CBSE · CLASS 12 · MATHEMATICS

CBSE Class 12 Mathematics Guess Paper 2027

Time: 3 hours · Maximum marks: 80 · 38 questions

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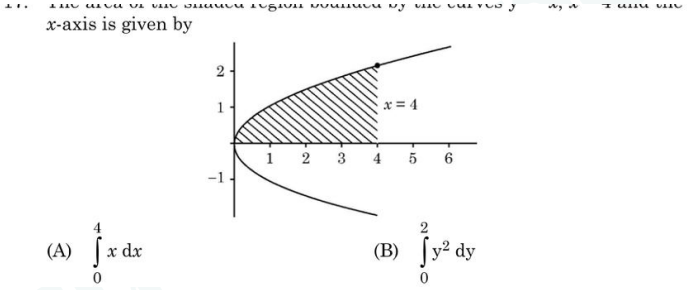
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Section A

20 questions of 1 mark each — 18 MCQ + 2 Assertion-Reason

Q1. If integral $3ax/(b^2 + c^2 x^2)\,dx = A \log|b^2 + c^2 x^2| + K$, then the value of A is 1 mark
(A) 3a
(B) $3a/(2b^2)$
(C) $3a/(b^2 c^2)$
(D) $3a/(2c^2)$

Q2. The area of the shaded region bounded by the curves $y^2 = x$, $x = 4$ and the x-axis is given by (A) $\int_0^4 x\,dx$ (B) $\int_0^2 y^2\,dy$ (C) $2\int_0^4 \sqrt{x}\,dx$ (D) $\int_0^4 \sqrt{x}\,dx$ 1 mark



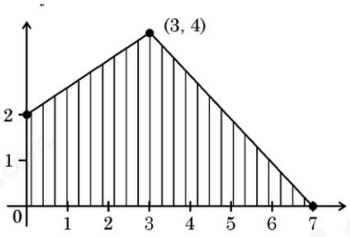
Q3. A function $f(x) = 10 - x - 2x^2$ is increasing on the interval (A) (-infinity, -1/4] (B) (-infinity, 1/4) (C) [-1/4, infinity) (D) [-1/4, 1/4] 1 mark

Q4. If A is a square matrix of order 4 and $|\text{adj } A| = 27$, then A (adj A) is equal to (A) 3 (B) 9 (C) 3 I (D) 9 I 1 mark

Q5. Assertion (A): Let Z be the set of integers. A function f: Z → Z defined as $f(x) = 3x - 5$, $\forall\, x \in Z$ is a bijective. Reason (R): A function is a bijective if it is both surjective and injective. (A) Both Assertion (A) and Reason (R) are true and the Reason (R) is the correct explanation of the Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true. 1 mark

Q6. If $f(x) = |x| + |x - 1|$, then which of the following is correct? (A) f(x) is both continuous and differentiable, at x = 0 and x = 1. (B) f(x) is differentiable but not continuous, at x = 0 and x = 1. (C) f(x) is continuous but not differentiable, at x = 0 and x = 1. (D) f(x) is neither continuous nor differentiable, at x = 0 and x = 1. 1 mark

Q7. The feasible region of a linear programming problem with objective function Z = 5x + 7y is shown below [feasible region is the shaded polygon with corner points (0, 0), (0, 2), (3, 4) and (7, 0)]. The maximum value of Z - minimum value of Z is (A) 8 (B) 29 (C) 35 (D) 43 — 1 mark

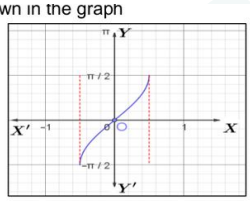


The maximum value of Z – minimum value of Z is

Q8. If for three matrices A = $[a_{ij}]_{m\times4}$, B = $[b_{ij}]_{n\times3}$ and C = $[c_{ij}]_{p\times q}$, products AB and AC both are defined and are square matrices of same order, then value of m, n, p and q are: (A) m = q = 3 and n = p = 4 (B) m = 2, q = 3 and n = p = 4 (C) m = q = 4 and n = p = 3 (D) m = 4, p = 2 and n = q = 3 — 1 mark

