

CBSE Class 12 Applied Mathematics 2026 - Set 465



Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours

Maximum Marks: 80

General Instructions

- (i) This question paper contains 38 questions. All questions are compulsory.
- (ii) This question paper is divided into five Sections A, B, C, D and E.
- (iii) In Section A, Questions no. 1 to 18 are multiple choice questions (MCQs) and questions number 19 and 20 are Assertion-Reason based questions of 1 mark each.
- (iv) In Section B, Questions no. 21 to 25 are very short answer (VSA) type questions carrying 2 marks each.
- (v) In Section C, Questions no. 26 to 31 are short answer (SA) type questions carrying 3 marks each.
- (vi) In Section D, Questions no. 32 to 35 are long answer (LA) type questions carrying 5 marks each.
- (vii) In Section E, Questions no. 36 to 38 are case study based questions carrying 4 marks each.
- (viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.
- (ix) Use of calculators is not allowed.

Section A

1.

The real x for which $2(2x + 3) - 10 < 6(x - 2)$ is:

- (A) $x > 2$ (B) $x > 3$
(C) $x > 4$ (D) $x > -4$

2.

The number of all possible matrices of order 3×2 with each entry 1 or 2 is:

- (A) 6 (B) 16
(C) 24 (D) 64

3.

If $AB = A$ and $BA = B$, then $(B^2 + B)$ is equal to:

- (A) $2A$ (B) O
(C) $2I$ (D) $2B$

4.

The value of $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$ is:

- (A) 5 (B) -7
(C) 9 (D) 0

5.

General solution of differential equation $y \log y \, dx - x \, dy = 0$ is:

- (A) $y = \log |cx|$ (B) $y = e^{|cx|}$
(C) $y = e^{c+x}$ (D) $\log y = |c + x|$

6.

If $\int_0^{40} \frac{dx}{2x+1} = \log k$, then the value of k is:

- (A) 3 (B) 9
(C) $\frac{9}{2}$ (D) $\frac{3}{2}$

7.

If $x = t^2$ and $y = t^3$, then $\frac{d^2y}{dx^2}$ is equal to:

- (A) $\frac{3}{2}$ (B) $\frac{3}{4t}$
(C) $\frac{1}{2t^2}$ (D) $\frac{3}{2t}$

8.

The rate of change of the area of a circle with respect to its radius r (in cm^2/s), when $r = 6$ cm, is:

- (A) 10π (B) 12π
(C) 8π (D) 11π

9.

Let X be a discrete random variable, then the variance of X is :

- (A) $E(X^2)$ (B) $E(X^2) - [E(X)]^2$
(C) $E(X^2) + [E(X)]^2$ (D) $\sqrt{E(X^2) - [E(X)]^2}$

10.

If ' m ' is the mean of a Poisson distribution, then its variance is given by:

- (A) m^2 (B) $\sqrt{m}$
(C) m (D) $\frac{m}{2}$

11.

The total area under a standard normal curve is:

- (A) 1 (B) $\sqrt{2}$
(C) 2 (D) $\frac{1}{2}$

12.

For the purpose of t-test of significance, if a random sample of size 34 is drawn from a normal population, then the degree of freedom (ν) is:

- (A) 32 (B) 33
(C) 34 (D) 35

13.

The range of variable t of the t -distribution is:

- (A) (0, 1) (B) (1, 2)
(C) $(-\infty, \infty)$ (D) $(-\infty, \infty)$

14.

The present value of a perpetuity of ₹ R payable at the end of each period, when the money is worth i per period is:

- (A) Ri (B) $R + \frac{R}{i}$
(C) $\frac{R}{i}$ (D) $R - Ri$

15.

Using flat rate method, the EMI to repay a loan of ₹20,000 in $2\frac{1}{2}$ years at an interest rate of 8% per annum is:

- (A) ₹700 (B) ₹800
(C) ₹900 (D) ₹100

16.

