CUET UG 2026 Mathematics / Applied Mathematics May 24 Shift 2 Question Paper

Conducted by the National Testing Agency (NTA)

Time Allowed: 60 Minutes **Total Questions: 85** **Maximum Marks: 250**

General Instructions

(i) This is the **Mathematics / Applied Mathematics** question paper of **CUET (UG) 2026**, conducted by the **National Testing Agency (NTA)** in Computer Based Test (CBT) mode.

(ii) The paper contains **85 multiple choice questions**. Section A contains 15 compulsory questions. Choose either Section B1 or Section B2. Attempt all 35 questions in the chosen section.

(iii) The duration of this test paper is **60 minutes**. The maximum score is **250 marks**.

(iv) Each question has **four options**. Select the **one correct answer** for each question.

(v) **Marking scheme: +5 marks** for a correct answer, **-1 mark** for an incorrect answer, and **0 marks** for an unanswered question.

(vi) For questions based on a passage or table, read the given material carefully and answer the questions that follow.

Section A - Common

1. A is any matrix, defined by $A = [a_{ij}]_{3\times3}$, where $a_{ij} = |i - j|$, then which of the following statements are true ?
A. A is symmetric matrix.
B. A is skew-symmetric matrix.
C. A is diagonal matrix.
D. A is non singular matrix.
Choose the correct answer from the options given below:

(A) A and B only (B) B and C only
(C) A and D only (D) B and D only

2. If $AB = A$ and $BA = B$, where A and B are square matrices of same order, then

(A) $B^2 = B, A^2 = A$ (B) $B^2 \neq B$ and $A^2 = A$
(C) $A^2 \neq A, B^2 = B$ (D) $A^2 \neq A, B^2 \neq B$

3. If $\Delta = \begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = (1 + ax^3)^b$, then which of the following statements are TRUE?
A. $a = -1$ and $b = 2$
B. $x = 1$ is a multiple root of $\Delta = 0$
C. $x = 1$ is a simple root of $\Delta = 0$
D. $x = 3$ is a simple root of $\Delta = 0$
Choose the **correct** answer from the options given below:

(A) A and D only (B) A and C only
(C) A, B and D only (D) A and B only

4. If A is a square matrix of order 3×3, and $|\text{adj } A| = 25$, then the value of $|2A|$ is

(A) 20 (B) ±20
(C) 40 (D) ±40

5. If $y = \sqrt{\frac{1-x}{1+x}}$, then the value of $(1 - x^2)\frac{dy}{dx} + y$ is

(A) $\frac{1}{1+x}$ (B) $\frac{-1}{(1+x)^2}$
(C) 0 (D) 1

6. The minimum value of $e^x + e^{-x}$ is

(A) –1 (B) 0
(C) 1 (D) 2

7. The function $f(x) = \frac{x}{\log x}$ is increasing in the interval
(consider $\log_e x = \log x$)

(A) $(1, \infty)$ (B) (e, ∞)
(C) $(-\infty, e)$ (D) $(-\infty, -1)$

8. $\int e^x \left(\log x + \frac{1}{x^2}\right) dx$ is equal to
(consider $\log_e x = \log x$)

(A) $e^x \log_e x + c$: where c is an arbitrary constant
(B) $e^x \left(\log_e x + \frac{1}{x}\right) + c$: where c is an arbitrary constant
(C) $e^x \left(\log_e x - \frac{1}{x}\right) + c$: where c is an arbitrary constant
(D) $e^x \cdot \frac{1}{x} + c$: where c is an arbitrary constant

9. If $2f(x) + f\left(\frac{1}{x}\right) = \frac{1}{x} - 5,\ x \neq 0,$ then $\int_1^2 f(x)dx$ is equal to:
(consider $\log_e x = \log x$)

(A) $\frac{1}{6}[\log 16 - 13]$ (B) $\frac{1}{3}[\log 8 - 13]$

(C) $\frac{1}{3}[\log 8 - 14]$ (D) $[\log 16 - 14]$

10. Area of the region bounded by the lines $|x| + |y| = 1,\ x \geq 0,\ y \geq 0$ is

(A) 1 square units (B) $\frac{1}{2}$ square units

(C) 2 square units (D) 4 square units

11. The order and degree of the differential equation $\sqrt{1 + \left(\frac{dy}{dx}\right)^2} = \left(\frac{d^2y}{dx^2}\right)^{\frac{1}{3}}$ are

