^2-7x+7} = 9$ is : (1) 2 (2) 1 (3) Zero (4) 4
87.	If the roots of the equation $qx^2 + px + q = 0$ are complex, where p, q are real, then the roots of the equation $x^2 - 4qx + p^2 = 0$ are : (1) Imaginary (2) Real and equal (3) Real and unequal (4) None of these
88.	If $2 + i\sqrt{3}$ is a root of the equation $x^2 + px + q = 0$ where p and q are real, then (p, q) is equal to : (1) $(4, -7)$ (2) $(4, 7)$ (3) $(-4, 7)$ (4) $(-4, -7)$

Question No.	Questions
89.	If eleven members of a Committee at a round table, so that the Chairman and Secretary always sit together, then the number of arrangements is : (1) $\lfloor 10$ (2) $\lfloor 9$ (3) $\lfloor 10 \times 2$ (4) $\lfloor 9 \times 2$
90.	A man has 7 friends. In how many ways, he can invite one or more of them to a tea party : (1) 127 (2) 128 (3) 256 (4) 130
91.	A coin is tossed and a die is rolled. The probability that the coin shows a head and the die shows 3 is : (1) $\frac{1}{3}$ (2) $\frac{1}{6}$ (3) $\frac{1}{12}$ (4) $\frac{1}{24}$
92.	The probability that at least one of the events A and B occurs is $\frac{3}{5}$. If A and B occur simultaneously with probability $\frac{1}{5}$, then $P(A') + P(B')$ is : (1) $\frac{6}{5}$ (2) $\frac{4}{5}$ (3) $\frac{7}{5}$ (4) $\frac{2}{5}$

Question No.	Questions
93.	If two coins are tossed 5 times, then the probability of getting 5 heads and 5 tails is : (1) $\frac{9}{64}$ (2) $\frac{2}{205}$ (3) $\frac{1}{1024}$ (4) $\frac{63}{256}$
94.	A Coin is tossed 10 times. The probability of getting exactly six heads is : (1) $\frac{100}{153}$ (2) ${}^{10}C_6$ (3) $\frac{105}{512}$ (4) ${}^{10}C_4$
95.	A box contains 3 white and 2 red balls. If we draw one ball and without replacing the first ball, the probability of drawing red ball in second draw is : (1) $\frac{8}{25}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{21}{25}$
96.	If $3 < \|x\| < 6$, then x belongs to : (1) $(-6,-3) \cup (3,6)$ (2) $(-6,6)$ (3) $(-3,-3) \cup (3,6)$ (4) None of these
97.	If $ab = 4$ and $a, b \in R^+$, then : (1) $a + b \leq 4$ (2) $(a + b) = 4$ (3) $a + b \geq 4$ (4) None of these

Question No.	Questions
98.	Area lying between parabola $y^2 = 4ax$ and its latus rectum is : (1) $\frac{4}{3}a^2$ sq. unit (2) $\frac{8}{3}a^2$ sq. unit (3) $\frac{16}{3}a^2$ sq. unit (4) None of these
99.	$\int_{-1}^{0} \frac{dx}{x^2+2x+2}$ is equal to : (1) $\frac{\pi}{4}$ (2) $-\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) 0
100.	The value of $\int_{-\pi/4}^{\pi/4} x^3 \sin^4 x \, dx$ is equal to : (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{8}$ (4) 0

Answer keys of Bachelor of Science (Mathematics) 4-year entrance test dated 20.06.2025				
Q. No.	A	B	C	D
1	2	2	1	1
2	1	4	1	3
3	3	1	2	2
4	4	2	3	4
5	1	2	4	2
6	2	3	2	1
7	2	3	4	2
8	3	4	1	3
9	4	1	2	4
10	1	2	2	1
11	1	3	4	4
12	3	1	2	3
13	2	4	3	2
14	4	2	1	3
15	2	1	1	4
16	1	3	2	1
17	2	1	3	1
18	3	2	4	2
19	4	4	1	3
20	1	1	2	3
21	4	3	2	2
22	2	4	1	4
23	3	1	3	1
24	1	2	4	2
25	1	1	1	2
26	2	4	2	3
27	3	1	2	3
28	4	2	3	4
29	1	3	4	1
30	2	4	1	2
31	3	1	4	3
32	4	3	3	1
33	1	2	2	4
34	2	4	3	2
35	1	2	4	1
36	4	1	1	3
37	1	2	1	1
38	2	3	2	2
39	3	4	3	4
40	4	1	3	1
41	1	4	3	3
42	1	3	2	4
43	2	2	3	1
44	3	3	4	2
45	4	4	4	1
46	2	1	2	4
47	4	1	3	1
48	1	2	1	2
49	2	3	1	3
50	2	3	2	4

Answer keys of Bachelor of Science (Mathematics) 4-year entrance test dated 20.06.2025				
Q. No.	A	B	C	D
51	3	3	3	4
52	1	2	4	2
53	4	3	1	3
54	2	4	2	1
55	1	4	1	1
56	3	2	4	2
57	1	3	1	3
58	2	1	2	4
59	4	1	3	1
60	1	2	4	2
61	3	3	2	1
62	2	1	4	1
63	3	4	1	2
64	4	3	2	3
65	4	2	2	4
66	2	1	3	2
67	3	3	3	4
68	1	2	4	1
69	1	1	1	2
70	2	4	2	2
71	2	1	3	3
72	4	1	1	2
73	1	2	4	3
74	2	3	3	4
75	2	4	2	4
76	3	2	1	2
77	3	4	3	3
78	4	1	2	1
79	1	2	1	1
80	2	2	4	2
81	3	4	1	2
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83	4	3	2	3
84	3	1	4	4
85	2	1	2	1
86	1	2	1	2
87	3	3	2	2
88	2	4	3	3
89	1	1	4	4
90	4	2	1	1
91	4	2	3	3
92	3	1	1	1
93	2	3	4	4
94	3	4	2	3
95	4	1	1	2
96	1	2	3	1
97	1	2	1	3
98	2	3	2	2
99	3	4	4	1
100	3	1	1	4

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