Q9. Identify the function shown in the graph [graph of an inverse trigonometric function with range from -pi/2 to pi/2 and domain shown between -1 and 1]. (A) $\sin^{-1} x$ (B) $\sin^{-1}(2x)$ (C) $\sin^{-1}(x/2)$ (D) $2\sin^{-1} x$ — 1 mark

1. Identify the function shown in the graph — 1



(A) $\sin^{-1} x$ (B) $\sin^{-1}(2x)$ (C) $\sin^{-1}\left(\frac{x}{2}\right)$ (D) $2\sin^{-1} x$

Q10. If a + b + c = 0, |a| = sqrt(37), |b| = 3 and |c| = 4, then angle between b and c is (A) pi/6 (B) pi/4 (C) pi/3 (D) pi/2 — 1 mark

Q11. The area bounded by the curve y = x|x|, x-axis and the ordinates x = -1 and x = 1 is given by (A) 0 (B) 1/3 (C) 2/3 (D) 4/3 — 1 mark

Q12. If a function defined by f(x) = { kx + 1, x <= pi ; cos x, x > pi } is continuous at x = pi, then the value of k is (A) pi (B) -1/pi (C) 0 (D) -2/pi — 1 mark

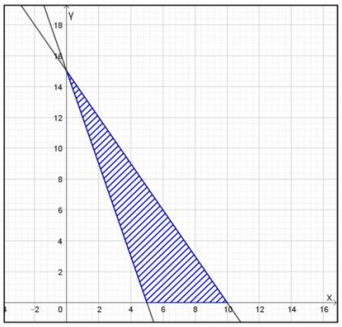
Q13. The value of p for which vectors i^ + 2j^ + 3k^ and 2i^ - pj^ + k^ are perpendicular to each other is (A) 0 (B) 1 (C) 5/2 (D) -5/2 — 1 mark

Q14. What is the general solution of the differential equation $e^{y'} = x$? 1 mark
(A) y = xlogx + c
(B) y = xlogx - x + c
(C) y = xlogx + x + c
(D) y = x + c

Q15. The order and degree of the differential equation $d/dx(e^y) = 0$ respectively are 1 mark
(A) 0, 1
(B) 1, 1
(C) 2, 1
(D) 1, not defined

Q16. If the matrix A = [[0, r, -2], [3, p, t], [q, -4, 0]] is skew-symmetric, then value of (q+t)/(p+r) is.... (A) -2 (B) 0 (C) 1 (D) 2 1 mark

Q17. The feasible region of a linear programming problem is bounded but the objective function attains its minimum value at more than one point. One of the points is (5,0). Then one of the other possible points at which the objective function attains its minimum value is (A) (2,9) (B) (6,6) (C) (4,7) (D) (0,0) 1 mark



Then one of the other possible points at which the objective function attains its minimum value is

(A) (2,9) (B) (6,6) (C) (4,7) (D) (0,0)

Q18. The least value of $f(x) = x^3 - 12x$, x in [0, 3] is 1 mark
(A) -16
(B) -9
(C) 0
(D) 16

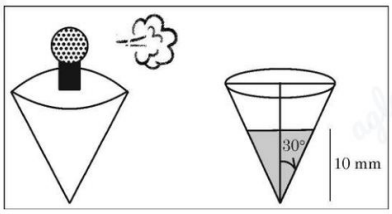
Q19. If the direction cosines of a line are sqrt(3) k, sqrt(3) k, sqrt(3) k, then the value of k is : 1 mark
(A) +/- 1
(B) +/- sqrt(3)
(C) +/- 3
(D) +/- 1/3

Q20. If $2\cos^{-1} x = y$, then 1 mark
(A) 0 <= y <= pi
(B) -pi <= y <= pi
(C) 0 <= y <= 2pi
(D) -pi <= y <= 0