(A) order =2, degree = 2 (B) order =2, degree= $\frac{1}{3}$

(C) order = 3, degree is not defined (D) order = 2, degree = 3

12. The solution of the differential equation $\frac{dy}{dx} = \frac{x}{y}$ represents a family of

(A) circles (B) ellipses

(C) parabolas (D) hyperbolas

13. The solution of initial value problem: $\frac{dy}{dx} = e^{3x+4y};\ y(0) = -\frac{1}{4}$ is

(A) $e^{-4y} + e^{3x} = 3e$

(B) $3e^{-4y} + 4e^{3x} = 3e + 4$

(C) $-4e^{-4y} + 3e^{3x} = 3e + 4$

(D) $e^{-4y} - 3e^{3x} = 0$

14. Three coins are tossed, then
Match the LIST-I with LIST-II

List I	List II
(A) Probability of occurrence of 3 heads or 3 tails	(I) 1/8
(B) Probability of occurrence of at least two heads	(II) 7/8
(C) Probability of occurrence of at most two heads	(III) 1/2
(D) Probability of occurrence of no head	(IV) 1/4

Choose the correct answer from the options given below:

(A) A-I, B-II, C-III, D-IV (B) A-IV, B-III, C-I, D-II

(C) A-III, B-IV, C-II, D-I (D) A-IV, B-III, C-II, D-I

15. Match the LIST-I with LIST-II

List I (Inequality)	List II (Solution Space)
(A) 2x + 3y ≥ 6	(I) half plane contains the origin, also points on the line 2x + 3y = 6
(B) 2x + 3y ≤ 6	(II) half plane contains the origin but not points on the line 2x + 3y = 6
(C) 2x + 3y > 6	(III) half plane not contains the origin but contains points on the line 2x + 3y = 6
(D) 2x + 3y < 6	(IV) half plane neither contains the origin nor contains points on the line 2x + 3y = 6

Choose the correct answer from the options given below:

(A) A-II, B-III, C-I, D-IV (B) A-III, B-II, C-I, D-IV

(C) A-III, B-I, C-IV, D-II (D) A-II, B-IV, C-I, D-III

16. Relation R in the set $A = \{1, 2, 3, 4, \ldots, 16\}$ defined as $R = \{(x, y) : 3x = y,\ x, y \in A\}$, then which of the following are correct ?
A. domain of $R = \{1, 2, 3, 4, 5\}$.
B. range of $R = \{3, 6, 9, 12, 15\}$.
C. R is reflexive.
D. R is not symmetric.
Choose the ***correct*** answer from the options given below:

(A) A and B only
(B) B and D only
(C) A,B and C only
(D) A,B and D only

17. A function f : N → N, (N: set of natural numbers) defined by f(x) = x^2 + x + 1 is

(A) one-one and onto
(B) one-one but not onto
(C) many-one and onto
(D) many-one but not onto

18. Match the LIST-I with LIST-II

	LIST-I Function		**LIST-II Range (Principal value)**
A.	$\tan^{-1} x$	I.	$[0, \pi] - \{\frac{\pi}{2}\}$
B.	$\sec^{-1} x$	II.	$[-\frac{\pi}{2}, \frac{\pi}{2}]$
C.	$\text{cosec}^{-1} x$	III.	$[-\frac{\pi}{2}, \frac{\pi}{2}] - \{0\}$
D.	$\sin^{-1} x$	IV.	$(-\frac{\pi}{2}, \frac{\pi}{2})$

Choose the ***correct*** answer from the options given below:

(A) A-IV, B-I, C-III, D-II
(B) A-II, B-III, C-I, D-IV
(C) A-IV, B-III, C-I, D-II
(D) A-II, B-IV, C-III, D-I

19. If A is a square matrix such that A^2 = A, then $(2I + A)^4 - 65A$ is equal to (where I is the identity matrix)

(A) 8I
(B) 16I
(C) 16I + A
(D) 8I + A

20. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, such that $A^2 - 4A + \lambda I = 0$, where I is identity matrix of order 2, then 'λ' is equal to

(A) -1
(B) 1
(C) -2
(D) 2

21. If $A = [a_{ij}]_{3\times 3}$, $a_{ij} = \begin{cases} 0, & i \neq j \\ i + j, & i = j \end{cases}$, then which of the following statements are correct ?
A. A is scalar matrix
B. A is diagonal matrix
C. A is unit matrix
D. A is symmetric matrix
Choose the ***correct*** answer from the options given below:

(A) B and C only
(B) A, B and C only
(C) B and D only
(D) C and D only

22. If $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of an equilateral triangle whose each side is equal to k, then the value of $\begin{vmatrix} x_1 & y_1 & 2 \\ x_2 & y_2 & 2 \\ x_3 & y_3 & 2 \end{vmatrix}^2$ is

