

O. P. JINDAL SCHOOL, SAVITRI NAGAR
Half Yearly Examination (2025 – 2026)

Class: XI

Subject: Applied Mathematics

MM: 80

Time: 3 Hrs.

Fifteen Minutes Extra will be for reading the Question Paper.

General Instructions:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment (4 marks each) with sub parts.

SECTION A

(This section comprises of Multiple Choice Questions (MCQ) of 1 mark each)

1. Which of the following binary numbers is equivalent to decimal number 54?
 (a) 110110 (b) 110010 (c) 101110 (d) 101110
2. Which of the following decimal numbers is equivalent to binary number 110101?
 (a) 57 (b) 53 (c) 55 (d) 51
3. The sum of binary numbers 11010 and 11011 is :
 (a) 110101 (b) 111101 (c) 101101 (d) 100111
4. If $\log(3x + 1) = 3$, then the value of x is :
 (a) 999 (b) 333 (c) $\frac{1}{33}$ (d) 33
5. If $\log 325.6 = 2.5127$, then $\log 0.03256$ is
 (a) -2.5127 (b) -1.5127 (c) $\bar{2.5127}$ (d) $\bar{2.5127}$
6. The value of $2 \log 2 + \log 5 - \frac{1}{2} \log 36 - \log \frac{1}{30}$ is:
 (a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\log 2$
7. If $\left(\sqrt{\frac{3}{5}}\right)^{x+1} = \frac{125}{27}$ then x is equal to
 (a) 7 (b) -7 (c) $\frac{1}{7}$ (d) 6
8. How many odd days are there in a century?:
 (a) 2 (b) 3 (c) 4 (d) 5
9. January 1, 2007, was Monday. What day of the week was January 1, 2008?
 (a) Monday (b) Tuesday (c) Wednesday (d) Sunday
10. If each observations of the data is decreased by 5, then their mean
 (a) remains same (b) is increased by 5
 (c) is decreased by 5 (d) becomes 5 times the original mean

11. A train is running at 72 km/h crosses a pole in 6 seconds. What is the length of the train?

(a) 100 m (b) 110 m (c) 120 m (d) 130 m

12. The 16th term from end of the A.P. 2, 5, 8,302 is-

(a) 263 (b) 254 (c) 257 (d) 260

13. If $(x - 2, y + 5) = (-2, -13)$ are two equal ordered pairs, then values of x and y are

(a) $x = 0, y = -8$ (b) $x = 4, y = -8$
(c) $x = 0, y = -18$ (d) $x = 4, y = -18$

14. Write the following set in roster form:

$$A = \{x \mid x \text{ is a positive integer less than } 10 \text{ and } 2x - 1 < 10\}$$

(a) {1, 2, 3, 4, 5, 6} (b) {1, 3, 5, 7, 9} (c) {1, 2, 3, 4, 5} (d) {1, 2, 3, 4}

15. If $A = \{1, 2, 3, 4\}$, then number of proper subsets of A are

(a) 16 (b) 15 (c) 7 (d) 3

16. The sum of an infinite G.P. 12, 6, 3, 3/2,

(a) 36 (b) 24 (c) 22.5 (d) Not defined

17. In a group of 70 people, 52 likes soft drinks, 37 likes tea and each person likes atleast one of the two drinks. Then the number of persons who likes both the drinks are

(b) 15 (b) 19 (c) 20 (d) 18

18. The product of 5 terms of a G.P. whose 3rd term is 2 is:

(a) 5^2 (b) 2^5 (c) 3^5 (d) 3^2

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(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)** : If $\log_{2x-1} 343 = 3$, then $x = 4$

Reason (R) : If $\log_a b = x$, then $a^x = b$

(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.

20. **Assertion (A)** : The year 1900 is a Leap year.

Reason (R) : If a non century year is divisible by 4, then it is a Leap year.

(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

SECTION B

(This section comprises of very short answer type-questions (VSA) of 2 marks each)

21. Find the angle between the hands of a clock at 3:40 pm?

22. Simplify: $(81)^{\frac{3}{4}} - \left(\frac{1}{32}\right)^{-\frac{2}{5}} + (8)^{\frac{1}{3}} \left(\frac{1}{2}\right)^{-1} (2)^0$

OR

Solve for x : $\log_2(x^2 - 1) = 3$

23. A person travels at 40 km/h for 2 hours and then travels 100 km at 50 km/h. Find his average speed.

24. Let $U = \{x : x \in \mathbb{N}, x \leq 9\}$; $A = \{x : x \text{ is an even number, } 0 < x < 10\}$; $B = \{2, 3, 5, 7\}$.
 Find $(A \cup B)'$

OR

Write the power set of set A where $A = \{3, 4, 5\}$

25. What is the sum of all 3 digit numbers which are divisible by 7?

SECTION C

(This section comprises of short answer type questions (SA) of 2 marks each.)