Section B
5 Very Short Answer questions of 2 marks each

Q21. A room freshner bottle in the shape of an inverted cone sprays the perfume at regular intervals such that volume of the perfume in the bottle decreases at the steady rate of 1 mm^3/min. Find the rate at which level of perfume is dropping at an instant when level of perfume in the bottle is 10 mm, if the semi-vertical angle of conical bottle is pi/6. 2 marks

perfume is dropping at an instant when level of perfume in the bottle is 10 mm, if the semi-vertical angle of conical bottle is $\frac{\pi}{6}$. 2



Q22. Evaluate: $\tan(\sin^{-1} 1 - \cos^{-1}(-1/2))$ 2 marks

Q23. Find: integral $(x-3)/(x-1)^3 e^x dx$ 2 marks

Q24. If $y = \log \tan(\pi/4 + x/2)$, then prove that $dy/dx - \sec x = 0$ 2 marks

Q25. If $\sqrt{3}(x^2 + y^2) = 4xy$, then find dy/dx at $(1/2, \sqrt{3}/2)$. 2 marks

Section C
6 Short Answer questions of 3 marks each

Q26. Out of two bags, bag I contains 3 red and 4 white balls and bag II contains 8 red and 6 white balls. A die is thrown. If it shows a number less than 3 then a ball is drawn at random from bag I, otherwise a ball is drawn at random from bag II. Find the probability that the ball drawn from one of the bags is a red ball. 3 marks

Q27. (a) A relation R on set A = {1, 2, 3, 4, 5} is defined as $R = \{(x, y) : |x^2 - y^2| < 8\}$. Check whether the relation R is reflexive, symmetric and transitive. 3 marks
OR
(b) A function f is defined from R -> R as f(x) = ax + b, such that f(1) = 1 and f(2) = 3. Find function f(x). Hence, check whether function f(x) is one-one and onto or not.

Q28. Solve the following linear programming problem graphically: Minimize Z = 13x - 15y Subject to constraints x + y <= 7, 2x - 3y + 6 >= 0, x >= 0, y >= 0 3 marks

Q29. Find: integral $x^2/((x^2 + 9)(x^2 + 16)) dx$ 3 marks

Q30. Evaluate: integral from 0 to 1 of $x(1 - x)^n dx$; (where n in N). 3 marks

Q31. Find the general solution of the following differential equation: $x^2 dy/dx = x^2 + xy + y^2$ 3 marks

Section D
4 Long Answer questions of 5 marks each

Q32. If A = [[0,2,1],[-2,-1,-2],[1,-1,0]], find A^{-1} and use it to solve the following system of equations: -2y + z = 7, 2x - y - z = 8, x - 2y = 10 — 5 marks

Q33. Check whether the lines given by (x - 1)/2 = (y - 2)/3 = (z - 3)/4 and (x - 4)/5 = (y - 1)/2 = z are parallel or not. If parallel, find the distance between them, otherwise find their point of intersection, if the lines are intersecting. — 5 marks

Q34. Find the image A' of the point A(1, 6, 3) in the line x/1 = (y - 1)/2 = (z - 2)/3. Also, find the equation of the line joining A and A'. — 5 marks

Q35. Solve the differential equation: y + d/dx(xy) = x(sin x + x) — 5 marks

Section E
3 Case-study based questions of 4 marks each (with sub-parts)

Q36. Using integration, find the area of the smaller region enclosed by the curve $4x^2 + 4y^2 = 9$ and the line 2x + 2y = 3. — 4 marks

Q37. [An online delivery company in a city has 5000 subscribers and collects annual subscription fees of Rs 300 per subscriber for unlimited free deliveries. The company wishes to increase the annual subscription fee. It is predicted that, for every increase of Rs 1, ten subscribers will discontinue. Assume that the company increased the annual fee by Rs x.] How many subscribers will discontinue after an increase of Rs x in annual fee? — 4 marks

Q38. [Case Study 3: three groups by screen time - high (>4 hrs) 60%, moderate (2-4 hrs) 30%, low (<2 hrs) 10%; anxiety/low-retention rates 80%, 70%, 30% respectively.] II. A student is selected at random, and he is found to suffer from anxiety and low retention issues. What is the probability that he/she spends screen time more than 4 hours per day? — 4 marks

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