If an investment of ₹10,000 becomes ₹60,000 in 4 years, then the Compound Annual Growth Rate (CAGR) is:

- (A) $\frac{\sqrt[4]{6} - 1}{100}$ (B) $\frac{\sqrt[4]{6} + 1}{100}$
(C) $(\sqrt[4]{6} - 1) \times 100$ (D) $(\sqrt[4]{6} + 1) \times 100$

17.

A machine costs ₹45,000 with an estimated useful life of 5 years and a scrap value of ₹10,000. The annual depreciation of the machine is:

- (A) ₹8,000 (B) ₹7,000
(C) ₹6,000 (D) ₹5,000

18.

The maximum value of the function $z = 7x + 5y$, subject to the constraints $x \leq 3, y \leq 2, x \geq 0, y \geq 0$ is:

- (A) 10 (B) 21
(C) 31 (D) 29

19.

Assertion (A): $\int \frac{1}{\sqrt{9-x^2}} dx = \sin^{-1} \frac{x}{3} + C$
Reason (R): $\int \frac{1}{\sqrt{a^2-x^2}} dx = \sin^{-1} \frac{x}{a} + C$

- (A) Both Assertion (A) and Reason (R) are true and 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.

20.

Assertion (A): In sinking fund, a fixed amount at regular intervals is deposited.

Reason (R): In Savings Bank Account, any amount, any time can be deposited.

- (A) Both Assertion (A) and Reason (R) are true and 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.

21.

A man in a boat goes 12 km downstream and comes back to the starting point by rowing non-stop in a total time of 3 hours. If the speed of the stream is 3 km/h, find the speed with which the man can row the boat in still water.

22(a).

Solve the following differential equation: $\frac{dy}{dx} = \frac{2-y}{x+1}$

OR

22(b).

If $\int_a^b x^3 dx = 0$ and $\int_a^b x^2 dx = \frac{2}{3}$, then find the values of 'a' and 'b'.

23(a).

For a Poisson distribution, if mean (m) = 1, then find $P(r = 1)$.

OR

23(b).

Find the mean and standard deviation of the Binomial distribution $B\left(4, \frac{1}{3}\right)$.

24.

Calculate 3-yearly moving averages for the following data:

Years (t)	Variables (x)
2013	3
2014	5
2015	7
2016	10
2017	12
2018	14
2019	15
2020	16

25.

A man takes a personal loan of ₹2,00,000 at an interest rate of 15% p.a. compounded monthly, to be repaid by equal monthly instalments in 4 years. Calculate the EMI, using reducing balance method. [Given: $(1.0125)^{-48} = 0.55$]

26(a).

- (i) Apply addition modulo to positive integers 17 and 13 for modulo 30.
 (ii) Find subtraction modulo 8 for numbers 11 and 3.

OR

26(b).

Three pipes A, B and C can together fill a tank in 8 hours. After working at it together for 2 hours, B is closed and A and C fill the remaining part in 9 hours. Determine the time in which pipe B alone can fill the tank.

27.

Using Cramer's rule, show that the following system of linear equations is consistent and hence solve it:

$$2x - 3y + 5z = 11$$

$$3x + 2y - 4z = -5$$

$$x + y - 2z = -3$$

28(a).

Find the intervals in $\mathbb{R}$ for which the function $f(x) = x^4 - 2x^2$ is increasing or decreasing.

OR

28(b).

Find: $\int \frac{2x + 1}{18 - 4x - x^2} dx$

29.

A soap manufacturing company was distributing a particular brand of a soap through a large number of retail shops. Before a heavy advertisement campaign, the mean sales per week per shop was 140 dozen. After the campaign, a sample of 26 shops was taken and mean sales was found to be 147 dozen with standard deviation 16. Can you consider the advertisement campaign effective? [Given $t_{25}(0.05) = 2.06$]

30.

A company XYZ Ltd. has issued a bond having a face value of ₹10,000 paying annual dividend at 8.5% p.a. The bond will be redeemed at par at the end of 10 years. Find the purchase value of this bond, if the investor wishes a yield rate of 8%. [Given: $(1.08)^{-10} = 0.46319349$]

31.