(A) $3k^2$
(B) $4k^2$
(C) $3k^4$
(D) $4k^4$

23. If x, y, z are all different from zero and $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix} = 0$, then the value of $x^{-1} + y^{-1} + z^{-1}$ is

(A) xyz
(B) -1
(C) 1
(D) 0

24. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 3 & 3 & 0 \\ 5 & 2 & -1 \end{bmatrix}$, then

Match the LIST-I with LIST-II

LIST-I	**LIST-II**
A. $\lvert\text{adj } A\rvert$	I. 81
B. $\lvert A\rvert$	II. -27
C. $\lvert A \text{ adj } A\rvert$	III. 9
D. $\lvert\text{adj (adj } A)\rvert$	IV. -3

Choose the ***correct*** answer from the options given below:

(A) A-II, B-III, C-IV, D-I (B) A-I, B-IV, C-II, D-III

(C) A-IV, B-III, C-II, D-I (D) A-III, B-IV, C-II, D-I

25. Function $f(x) = \begin{cases} k\left(x^2 - 6x + 13\right) & : x < 1 \\ \lvert x - 3\rvert & : x \geq 1 \end{cases}$ is differentiable at $x = 1$, then the value of k is

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

(C) $\frac{-1}{4}$ (D) -4

26. If $y = x^x$, $x > 0$ then $y''(2) - 2y'(2)$ is equal to

(A) $8\log_e 2 - 2$ (B) $4(\log_e 2)^2 + 2$

(C) $4(\log_e 2)^2 - 2$ (D) $4(\log_e 2) + 2$

27. If $x = \sec\theta + \cos\theta$, $y = \sec^n\theta + \cos^n\theta$, then $\frac{dy}{dx}$ is equal to

(A) $\frac{n^2(y^2+4)}{x^2+4}$ (B) $\frac{n^2(y^2-4)}{x^2-4}$

(C) $n\left(\sqrt{\frac{y^2+4}{x^2+4}}\right)$ (D) $n\left(\sqrt{\frac{y^2-4}{x^2-4}}\right)$

28. If $f(x) = (x-a)^2 + (x-b)^2 + (x-c)^2$, then $f(x)$ has minimum at x equal to:

(A) $3\sqrt{abc}$ (B) $3abc$

(C) $\frac{a+b+c}{3}$ (D) $\frac{3}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}}$

29. For the Function $f(x) = \tan x - 4x$, $x \in \left(0, \frac{\pi}{2}\right)$, which of the following statements are correct?

A. $f(x)$ is increasing in $\left(0, \frac{\pi}{3}\right)$

B. $f(x)$ is increasing in $\left(\frac{\pi}{3}, \frac{\pi}{2}\right)$

C. $f(x)$ is decreasing in $\left(0, \frac{\pi}{3}\right)$

D. $f(x)$ is decreasing in $\left(\frac{\pi}{3}, \frac{\pi}{2}\right)$

Choose the *correct* answer from the options given below:

(A) A and B only (B) A and D only

(C) B and C only (D) B and D only

30. The difference between the greatest and least values of the function $f(x) = \sin 2x - x$ on $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ is

(A) $\frac{\pi}{2}$ (B) $\frac{-\sqrt{3}}{2} + \frac{\pi}{6}$

(C) π (D) $\frac{\sqrt{3}}{2} - \frac{\pi}{6}$

31. Match the **LIST-I** with **LIST-II**

LIST-I **Indefinite Integral**	**LIST-II** **Solution (where c is an arbitrary constant)**
A. $\int \sqrt{16 - x^2}\, dx$	I. $\sin^{-1}\left(\frac{x}{4}\right) + c$
B. $\int \frac{dx}{\sqrt{16-x^2}}$	II. $\frac{x}{2}\sqrt{16 - x^2} + 8 \sin^{-1}\left(\frac{x}{4}\right) + c$
C. $\int \frac{dx}{\sqrt{x^2-16}}$	III. $\frac{1}{8}\log\left\lvert\frac{4+x}{4-x}\right\rvert + c$
D. $\int \frac{dx}{16-x^2}$	IV. $\log\left\lvert x + \sqrt{x^2 - 16}\right\rvert + c$

Choose the *correct* answer from the options given below:

(A) A-I, B-IV, C-III, D-II (B) A-II, B-I, C-III, D-IV

(C) A-IV, B-II, C-III, D-I (D) A-II, B-I, C-IV, D-III

32. $\int_{-\pi/2}^{\pi/2} \frac{\cos x}{1+e^x}\,dx =$

(A) 0 (B) 1

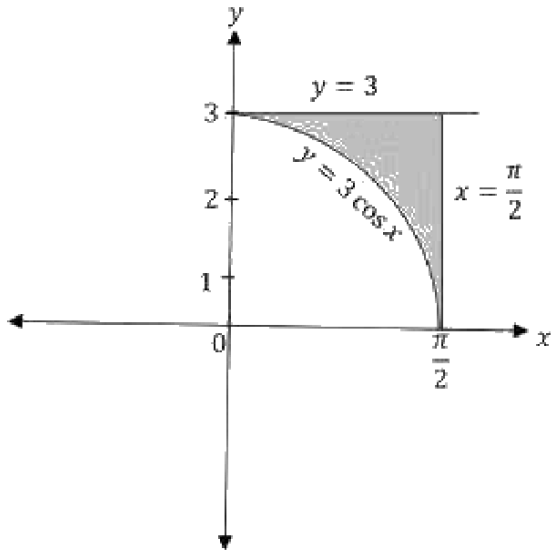
(C) -1 (D) 2

33. $\int \frac{dx}{(x+1)\sqrt{x^2-1}}$ is equal to:
[c is an arbitrary constant]

(A) $\sqrt{\frac{x+1}{x-1}} + c$ (B) $\sqrt{\frac{x}{x-1}} + c$

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

34. In the given figure, area of the shaded portion is equal to



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

(C) $3\left(\frac{\pi}{2} - 1\right)$ (D) $3(\pi - 1)$

35. The area of the region bounded by the line $y = 3x + 2$, the x-axis and the ordinates $x = -1$ and $x = 1$ is:

(A) $\frac{25}{6}$ (B) 4

(C) 0 (D) $\frac{13}{3}$

36. Match the **LIST-I** with **LIST-II**

LIST-I **Differential Equations**	**LIST-II** **Solutions[c is an arbitrary constant]**
A. $x\,dy = y\,dx$	I. $y = e^x + c$
B. $\log\left(\frac{dy}{dx}\right) = x$	II. $y = c\,e^x$
C. $\frac{y\,dx - dy}{y} = 0$	III. $xy = c$
D. $x\,dy + y\,dx = 0$	IV. $y = cx$

Choose the **correct** answer from the options given below:

(A) A-IV, B-II, C-I, D-III (B) A-IV, B-I, C-II, D-III

(C) A-III, B-II, C-I, D-IV (D) A-III, B-I, C-II, D-IV

37. The general solution of the differential equation of the type $\frac{dy}{dx} + py = Q$ is:
(where P and Q are functions of x only or constant)

(A) $y\,e^{\int p\,dy} = \int \left(Q\,e^{\int p\,dy}\right) dy + c$: (where c is an arbitrary constant)

(B) $y\,e^{\int p\,dx} = \int \left(Q\,e^{\int p\,dx}\right) dx + c$: (where c is an arbitrary constant)

(C) $x\,e^{\int p\,dy} = \int \left(Q\,e^{\int p\,dy}\right) dy + c$: (where c is an arbitrary constant)

(D) $x\,e^{\int p\,dx} = \int \left(Q\,e^{\int p\,dx}\right) dx + c$ (where c is an arbitrary constant)

38. Match the **LIST-I** with **LIST-II**

LIST-I	LIST-II
A. If $\|\vec{a}\| = \sqrt{26}$, $\|\vec{b}\| = 7$ and $\|\vec{a} \times \vec{b}\| = 35$, then $\|\vec{a} \cdot \vec{b}\|$ is equal to	I. 4
B. If $2\hat{i} - 3\hat{j} + 4\hat{k}$ and $a\hat{i} - 6\hat{j} + 8\hat{k}$ are collinear, then 'a' is equal to	II. 2
C. If $2\hat{i} + \hat{j} + \hat{k}$ and $2\hat{i} - 4\hat{j} + \lambda\hat{k}$ are perpendicular, then λ is equal to	III. 7
D. $(\hat{i} \times \hat{j}) \cdot \hat{k} + (\hat{j} \times \hat{k}) \cdot \hat{i}$ is equal to	IV. 0

Choose the **correct** answer from the options given below:

(A) A-III, B-II, C-IV, D-I (B) A-III, B-I, C-IV, D-II

(C) A-II, B-I, C-III, D-IV (D) A-I, B-IV, C-II, D-III

39. If $\vec{a} = x\hat{i} + x\hat{j} + y\hat{k}$, $\vec{b} = \hat{i} + \hat{k}$ and $\vec{c} = y\hat{i} + y\hat{j} + z\hat{k}$ are three vectors such that $\vec{a} \times \vec{b} \perp \vec{c}$, then

