Mock Test 07: Full Syllabus Exam as per CBSE Sample Paper 2025-26

Time: 3 Hrs | **Maximum marks : 80**

INSTRUCTIONS TO THE STUDENTS

1. This question paper has 5 sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each.
7. All questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 question of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

SECTION A

(Questions 1 – 10 carry 1 marks)

1	If the lines $\frac{x-1}{k} = \frac{y-3}{1} = \frac{z+6}{-2}$ and $\frac{x-1}{1} = \frac{y-3}{-2} = \frac{z+6}{k}$ are perpendicular , then k is equal to (a)2 (b)1 (c)-2 (d)3	1
2	The solution of differential equation 2x $\frac{dy}{dx} - y$ = 3 represents: (a)straight lines (b) circle (c) parabola (d) ellipse	1
3	If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 9 \\ 4 & 6 \end{vmatrix}$ then x is equal (a) 6 (b) -6 (c) ±6 (d) none of the above	1
4	Assume that in a family, each child is equally likely to be a boy or a girl. A family with three children is chosen at random. The probability that the eldest child is a girl given that the family has at least one girl is (a)$\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{4}{7}$	1
5	A unit vector perpendicular to both the vectors $\hat{\imath} - 2\hat{\jmath} + 3\hat{k}$ and $\hat{\imath} + 2\hat{\jmath} - \hat{k}$ is (a)$\pm\frac{1}{\sqrt{3}}(\hat{\imath} + \hat{\jmath} + \hat{k})$ (b) $\pm\frac{1}{\sqrt{3}}(-\hat{\imath} + \hat{\jmath} + \hat{k})$ (c) $\pm\frac{1}{\sqrt{3}}(\hat{\imath} - \hat{\jmath} - \hat{k})$ (d) $\pm\frac{1}{\sqrt{3}}(\hat{\imath} - \hat{\jmath} + \hat{k})$	1
6	If A = $\begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$,then find the value of |2A| (a) -6 (b) -24 (c) 12 (d) -12	1
7	If $\alpha$is the angle between any two vectors. $\vec{a}$ and b , then $\|\vec{a}.\vec{b}\| = \|\vec{a} \times \vec{b}\|$ when α is equal to (a)0 (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) π	1
8	The projection of $3\hat{\imath} + 3\hat{\jmath} + \hat{k}$ on $9\hat{\imath} + 6\hat{\jmath} + 2\hat{k}$ is... (a)4 (b)2 (c)1 (d)3	1