Solve the following Linear Programming Problem (LPP) graphically:

$$\text{Maximize } z = 3x + 5y$$

subject to the constraints:

$$x + 2y \leq 2000$$

$$x + y \leq 1500$$

$$y \leq 600$$

$$x \geq 0, y \geq 0$$

32.

Solve the following inequation:

$$\frac{2x-1}{12} - \frac{x-11}{3} < \frac{3x+1}{4}, x \in R$$

33(a).

Find the consumer's surplus for the demand function $p = 25 - x - x^2$, where the prevailing market price $p_0 = 19$.

OR

33(b).

Solve the following initial value differential equation:

$$(x-1)\frac{dy}{dx} = 2xy, \text{ when } y(2) = 1.$$

34(a).

Two cards are drawn at random and one by one with replacement from a well-shuffled pack of 52 playing cards. Find the probability distribution of the number of aces. Also, find its mean and variance.

OR

34(b).

It is given that 2% of the screws manufactured by a company are defective. Use Poisson distribution to find the probability that a packet of 100 screws contains (i) no defective screw, (ii) one defective screw.

35.

Mr. Arya wants to know the amount he should pay for a gold mine expected to yield an annual return of ₹4 lakh for the next 10 years, after which it will be worthless. Find the amount he should pay for the mine, if he wants to yield 18% annual return on his investment and also set up a sinking fund to replace the purchase price. Assume that the sinking fund earns 10% annually. [Use $(1.1)^{10} = 2.5937$]

36.

Case Study – 1

Three schools A, B and C organised a mela for collecting funds for helping the rehabilitation of flood victims. They sold hand-made fans, mats and plates from recycled material at a cost of ₹25, ₹50 and ₹10 each respectively. The number of articles sold are given below:

School \ Articles	A	B	C
Hand-made fans	50	30	35
Mats	60	35	40
Plates	40	50	25

Based on the above information, answer the following questions:

36(i).

What is the price matrix?

36(ii).

What is the sales matrix?

36(iii)(a).

What is the matrix of funds collected by School B?

OR

36(iii)(b).

What is the total amount of funds collected by Schools A and C?

37.

Case Study – 2

When observed over a long period of time, a time series data can predict trends that can forecast increase or decrease or stagnation of a variable under consideration. Such analytical studies can benefit a business for forecasting or prediction of future estimated sales or production.

Mathematically, for finding a line of best-fit to represent a trend, many methods are available. Methods like moving averages and least squares are some of the techniques to predict such trends. Mr. Nitin runs a soap-making factory and the record of his sales of soaps for the period 2018 – 2024 is as follows:

Year	Sales (in ₹ thousands)
2018	80
2019	90
2020	92
2021	83
2022	94
2023	99
2024	92

Based on the above information, answer the following questions:

37(i).

Obtain the trend line to the given data.

37(ii).

Find the average change in the sales.

37(iii)(a).

Find the sum of the differences between the actual sales and the trend values (for 2018 – 2024).

OR

37(iii)(b).

What are the expected sales for the year 2025?

38.

Case Study – 3

A man has ₹15,000 for purchasing rice and wheat. A bag of rice and a bag of wheat cost ₹1,800 and ₹1,200 respectively. He has a storage capacity of 10 bags. He earns a profit of ₹100 and ₹90 per bag of rice and wheat respectively. Assuming that he can sell all the items that he can buy, he purchases x bags of rice and y bags of wheat.

Based on the above information and by formulation of Linear Programming Problem (LPP), answer the following questions:

38(i).

Write the objective function which represents the total profit from the sale of total bags of both types.

38(ii).

Write the constraints that relate the total cost of both types of bags.

38(iii)(a).

How many bags of each type should the man buy to get maximum profit?

OR

38(iii)(b).

Find the profit that the man can earn by selling all the bags.

- End of Question Paper -