(A) $y^2 = xz$ (B) $x^2 = yz$

(C) $z^2 = xy$ (D) $xyz = 1$

40. If $\vec{a}$ is any vector, then the value of $|\vec{a} \times \hat{i}|^2 + |\vec{a} \times \hat{j}|^2 + |\vec{a} \times \hat{k}|^2$ is equal to

(A) $2|\vec{a}|^2$ (B) $|\vec{a}|^2$

(C) $4|\vec{a}|^2$ (D) $3|\vec{a}|^2$

41. If $\vec{a}, \vec{b}$ and $\vec{c}$ are three unit vectors such that $\vec{a} \cdot \vec{b} = \vec{a} \cdot \vec{c} = 0$ and angle between $\vec{b}$ and $\vec{c}$ is $\frac{\pi}{6}$, then

(A) $\vec{a} = \vec{b} \times \vec{c}$ (B) $\vec{a} = \pm\left(\vec{b} \times \vec{c}\right)$

(C) $\vec{a} = 2\left(\vec{b} \times \vec{c}\right)$ (D) $\vec{a} = \pm 2\left(\vec{b} \times \vec{c}\right)$

42. If α, β, γ are angles of inclinations of a line with x, y and z-axis respectively, then which of the following are correct?

A. $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

B. $\cos 2\alpha + \cos 2\beta + \cos 2\gamma = -1$

C. $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = -2$

D. $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 2$

Choose the correct answer from the options given below:

(A) A and B only (B) A, B and C only

(C) B and D only (D) A and D only

43. The lines $x = py + q$, $z = ry + s$ and $x = p'y + q'$, $z = r'y + s'$ are perpendicular if

(A) $pp' + rr' = 0$ (B) $pp' + rr' + 1 = 0$

(C) $\frac{p}{p'} = \frac{r}{r'}$ (D) $pp' = rr'$

44. Two lines L_1 and L_2 are given as $L_1 : \vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$ and $L_2 : \vec{r} = (2\hat{i} + 4\hat{j} + 5\hat{k}) + \mu(4\hat{i} + 6\hat{j} + 8\hat{k})$, where λ and μ are real parameters. Then which of the following statements are correct ?

A. Shortest distance between line L_1 and L_2 is $\sqrt{\frac{5}{29}}$.

B. line L_1 and L_2 are parallel.

C. line L_1 and L_2 are concurrent lines.

D. line L_1 and L_2 are perpendicular.

Choose the ***correct*** answer from the options given below:

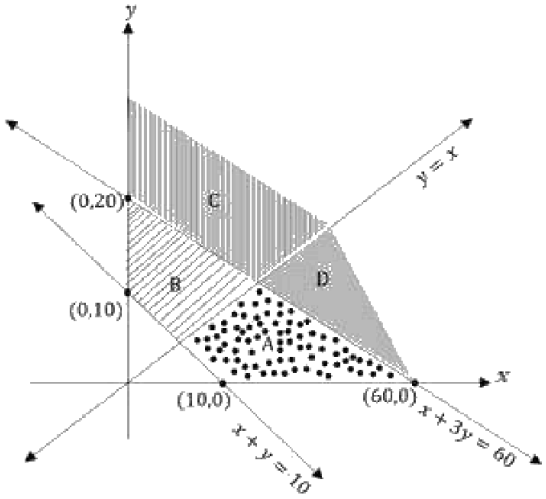
(A) B and C only (B) C and D only

(C) A and C only (D) A and B only

45. The objective function of a LPP is given by z = ax + by, where a and b are constants. If minimum of z occurs at two points (50, 30) and (20, 40), then

(A) 3b = a
(B) 3b + a = 0
(C) 3a + b = 0
(D) 3a – b = 0

46. In the linear programming problem:
Minimize $z = x + y$, subject to the constraints:
$x + 3y \leq 60,\ x + y \geq 10,\ x \leq y,\ x \geq 0,\ y \geq 0$
Which of the following region in graph given below represents the feasible region of the above LPP?



