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CLASS 12 APPLIED MATHEMATICS - PRACTICE QUESTIONS

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CLASS 12

Applied Mathematics

Sample Paper 3 - 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. Calculate the central three-period moving average for observations 28, 32, 36. **1**

(A) 33 (B) 34 (C) 31 (D) 32

2. Maximise Z = x + y with x >= 0, y >= 0 and x + y <= 30. State the maximum value. **1**

(A) 30 (B) 32 (C) 29 (D) 31

3. An observation is 88, the mean is 50 and standard deviation is 19. Calculate its standard score. **1**

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

4. The inverse demand function is $p=29-q$ for $q\geq 0$. At market price 23, calculate consumer surplus. **1**

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

5. A 100-litre tank initially contains only juice. Twice, 10 litres of well-mixed liquid are removed and replaced with water. Calculate the fraction of original juice remaining. **1**

(A) -19/100 (B) 281/100 (C) 81/100 (D) 181/100

6. For cost $C(x) = x^2 + 38x + 100$, find marginal cost $C'(5)$. **1**

(A) 49 (B) 48 (C) 50 (D) 47

7. Determine the value of the integral from 0 to 1 of $60x^2$ dx. **1**
(A) 22 (B) 20 (C) 19 (D) 21

8. A binomial random variable has n = 23 and p = 0.2. Calculate its mean. **1**
(A) 28/5 (B) 33/5 (C) 23/5 (D) 18/5

9. Calculate the determinant of [[20,1],[1,21]]. **1**
(A) 418 (B) 420 (C) 421 (D) 419

10. A random sample of 25 observations from a normal population has mean 73 and sample standard deviation 5. For H0: mu=70, calculate the one-sample t statistic. **1**
(A) 3 (B) 5 (C) 2 (D) 4

11. For $f(x) = 21x^3$, calculate f'(2). **1**
(A) 253 (B) 254 (C) 251 (D) 252

12. Calculate the present value of Rs 20000 due in two years at a 10% annual discount rate. Round to two decimal places. **1**
(A) 16528.93 (B) 16530.93 (C) 16527.93 (D) 16529.93

13. 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) -51/100 (B) 49/100 (C) 149/100 (D) 249/100

14. For $f(x) = 25x^3$, calculate f'(2). **1**
(A) 302 (B) 300 (C) 301 (D) 299

15. Calculate the determinant of [[25,1],[1,26]]. **1**
(A) 651 (B) 649 (C) 648 (D) 650

16. The inverse demand function is p=33−q for q≥0. At market price 27, calculate consumer surplus. **1**
(A) 19 (B) 17 (C) 18 (D) 20

17. A binomial random variable has n = 27 and p = 0.5. Calculate its variance. **1**
(A) 31/4 (B) 27/4 (C) 23/4 (D) 35/4

18. Calculate the present value of Rs 26000 due in two years at a 10% annual discount rate. Round to two decimal places. 1
(A) 21488.6 (B) 21486.6 (C) 21487.6 (D) 21489.6

19. For cost $C(x) = x^2 + 36x + 100$, find marginal cost C'(5). 1
(A) 48 (B) 47 (C) 46 (D) 45

20. Determine the value of the integral from 0 to 1 of $66x^2$ dx. 1
(A) 21 (B) 22 (C) 23 (D) 24

Section B - Short responses

21. A random sample of 25 observations from a normal population has mean 76 and sample standard deviation 5. For H0: mu=73, calculate the one-sample t statistic. 2

22. An observation is 92, the mean is 50 and standard deviation is 21. Calculate its standard score. 2

23. Calculate the central three-period moving average for observations 35, 39, 43. 2

24. Maximise Z = x + y with x >= 0, y >= 0 and x + y <= 29. State the maximum value. 2

25. Calculate the determinant of [[23,1],[1,24]]. 2

Section C - Short responses

26. Calculate the present value of Rs 25000 due in two years at a 10% annual discount rate. Round to two decimal places. Show the governing rule, substitution and conclusion clearly. 3

27. 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. Show the governing rule, substitution and conclusion clearly. **3**

28. For cost $C(x) = x^2 + 48x + 100$, 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**

29. For $f(x)=24x^3$, determine $f'(x)$. Calculate the equation of the tangent at $x=2$, showing the point and slope used. **3**

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

31. A random sample of 25 observations from a normal population has mean 71 and sample standard deviation 5. For H0: mu=69, calculate the one-sample t statistic. Use a two-sided 5% test with critical t=2.064 and state your decision. **3**

Section D - Extended responses

32. 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**

33. 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**

34. 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**

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 $C(x)=x^2-14x+79$, $x\geq 0$.

(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 $X=[[5],[6]]$.

(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 65% 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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