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CLASS 12 APPLIED MATHEMATICS - PRACTICE QUESTIONS

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CLASS 12

Applied Mathematics

Sample Paper 5 - Questions

38 questions | 80 marks | 2026-27

Time: 3 hours. Answer all questions and subparts unless a choice is stated. Marks are shown on the right. Write answers on separate sheets. Independently prepared practice paper.

Section A - Objective questions

1. A random sample of 25 observations from a normal population has mean 89 and sample standard deviation 5. For H0: mu=87, calculate the one-sample t statistic. **1**
(A) 4 (B) 3 (C) 1 (D) 2

2. For $f(x) = 36x^3$, calculate f'(2). **1**
(A) 433 (B) 431 (C) 432 (D) 434

3. Calculate the present value of Rs 39000 due in two years at a 10% annual discount rate. Round to two decimal places. **1**
(A) 32232.4 (B) 32233.4 (C) 32231.4 (D) 32230.4

4. Calculate the central three-period moving average for observations 45, 49, 53. **1**
(A) 49 (B) 51 (C) 48 (D) 50

5. For cost $C(x) = x^2 + 68x + 100$, find marginal cost C'(5). **1**
(A) 78 (B) 77 (C) 80 (D) 79

6. Determine the value of the integral from 0 to 1 of $120x^2$ dx. **1**
(A) 39 (B) 41 (C) 40 (D) 42

7. A binomial random variable has n = 39 and p = 0.5. Calculate its variance. **1**
(A) 39/4 (B) 47/4 (C) 43/4 (D) 35/4

8. An observation is 122, the mean is 50 and standard deviation is 36. Calculate its standard score. **1**

(A) 4 (B) 2 (C) 1 (D) 3

9. Calculate the determinant of [[42,1],[1,43]]. **1**

(A) 1806 (B) 1804 (C) 1805 (D) 1807

10. The inverse demand function is $p=49-q$ for $q \geq 0$. At market price 43, calculate consumer surplus. **1**

(A) 19 (B) 17 (C) 20 (D) 18

11. A 100-litre tank initially contains only juice. Twice, 30 litres of well-mixed liquid are removed and replaced with water. Calculate the fraction of original juice remaining. **1**

(A) 149/100 (B) -51/100 (C) 49/100 (D) 249/100

12. Maximise Z = x + y with x >= 0, y >= 0 and x + y <= 49. State the maximum value. **1**

(A) 50 (B) 48 (C) 49 (D) 51

13. A random sample of 25 observations from a normal population has mean 88 and sample standard deviation 5. For H0: mu=85, calculate the one-sample t statistic. **1**

(A) 2 (B) 5 (C) 3 (D) 4

14. For $f(x) = 37x^3$, calculate f'(2). **1**

(A) 445 (B) 446 (C) 444 (D) 443

15. Calculate the central three-period moving average for observations 47, 51, 55. **1**

(A) 52 (B) 50 (C) 53 (D) 51

16. For cost $C(x) = x^2 + 70x + 100$, find marginal cost C'(5). **1**

(A) 82 (B) 79 (C) 81 (D) 80

17. A binomial random variable has n = 46 and p = 0.2. Calculate its mean. **1**

(A) 46/5 (B) 41/5 (C) 51/5 (D) 56/5

18. An observation is 120, the mean is 50 and standard deviation is 35. Calculate its standard score. 1

(A) 4 (B) 3 (C) 2 (D) 1

19. The inverse demand function is $p=46-q$ for $q \geq 0$. At market price 43, calculate consumer surplus. 1

(A) 7/2 (B) 9/2 (C) 13/2 (D) 11/2

20. Determine the value of the integral from 0 to 1 of $105x^2$ dx. 1

(A) 37 (B) 36 (C) 34 (D) 35

Section B - Short responses

21. Calculate the determinant of [[37,1],[1,38]]. 2

22. Calculate the present value of Rs 37000 due in two years at a 10% annual discount rate. Round to two decimal places. 2

23. Maximise Z = x + y with x >= 0, y >= 0 and x + y <= 50. State the maximum value. 2

24. A 100-litre tank initially contains only juice. Twice, 20 litres of well-mixed liquid are removed and replaced with water. Calculate the fraction of original juice remaining. 2

25. Calculate the central three-period moving average for observations 48, 52, 56. 2

Section C - Short responses

26. For $f(x)=39x^3$, determine $f'(x)$. Calculate the equation of the tangent at $x=2$, showing the point and slope used. 3

27. For cost $C(x) = x^2 + 72x + 100$, find marginal cost $C'(5)$. Also calculate $C(6)-C(5)$ and compare it with $C'(5)$. Explain the difference between a derivative and this finite change. **3**

28. The inverse demand function is $p=45-q$ for $q \geq 0$. At market price 39, calculate consumer surplus. Show the governing rule, substitution and conclusion clearly. **3**

29. For X following a binomial distribution with $n=42$ and $p=1/5$, calculate $E(X)$, $Var(X)$ and $P(X=0)$. State the trial assumptions. **3**

30. Calculate the present value of Rs 38000 due in two years at a 10% annual discount rate. Round to two decimal places. Show the governing rule, substitution and conclusion clearly. **3**

31. An observation is 132, the mean is 50 and standard deviation is 41. Calculate its standard score. Show the governing rule, substitution and conclusion clearly. **3**

Section D - Extended responses

32. Let X have binomial distribution with n = 5 and p = 0.2. Calculate its mean, variance, P(X = 0) and P(X >= 1). State the independence assumption. **5**

33. Annual sales for Years 1-5 are 10, 14, 18, 16 and 22 thousand units. Calculate three-year moving averages and identify the years at which they are centred. **5**

34. Maximise Z = 3x + 4y subject to 2x + y <= 8, x + 2y <= 8, x >= 0 and y >= 0. List the feasible corner points and the maximum value. **5**

35. Calculate the present value of Rs 1,000 due after one year and Rs 1,000 due after two years, using annual discount rate 10%. Compare this with paying Rs 1,800 immediately. **5**

Section E - Case and application questions

36. A production model has cost $C(x)=x^2-18x+111$, $x\geq 0$.

(a) Find $C(0)$. **1**

(b) Find marginal cost. **1**

(c) Determine and justify the minimum-cost output and minimum cost. **2**

37. A resource matrix is $A=[[2,1],[1,3]]$ and the production column is $X=[[7],[8]]$.

(a) State the order of AX. **1**

(b) Find its first entry. **1**

(c) Find its second entry and interpret the two entries. **2**

38. A factory receives 75% of items from A and the rest from B. Their defect rates are 2% and 5% respectively.

(a) Find P(A and defective). **1**

(b) Find the overall defect probability. **1**

(c) Given an item is defective, find the probability it came from B. **2**

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