(A) A
(B) B
(C) C
(D) D

47. A speaks truth in 80% cases and B in 90% cases. The probability that they contradict each other in stating the same fact, is:

(A) $\frac{17}{50}$
(B) $\frac{13}{50}$
(C) $\frac{19}{50}$
(D) $\frac{11}{50}$

48. If A and B are two events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$, then $P\left(\frac{A'}{B}\right) =$

(A) $\frac{3}{4}$
(B) $\frac{1}{4}$
(C) $\frac{1}{2}$
(D) $\frac{5}{8}$

49. The probability of the simultaneous occurrence of two events A and B is p. If the probability that exactly one of A and B occurs is q, then
A. $P(\overline{A}) + P(\overline{B}) = 2 + 2q - p$
B. $P(\overline{A}) + P(\overline{B}) = 2 - 2p - q$
C. $P(\overline{A} \cap \overline{B}) = 1 - p - q$
D. $P((A \cap B)|(A \cup B)) = \frac{p}{p+q}$
Choose the **correct** answer from the options given below:

(A) A, C and D only
(B) B, C and D only
(C) C and D only
(D) B only

50. A letter is known to have come for 'RAVINDRA' or 'DEVINDRAN'. On the envelop just two consecutive letters 'RA' are visible. The probability that the letter has come for 'RAVINDRA' is:

(A) $\frac{16}{23}$
(B) $\frac{7}{11}$
(C) $\frac{4}{11}$
(D) $\frac{7}{23}$

Section B2 - Applied Mathematics

51. The effective rate that is equivalent to a nominal rate of 6% per annum compounded semi-annually is

(A) 6% (B) 6.09%

(C) 0.069% (D) 9.06%

52. Assume an investment's starting value is ₹ 10,000 and it grows to ₹ 60,000 in 4 years, then the CAGR % of the investment is,

[given : $(6)^{1/4} = 1.565$]

(A) 65% (B) 56.5%

(C) 65.5% (D) 55.6%

53. Vishal purchased a machine costing Rs. 50,000. The estimated useful life of the machine is 10 years with a scrap value of Rs. 5,000. The annual depreciation using linear method is,

(A) Rs. 45,000 (B) Rs. 4,500

(C) Rs. 3500 (D) Rs. 2500

54. Vatsala takes a loan of Rs. 2,00,000 at an interest rate of 10% per annum for 5 years. Her EMI using flat rate method is,

(A) Rs. 20,000 (B) Rs. 1,666.6

(C) Rs. 5,000 (D) Rs. 15,000

55. Face value of a bond is

(A) the rate at which a bond yields interest

(B) the price at which the bond is sold to buyers at the time of issue

(C) the annual interest rate paid by the bond issuer to the bond holder

(D) the discount rate which returns the market price of a bond without embedded optionality

56. At what rate of interest per annum will the present value of a perpetuity of ₹ 500 payable at the end of every 6 months be ₹ 10,000?

(A) 15% (B) 10%

(C) 20% (D) 25%

57. Let X denote the number of hours a person drive during a randomly selected working day. The probability that X can take the value x_i has the following form, where k is some unknown constant.

$$P(X = x_i) = \begin{cases} 0.2, & \text{if } x_i = 0 \\ kx_i, & \text{if } x_i = 1 \text{ or } 2 \\ k(4 - x_i), & \text{if } x_i = 3 \\ 0, & \text{otherwise} \end{cases}$$

Match the **LIST-I** with **LIST-II**

LIST-I	**LIST-II**
A. The value of k	I. 1
B. The probability that the person drive atleast two hours on a selected working day	II. 0.4
C. The probability that the person drive atmost three hours on a selected working day	III. 0.2
D. The probability that the person drive atmost one hour on a selected working day	IV. 0.6

Choose the **correct** answer from the options given below:

(A) A-III, B-II, C-I, D-IV (B) A-III, B-IV, C-I, D-II

(C) A-IV, B-II, C-III, D-I (D) A-IV, B-III, C-II, D-I

58. Match the **LIST-I** with **LIST-II**

LIST-I	LIST-II
A. In a binomial distribution, if n = 20, q = 0.75 then its mean is	I. 25
B. An unbiased coin is tossed 4 times. The mean of the number of tails is	II. 5
C. In a binomial distribution, mean is 5 and variance is 4, then the number of trials is	III. 0.5
D. In a binomial distribution, if mean is 8 and variance is 4, then the probability of success is	IV. 2

Choose the **correct** answer from the options given below:

(A) A-III, B-IV, C-I, D-II (B) A-II, B-I, C-IV, D-III

(C) A-II, B-IV, C-I, D-III (D) A-II, B-I, C-III, D-IV

59. If X is a Poisson variate such that 4P(X = 2) = 3P(X = 1), then the mean of the distribution is equal to:

(A) 1.5 (B) 2

(C) 3 (D) 4

60. In a math aptitude test, students scores are found to be normally distributed having mean as 45 and standard deviation 5. What percent of students scored more than the mean score?