26. A, B and C together can do a piece of work in 15 days. B alone can do it in 30 days and C alone can do it in 40 days. In how many days will A alone will do the work?

27. Two trains of length 140m and 110m are running in opposite directions. They cross each other in 6 seconds. If the speed of the first train is 80 km/h, find the speed of the second train?

28. The average of 25 observations is 27. If one observation is included, the average still remains 27. Find the included observation.

OR

The average height of 10 students is 151.8 cm. Two more students of heights 157.6cm and 154.4 cm join the group. What is the new average height?

29. If A and B are any two subsets of a universal set U , Draw a suitable Venn diagram for each of the following:

(i) $(A \cup B)'$ (ii) $A' \cap B'$ (iii) $A' \cup B'$

30. The ratio of the sum of n terms of two A.P.'s is $(7n - 1) : (3n + 11)$. Find the ratio of their 10th terms. **OR**

OR

If a, b, c are p th, q th and r th terms respectively of an A.P., prove that:

$$p(b - c) + q(c - a) + r(a - b) = 0$$

31. The sum of first three terms of a G.P. is $\frac{39}{10}$ and their product is 1. Find the common ratio and the terms of G.P.

SECTION D

(This section comprises of long answer-type questions (LA) of 5 marks each)

32. A person sends a fake news on WhatsApp to 4 of his friends on Monday. Each of those 4 friends forward the fake news to 4 of their other friends on Tuesday. Each person who receives the fake news on Tuesday send it to 4 of their other friends on Wednesday and this process goes on for whole week. After a week a leading news agency verifies the news and finds it to be fake. How many people will receive this fake news on Sunday? Find the total number of people who have received the fake news on WhatsApp till then?

33. Calculate the compound interest earned on Rs. 300000 for 5 years at the rate of 10% p.a. compounded quarterly? (Calculate using log tables)

OR

A new machine costs Rs. 640000. Its price depreciates at the rate of 10% p.a. What will be the price of machine after 7 years? (Calculate using log tables)

34. In a survey of 25 students , it was found that 12 have taken Physics 11 have taken Chemistry and 15 have taken Mathematics 4 have taken Physics & chemistry and 9 have taken Physics and Mathematics 5 have taken Chemistry and Mathematics while 3 have taken all the three subjects. Find the numbers of students who have taken.

- (i) Physics only. (ii) Chemistry only.
- (iii) Mathematics only. (iv) Physics and Chemistry but not Mathematics.
- (v) Physics and Mathematics but not Chemistry. (vi) Only one of the subjects.
- (vii) At least one of the three subjects. (viii) None of the three subjects.

35. A alone can do a piece of work in 6 days while B alone can do the same work in 8 days. They worked together for 2 days and then B left the work. How many days will A require to finish the remaining work?

OR

A train travels 25% faster than a car. Both travels between A and B which are 120 km apart. Both start from A at the same time and reach the point B at the same time. However train lost 18 minutes while stopping at the stations. Find the speed of train and the car

SECTION E

(This section comprises of 3 case based questions of 4 marks each with two or three sub-parts.)

36. **Case-Study 1:** Read the following passage and answer the questions given below.

Nine girls A, B, C, D, E, F, G, H and I are sitting in a row. D is sitting second to the right of E and C is sitting third to the right of E. B is sitting at one end of the row. H is sitting between F and G. B is sitting third to the right of F. F is sitting to the immediate right of A.

Based on the above information, answer the following questions:

- (ii) Write the seating arrangement [2 Marks]
- (iii) Which girl is sitting exactly in the middle of all the girls? [1 Mark]
- (iv) How many girls are seated between E and H?

OR

Who is sitting to the right of E?

[1 Mark]

37. **Case-Study 2:** Read the following passage and answer the questions given below

An auditorium has 20 seats in the first row, 24 seats in the second row, 28 seats in the third row and so on. Based on the above information, answer the following questions:

- (i) How many seats are there in the 16th row? [1 Mark]
- (ii) If there are 116 seats in the last row, find the number of rows in the auditorium? [1 Mark]
- (iii) The hall was full on last Saturday for a show, how much was the total collection for the show if cost of ticket per person was Rs. 200?

OR

If the first row is kept reserved for Guests and relatives, what will be the collection per show, if all the remaining seats are sold at premium cost of Rs. 250 per seat? [2 Marks]

38. **Case-Study 3:** Read the following passage and answer the questions given below

Sonu draws a square of side 8 cm. He then draws another square by joining the mid points of sides of first square. He then again draws another square by joining the mid points of sides of second square and he continued this process.

Based on the above information, answer the following questions:

- (i) What is the area of second square? [1 Mark]
- (ii) What is the area of third square? [1 Mark]
- (iii) What is the length of side of 7th number square?

OR

Find the sum of areas of all the squares, if the process is continued indefinitely?

[2 Marks]