SPECTRA SAMPLE PAPER 2025-26
SPECTRA CLASSES
CLASS -11th (APPLIED MATHEMATICS)

TIME: 3HRS **MARKS:80**

INSTRUCTIONS:

Read the following instructions very carefully and strictly follow them:

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 no. 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
vii. each.
viii. In Section E, Questions no. 36 to 38 are case study/passage -based questions carrying 4 marks each.
ix. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 1 questions in Section C, 2 questions in Section D.
x. Use of calculators is not allowed.

SECTION - A

(This section comprises of Multiple-Choice questions (MCQs) of 1 mark each) **(1 × 20 = 20 Marks)**

Select the correct option (Q1 - Q18):

1. Convert the binary number 111011 to a decimal number.

   (*a*) $(59)_{10}$ (*b*) $(39)_{10}$ (*c*) $(79)_{10}$ (*d*) $(99)_{10}$

2. The average of ten numbers is 7. If each number is multiplied by 12 , then what is the new average

   (*a*) 80 (*b*) 85 (*c*) 84 (*d*) 90

3. Write the set D in roster from: $D = \{x : x \text{ is a multiple of 3 between 10 and 20}\}$.

   (*a*) {12, 15} (*b*) {12, 18} (*c*) {9, 12, 15, 18} (*d*) {12, 15, 18}

4. Find odd one out of the following: 41, 43, 47, 53, 61,71, 75, 83

(a) 75 (b) 73 (c) 71 (d) 53

5. Evaluate the following limit: $\lim_{x\to 0}\frac{\sqrt{1+x}+\sqrt{1-x}}{1+x}$

(a) 0 (b) 1 (c) 2 (d) 3

6. Two cards are drawn from a well -shuffled pack of 52 cards without replacement. Write the number of possible outcomes.

(a) 826 (b) 926 (c) 1026 (d) 1326

7. When it comes to comparing two or more distribution, we consider

(a) Absolute measures of dispersion (b) Relative measures of dispersion

(c) Both (1) and (2) (d) Either (1) or (2)

8. Find the effective rate of interest that is equivalent to 6% compounded quarterly.

(a) 6.13%. (b) 7.13%. (c) 9.13%. (d) 11.13%.

9. Find the value of x for which the points $A(x,-1)$, $B(2,1)$ and $C(4,5)$ are collinear.

(a) 0 (b) 1 (c) 5 (d) 8

10. The value of $2(256)^{-1/8}$ is

(a) 1 (b) 2 (c) 8 (d) 16

11. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

(a) Sunday (b) Thursday (c) Friday (d) Saturday

12. Raghav has 3 different types of shirts and 2 different types of trousers. Whenever he goes out, he likes to wear a shirt and a trouser. In how many ways can he decide what to wear?

(a) 4 (b) 6 (c) 8 (d) 20

13. In a certain code, a number 18462 is written as BETKO and 7935 is written as RAHU. How is 43857 written in that code?

(a) THEUR (b) TEUHR (c) HEURT (d) THERU

14. Find the derivative of the function w.r.t 'x : $f(x) = \log x^2$

(a) $\frac{2}{x}$ (b) 2x (c) $2x^2$ (d) $\frac{2}{x^2}$

15. A police man fires four bullets on a dacoit. The probability that the dacoit will he killed by one bullet is 0.6. What is the probability that the dacoit is still alive?

(a) 0.0576 (b) 0.0256 (c) 0.0596 (d) 0.0176

16. Following are the wages of 10 workers expressed in INR. 45, 72, 78, 90, 65, 20, 90, 65, 50, 70. Find the coefficient of range.

(*a*) 60.63 (*b*) 61.63 (*c*) 62.63 (*d*) 63.63

17. If the word PORTER can be coded as MBNZQN how can REPORT be written?

(*a*) BNQMNZ (*b*) NMQBNZ (*c*) QMBNZN (*d*) NQMBNZ

18. If 'GLOSSORY' is coded as '97533562' and 'GEOGRAPHY' is coded as '915968402', then 'GEOLOGY' can be coded as:

(*a*) 915692 (*b*) 9157592 (*c*) 9057592 (*d*) 9157591

ASSERTION-REASON BASED QUESTIONS

(Question numbers 19 and 20 are Assertion-Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (*a*), (*b*), (*c*) and (*d*) as given below.) **[1 × 2 = 2]**

(*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):** The relation R in a set A = {1, 2, 3, 4, 5} defined by R = {(x, y) : 5x = y} have the domain {1, 2, 3, 4, 5} and range = {5, 10, 15, 20, 25}.

Reason (R): Domain and range of relation (R) is respectively the set of all first and second entries of the distinct ordered pair of the relation.

20. **Assertion (A):** Let A and B are two independent events.

If P(A) = 0.3 and $P\left(A \cup \overline{B}\right) = 0.8$ then $P(B)$ is $\frac{2}{7}$.