(A) 45% (B) 50%

(C) 5% (D) 60%

61. If $y = e^{4x}(92)^x$; then $\frac{dy}{dx}$ is equal to
$(\log_e x = \log x)$

(A) $4x\, e^{4x} \cdot 92^{x-1}$ (B) $e^{4x}92^{x-1}[368 + x]$

(C) $e^{4x}(92)^x[4 + \log 92]$ (D) $e^{4x}92^x \log 92$

62. The order and degree of the following differential equation:
$y = px + \sqrt{a^2p^2 + b^2}$, where $p = \frac{dy}{dx}$, are

(A) Order = 2 : degree = 2 (B) Order = 1 : degree = 1

(C) Order = 1 : degree = 2 (D) Order = 2 : degree = 1

63. The demand function for a certain product is represented by the equation $p = 150 + 12x - x^2$, where x is the number of units demanded and p is the price per unit. The marginal revenue when 5 units are sold is

(A) Rs. 195 (B) Rs. 282

(C) Rs. 91 (D) Rs. 185

64. The function $f(x) = 4x^3 - 18x^2 + 27x - 7$ has:-

(A) Maxima at $x = \frac{3}{2}$ (B) Minima at $x = \frac{3}{2}$

(C) Point of inflexion at $x = \frac{3}{2}$ (D) Maximum value of function is 156

65. The function $f(x) = \frac{2}{x} + 5,\ x \neq 0$ is

(A) increasing function for $x \in \mathbb{R} - \{0\}$ (B) increasing function for $x \in (0, \infty)$

(C) neither increasing nor decreasing function for $x \in (0, \infty)$ (D) decreasing function for $x \in \mathbb{R} - \{0\}$

66. $\int (x+1)e^x\, dx$ is equal to
[C is an arbitrary constant]

(A) $(x+1)e^x + C$ (B) $e^x + C$

(C) $xe^x + C$ (D) $(x+1) + C$

67. Particular solution of the differential equation (x – 1)dy/dx = 2xy, when y(2) = 1 is:– (consider $\log_e$ x = log x)

(A) $\log|y| + \log(x-1)^2 = 2x + 4$ (B) $\log|y| - \log(x-1)^2 = 2x - 4$

(C) $\log|y| + \log(x-1)^2 = 2x - 4$ (D) $\log|y| - \log(x-1)^2 = 2x + 4$

68. Let R be the feasible region for a linear programming problem, and Let z = ax + by be the objective function. If the feasible region R is bounded then which of the following are true?
A. The maximum or minimum value of objective function may not exist.
B. The objective function z has both a maximum and a minimum value on R.
C. Maximum and minimum values lie in the unbounded region
D. The objective function z = ax + by has both a maximum value and a minimum value and each of these values occurs at a corner point of R.
Choose the correct answer from the options given below:

(A) A and B only (B) A and D only
(C) B and D only (D) C and D only

69. Consider a LPP given by
Maximize $Z = 38x + 19y$
Subject to $3x + 5y \leq 15$, $5x + 2y \leq 10$, and $x, y \geq 0$
The optimum value of Z is,

(A) 85 (B) 190
(C) 240 (D) 57

70. Which of the following is/are true about parameter?
A. It is a characteristic of a sample.
B. It is a characterstic of a population.
C. It is a numerical value that is taken from the entire population, such as the population mean.
D. It is the numerical value taken from a sample and calculated from the sample observations alone.
Choose the correct answer from the options given below:

(A) A only (B) B and D only
(C) B and C only (D) A and D only

71. Consider a office having seating capacity of 58 employees and all of them are to be seated in such a way that an employee can sit on any available vacant seat. What will be the degree of freedom?

(A) 58 (B) 57
(C) 59 (D) 58.5

72. The following data are from a simple random sample: 3, 7, 4, 12, 4, 12. The point estimate of the population mean is,

(A) 42 (B) 7
(C) 24 (D) 6

73. The patterns and behavior of the data in any time series are based on which of the following components.
A. Seasonal component
B. Secular trend component
C. Irregular component
D. Cyclical component
Choose the correct answer from the options given below:

(A) A and B only (B) B and C only
(C) B, C and D only (D) A, B, C and D

74. The number of wedding cards, in thousands, distributed in a certain city on each day for a week is given as follows:
21, 35, 19, 27, 32, 22, 12.
The three days moving averages will be:

(A) 25, 28, 26, 23, 21 (B) 25, 24, 23, 27, 26
(C) 25, 27, 26, 27, 22 (D) 24, 28, 26, 22, 25

75. Match the **LIST-I** with **LIST-II**

LIST-I **Matrix** A	**LIST-II** $\lvert\text{adj } A\rvert$
A. $A = \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$	I. 1
B. $A = \begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}$	II. 7
C. $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$	III. 2
D. $A = \begin{bmatrix} 6 & 1 \\ 5 & 2 \end{bmatrix}$	IV. 6

Choose the *correct* answer from the options given below:

(A) A - I, B - II, C - III, D - IV

(B) A - IV, B - II, C - III, D - I

(C) A - III, B - IV, C - I, D - II

(D) A - III, B - IV, C - II, D - I

76. For a given square matrix A of order n, if there exists another square matrix B of the same order n, such that AB = BA = I, then A is said to be invertible and B is called the inverse matrix of A.