9	The side of an equilateral triangle is increasing at the rate of 5 cm/sec. The rate at which its area increases, when side is $10\sqrt{3}$ cm is (a) $300\sqrt{3}$ (b) $100\sqrt{3}$ (c) $25\sqrt{3}$ (d)75	1
10	The value of integral $\int_{-1}^{1} \frac{\lvert x\rvert}{x}\, dx$, x≠ 0 is (a) -1 (b) 0 (c) 1 (d) 2	1
11	The objective function Z = ax + by of an LPP has maximum value 42 at (4,6) and minimum value 19 at (3,2). Which of the following is true? (a) a = 9, b = 1 (b) a = 5, b = 2 (c) a = 3, b = 5 (d) a = 5, b = 3	1
12	The value of the integral $\int_{-\pi}^{\pi} \cos^2 x \sin^3 x\ dx$ (a) π (b)2 π (c)0 (d)- π	1
13	The interval in which y = $x^2 e^{-x}$(x ≠ 0) increasing is (a) $(-\infty,\infty)$ (b) (−2,0) (c) (2, ∞) (d) (0, 2)	1
14	Let the vector $\vec{a}$ and $\vec{b}$ be such that $\lvert\vec{a}\rvert = \sqrt{3}$ and $\lvert\vec{b}\rvert = \frac{2}{\sqrt{3}}$, then $\vec{a} \times \vec{b}$ is a unit vector , if the angle between $\vec{a}$ and $\vec{b}$ is (a)$\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{4}$	1
15	A line makes angles α, β , γ with the co-ordinate axes. α + β= 90° , then γ = (a)0 (b)90° (c)180° (d)None of these	1
16	Five fair coins are tossed simultaneously. The probability of the events that at least one head comes up is (a)$\frac{27}{32}$ (b) $\frac{5}{32}$ (c) $\frac{31}{32}$ (d) $\frac{1}{32}$	1
17	If A = $\begin{bmatrix} 1 & 12 & 4y \\ 6x & 5 & 2x \\ 8x & 4 & 6 \end{bmatrix}$ is a symmetric matrix, then (2x + y) is (a) -8 (b) 0 (c) 6 (d) 8	1
18	The restrictions imposed on decision variables involved in an objective function of a LPP are called (a) feasible solutions (b) constraints (c) optimal solutions (d) infeasible solutions	1
	ASSERTION-REASON BASED QUESTIONS (Question numbers 19 and 20 are Assertion-Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (a), (b), (c) and (d) as given below.) (a) Both (A) and (R) are true and (R) is the correct explanation of (A). (b) Both (A) and (R) are true but (R) is not the correct explanation of (A). (c) (A) is true but (R) is false. (d) (A) is false but (R) is true.	
19	**Assertion(A):** A relation R = {(a, b): |a-b|<2} defined on the set A = {1, 2, 3, 4, 5} is reflexive. **Reason(R):** A relation R on the set A is said to be reflexive if (a,b) ∈ R and (b, c) ∈R then (a, c) ∈R for all a, b, c ∈ A.	1
20	**Assertion (A) :** Let A and B be two events such that P (A) = $\frac{1}{5}$ and P(A or B) = $\frac{1}{2}$ then P(B) = $\frac{3}{8}$ for A and B are independent events. **Reason (R) :** For independent events P (A or B) = P (A) + P(B) - P(A).P(B).	1

SECTION B

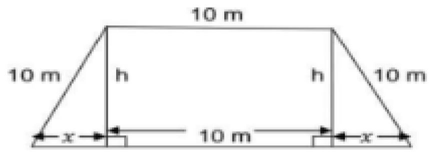
(Questions 21 – 25 carry 2 marks)