Reason (R): $P\left(\overline{E}\right) = 1 - P(E)$ where E is any event.

SECTION - B

(This section comprises of 5 very short answer (VSA) type questions of 2 marks each.) **[2 × 5 = 10]**

21. 'A' completes a piece of work in 3 days, 'B' completes it in 5 days and 'C' takes 10 days to complete the same work. How long will they take to complete the work, if they work together?

OR

Find the value of x if $\log_{10} x - \log_{10}(2x - 1) = 1$.

22. If $y = e^{x \log a} + e^{(a \log x)} + e^{a \log a}$,, find $\frac{dy}{dx}$

23. A coin is tossed three times. Consider the following events:

A: 'No head appears'

B: Exactly one tail appears

C: Attest two tails appear.

Do they form a set of mutually exclusive and exhaustive events?

24. The Karl Pearson's co-efficient of skewness of a distribution is 0.32, its standard deviation is 6.5 and mean is 29.6. Find the median.

25. Find the compound interest and amount on ₹ 20,000 at 6% per annum compounded quarterly for 4 years.

OR

At what rate of interest per annum compounded semi-annually, will money double itself in 5 years?

SECTION - C

(This section comprises of 6 short answer (SA) type questions of 3 marks each.) **[3 × 6 = 18]**

26. The product of three numbers of A.P. in 224, and the largest numbers is 7 times the smallest, find the sequence.

OR

How many terms of the sequence 3, $\frac{3}{4}, \frac{3}{2}$..... are needed to give the sum $\frac{3069}{512}$?

27. Find the domain and the range of the function, $f(x) = \frac{x-2}{x-3}$

28. A shopkeeper sells three types of seeds A1, A2 and A3. They are sold as a mixture where the proportions are 4 : 4 : 2 respectively. The germination rates of three types of seeds are 45%, 60% and 35%. Calculate the probability.

(*i*) that it will not germinate give that the speed is of type A3.

(*ii*) Of a randomly chosen seed to germinate.

29. Calculate the first four moments about the mean from the following data :

x_i:	7	8	9	10	11
f_i:	1	2	3	2	1

OR

The marks of 25 students in an examination are given below:

Marks:	16	20	25	28	32	35	38	42	45	49
Number of students:	2	3	1	2	4	2	6	1	2	2

Find the percentile rank of 38 marks.

30. A company purchases raw materials worth ₹1,00,000 and incurs transportation charges of ₹10,000. The GST rate on raw materials is 12%, and the transportation service is taxed at 5%. The company sells the final product for ₹1,50,000 at 18% GST.Find the total input tax credit (ITC) and the net GST payable to the government.

31. What is the nominal rate of interest per annum, which has effective rate of interest of 10%.

SECTION - D

(This section comprises of 4 long answer (LA) type questions of 5 marks each) **[4 × 5 = 20]**

32. What was the day of the week on 15th August, 1947?

OR

'P' can complete a work in 12 days by working 8 hours a day. 'Q' can complete the same work in 8 days by working 10 hours a day. If both 'P' and 'Q' work together, working 8 hours a day, in how many days can they complete the work ?

33. (*i*) How many words can be formed with the letters of the word, 'HARYANA' How many of these

(*ii*) Have H and N together

(*iii*) Begin with H and end with N?

(*iv*) Have 3 vowels together?

34. Following are the marks of the 10 students: 56, 48, 65, 35, 42, 75, 82, 60, 55, 50. Find the coefficient of quartile deviation.

35. Find Cov(x, y) between x and y if :

x	3	4	5	6	7
y	8	7	6	5	4

OR

If for two variable x and y, the covariance, variance of x and variance of y are 40, 16 and 256 respectively, what is the value of the correlation coefficient?

SECTION - E

Directions (36-38) Read the following passage and answer the given questions. **[4 × 3 = 18]**

Passage – 1

36. The sum of some terms of a G.P. is 315, whose first term and the common ratio are 5 and 2, respectively.

(*i*) Find the number of terms?

(*a*) 2 (*b*) 4 (*c*) 6 (*d*) 8

(*ii*) Find the last term

(*a*) 120 (*b*) 160 (*c*) 180 (*d*) 200

Passage– 2

37. Consider a curve $y=\frac{x+1}{x-1}$

(*i*) $\frac{dy}{dx}$ is equal to?

(*a*) $\frac{-2}{(x-1)}$ (*b*) $\frac{-2}{(x-1)^2}$ (*c*) $\frac{1}{(x-1)^2}$ (*d*) $\frac{-4}{3(x-1)^2}$

(*ii*) What is the value of $\frac{dy}{dx}$ at $y = 3$?

(*a*) -2 (*b*) $\frac{-1}{2}$ (*c*) 3 (*d*) 13

38. Find the values of k for which the line $(k-3)x-(4-k^2)y+k^2-7k+6=0$ is :

(i) Parallel to the x-axis. [1]

(ii) Parallel to they y-axis. [1]

(iii) Passing through the origin. [2]