Which of the following statements are not TRUE?

A. Inverse of a matrix, if it exists, is unique.

B. For two invertible matrices of same order, say A and B, then $(AB)^{-1} = A^{-1}B^{-1}$

C. For an invertible matrix A, $(A^{-1})^{-1} = A$

D. For an invertible matrix A, $(A^T)^{-1} = A^T$

Choose the correct answer from the options given below:

(A) A and C only

(B) B and D only

(C) A, C and D only

(D) A and D only

77. Match the LIST-I with LIST-II

List I	**List II**
(A) If A is a square matrix of order 3 such that $\lvert A\rvert = 3$, then $\lvert\text{adj (adj A)}\rvert$ =	(I) 16
(B) If A is a non-singular matrix and $\lvert A\rvert = {}^{1}/_{16}$, then $\lvert A^{-1}\rvert$ =	(II) 512
(C) If A is a square matrix of order 4 such that $\lvert A\rvert = 2$, then $\lvert\text{adj (adj A)}\rvert$ =	(III) 9
(D) If A is a square matrix of order 2 such that $\lvert A\rvert = 9$, then $\lvert\text{adj (adj A)}\rvert$ =	(IV) 81

Choose the correct answer from the options given below:

(A) A - IV, B - I, C - III, D - II

(B) A - IV, B - I, C - II, D - III

(C) A - I, B - IV, C - III, D - II

(D) A - III, B - I, C - IV, D - II

78. Match the LIST-I with LIST-II

	LIST-I		**LIST-II**
A.	Row matrix	I.	$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$
B.	Scalar matrix	II.	$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$
C.	Column matrix	III.	$\begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$
D.	Diagonal matrix	IV.	$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$

Choose the correct answer from the options given below:

(A) A - III, B - II, C - I, D - IV

(B) A - III, B - II, C - IV, D - I

(C) A - III, B - IV, C - II, D - I

(D) A - III, B - I, C - IV, D - II

79. The sum of two skew-symmetric matrices of the same order is a

(A) symmetric matrix
(B) zero matrix
(C) skew-symmetric matrix
(D) diagonal matrix

80. Which of the following properties are not correct for three real numbers a, b and c?
A. If $a > b$ and $b > c$, then $a < c$
B. If $a > b$, and $c < 0$, then $ac < bc$
C. If $a > b$, and $c < 0$, then $a \div c < b \div c$
D. If $a > b$ and $c > 0$, then $a \div c < b \div c$
Choose the correct answer from the options given below:

(A) A and D only
(B) B, C and D only
(C) A and B only
(D) B and C only

81. A tin container contains 50 litres of cow milk. From this container 5 litres cow milk was taken out and replaced with soya milk. This process was repeated further two more times. How much cow milk is there in the container now?

(A) 364.5 litres
(B) 36.45 litres
(C) 3.645 litres
(D) 40 litres

82. If $53 \equiv y \pmod 6$, then the possible values of y are:-

(A) ..... 64, 58, 52, 46, 40, ...
(B) ..... 70, 76, 81, 87, 93, 98, ...
(C) ..... 65, 59, 53, 47, 41, ...
(D) ..... 70, 76, 82, 88, 94, 97 .....

83. A man can row a boat in still water at the rate of 17 km/hr. He finds that it takes him thrice as long to row upstream of a river as to row downstream of the same river. The speed of the stream is,

(A) 15 km/hr
(B) 11.5 km/hr
(C) 8.5 km/hr
(D) 6 km/hr

84. Two pipes A and B can fill a tank in 12 minutes and 15 minutes respectively while a third pipe C can empty the full tank in 20 minutes. All the three pipes are opened in the beginning but pipe C is closed 6 minutes before the tank is filled. In what time will the tank be full?

(A) 15 minutes
(B) 10 minutes
(C) 7 minutes
(D) 17 minutes

85. In a 700 m race, A reaches the finishing point in 30 seconds & B reaches in 35 seconds. By how much distance does A beat B?

(A) 75 m
(B) 50 m
(C) 100 m
(D) 200 m

- End of Question Paper -