21	(a)Find the value of $\tan^{-1}\{2\sin(4\cos^{-1}\frac{\sqrt{3}}{2})\}$ **OR** (b)$\tan^{-1}(\tan\frac{7\pi}{6})$	2
22	Find the intervals in which the function f is given by $f(x)= 4x^3 -6x^2-72x+30$ (a)Strictly increasing (b)Strictly decreasing	2
23	If y = cosec ($\cot^{-1}x$), then prove that $\sqrt{1+x^2}\frac{dy}{dx} - x = 0$	2
24	(a)If $\vec{a}$, $\vec{b}$ are any two unit vectors and θ is the angle between them, then show that $\sin\frac{\theta}{2} = \frac{1}{2}\lvert\vec{a}-\vec{b}\rvert$ **OR** (b)If the position vectors of the points A and B are $2\hat{i}+3\hat{j}-\hat{k}$ and $3\hat{i}+2\hat{j}+\hat{k}$, then find the vector of magnitude 6 units in the direction of $(\overrightarrow{AB})$	2
25	A problem is given to A, B and C. The probabilities that they solve the problem correctly are 1/3, 2/7 and 3/8 respectively. If they try to solve the problem simultaneously, find the probability that exactly one of them solve the problem.	2
	SECTION C **(Questions 26 – 31 carry 3 marks)**	
26	Evaluate the definite integrals $\int_1^4 [\lvert x-1\rvert + \lvert x-2\rvert + \lvert x-3\rvert]$	3
27	Evaluate $\int \frac{6x+7}{\sqrt{(x-5)(x-4)}}dx$	3
28	Solve the following Linear Programming Problems graphically Maximise Z = 5x + 3y Subject to constrains :3x + 5y ≤ 15, 5x + 2y ≤ 10, x ≥ 0, y ≥ 0.	3
29	If $\vec{a} = 2\hat{i}+2\hat{j}+3\hat{k}$ $\vec{b} = -\hat{i}+2\hat{j}+\hat{k}$ $\vec{c} = 3\hat{i}+\hat{j}$ are such that $\vec{a}+\lambda\vec{b}$ is perpendicular to $\vec{c}$ then find the value of λ . **OR** If $\vec{a}$, $\vec{b}$ are any two unit vectors and θ is the angle between them, then show that $\sin\frac{\theta}{2} = \frac{1}{2}\lvert\vec{a}-\vec{b}\rvert$	3
30	(a)Sand is pouring from a pipe at the rate of 12 cm^3/sec. The falling sand forms a cone on the ground in such a way that the height of the cone is always three times the radius of the base. How fast is the radius of the sand cone increasing when the height is 6 cm. **OR** (b)Prove that $f(x) = \frac{4\sin x}{2+\cos x} - x$ is increasing on $[0, \frac{\pi}{2}]$	3
31	If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ and $x \neq 4$, prove that $\frac{dy}{dx} = -\frac{1}{(x+1)^2}$	3
	SECTION D **(Questions 32 – 38 carry 4 marks)**	
32	Using the method of integrals find the area of the region $\{(x, y): x^2 + y^2 \leq 9, 1 \leq x \leq 2\}$	5
33	(a)Let A be the set of all the triangles in a plane and R be the relation defined on R as R = $\{(T_1, T_2): T_1$ is similar to $T_2\}$ (i) Show that the relation R is an equivalence relation. (ii)Consider three right angle triangle T_1 with sides 3, 4, 5, T_2 with sides 5, 12, 13 and T_3 with sides 6,8,10. Which triangle among T_1, T_2, and T_3 are related?	4 1

	OR (b)Show that f: R→ {x∈R : −1 < x < 1} defined by f(x) = $\frac{x}{1+\|x\|}$, x∈ R is one - one and onto function	**3** **2**
34	(a)Find the image of the point (2,4,-1) in the line $\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}$ **OR** (b)Find the shortest distance between the lines whose vector equations are $\vec{r} = (1-t)\hat{i} + (2-t)\hat{j} + (3-2t)\hat{k}$ & $\vec{r} = (s+1)\hat{i} + (2s-1)\hat{j} - (2s+1)\hat{k}$	**5**
35	Find the particular solution of the differential equation tanx $\frac{dy}{dx}$ = 2x tanx + x^2 –y (tanx ≠ 0). Given that y = 0 when x = $\frac{\pi}{2}$	**5**

SECTION E

(Questions 36 – 35 carry 5 marks)

36	A telephone company in a town has 500 subscribers on its list and collect fixed charges of ₹ 300 per subscriberper per year. The company proposes to increase the annual subscription and it is believed that every increase of ₹1, one subscriber will discontinue the service.  (i)Based on above information find out how much amount can be increased for maximum revenue. (ii)Find out maximum revenue received by the telephone company.	**2+2**
37	The front gate of a building is in the shape of a trapezium as shown below. Its three sides other than base are 10 m each. The height of the gate is h meter. On the basis of this information and figure given below, answer the following questions:  (i) Express the area A of the gate as a function of x. (ii) Find the value of $\frac{dA}{dx}$ (iii)(a)Find the value of x , for which $\frac{dA}{dx} = 0$ **OR** **(b)**If at the value of x, where $\frac{dA}{dx}$ =0 , area of trapezium is maximum , then is maximum , then maximum area of trapezium is given by	**1+1 +2**
38	A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will come by cab, metro, bike or by other means of transport are respectively 3/10, 1/5, 1/10 and 2/5. The probabilities that he will be late are 1/4, 1/3, 1/12 and 1/10 if he comes by cab, metro, bike and other means of transport respectively.  (a)What is the probability that the doctor arrived late? (b) When the doctor arrives late, what is the probability that he comes by metro?	**2+2**