

**DAV BR PUBLIC SCHOOL, BINA**  
**PRACTICE PAPER SESSION 2023-24**  
**Class XI Subject: APPLIED MATHEMATICS**

**Time Allowed 3 HRS**

**MM: 80**

**General Instructions:** 1. This question paper contains five sections A, B, C, D and E. Each section is compulsory.

**Section - A** carries 20 marks weightage, **Section - B** carries 10 marks weightage, **Section - C** carries 18 marks weightage, **Section - D** carries 20 marks weightage and **Section - E** carries 3 case-based with total weightage of 12 marks.

**Section – A:** 3. It comprises of 20 MCQs of 1 mark each.

**Section – B:** 4. It comprises of 5 VSA type questions of 2 marks each.

**Section – C:** 5. It comprises of 6 SA type of questions of 3 marks each.

**Section – D:** 6. It comprises of 4 LA type of questions of 5 marks each.

**Section – E:** 7. It has 3 case studies. Each case study comprises of 3 case-based questions, where 2 VSA type questions are of 1 mark each and 1 SA type question is of 2 marks. Internal choice is provided in 2 marks question in each case-study. 8. Internal choice is provided in 2 questions in Section - B, 2 questions in Section – C, 2 questions in Section - D. You have to attempt only one of the alternatives in all such questions.

**SECTION - A**

- 1 Which of the following is the decimal of the binary number  $(11101001)_2$  is. 1  
(a) 233      (b) 231      (c) 321      (d) 333
- 2 The centre of the circle  $4x^2 + 4y^2 + 12x - 16y - 20 = 0$  1  
(a)  $(-3, 4)$    (b)  $(3, -4)$    (c)  $(4, -3)$    (d)  $(-4, 3)$
- 3 If the parabola  $y^2 = 4ax$  passes through the point  $(3,6)$ , then the length of its latus rectum is 1  
(a) 3      (b) 6      (c)  $\frac{1}{3}$       (d)  $\frac{1}{6}$
4. If  $f(x) = [x]$  (greatest integer function) then the value of  $[7.1] - [-2.3]$  is 1  
(a) 5      (b) 9      (c) 10      (d) 4
5. Six persons P, Q, R, S, T and U are sitting in a circle with their faces towards the centre. S is on the immediate left of T, P is on the immediate left of S and U is immediate neighbour of T, R is sitting second to the right of U. who is between P and T 1  
(a) R      (b) S      (c) Q      (d) U
6. What was the day of the week on 28<sup>th</sup> May, 2006?  
(a) Sunday      (b) Saturday      (c) Thursday      (d) Friday

7. The range of the function  $f(x) = 12 - 3x$ ,  $x \in R$ ,  $x > 0$ . is 1  
 (a)  $(\infty, 12)$  (b)  $(-\infty, 12)$  (c)  $(12, \infty)$  (d)  $(-12, \infty)$
8. The value of  $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$  1  
 (a) 1 (b) -1 (c) 0 (d)  $\infty$
9. If  $f(x) = x - \frac{1}{x}$  then  $f'(x)$  is 1  
 (a)  $1 + \frac{1}{x}$  (b)  $1 - \frac{1}{x}$  (c)  $1 + \frac{1}{x^2}$  (d)  $1 - \frac{1}{x^2}$
10. If  $P(B) = \frac{4}{5}$  and  $P(A \cap B) = \frac{7}{10}$ , then  $P(A/B)$  is equal to 1  
 (a)  $\frac{1}{10}$  (b)  $\frac{1}{8}$  (c)  $\frac{7}{8}$  (d)  $\frac{17}{20}$
11. Which of the following is true for coefficient of correlation  $r$ ? 1  
 (a)  $r > 1$  (b)  $r \leq 1$  (c)  $-1 < r < 1$  (d)  $-1 \leq r \leq 1$
12. The odd one out 8, 27, 64, 100, 125, 216, 343 is 1  
 (a) 27 (b) 100 (c) 125 (d) 343
13. If 'KOLKATA' is coded as 111512111201 then 'MUMBAI' will be coded as 1  
 (a) 1220121268 (b) 132113219 (c) 1422142210 (d) ) 1523152311
14. **Statements I :** All the harmoniums are instruments. 1  
**II :** All the instruments are flutes.  
**Conclusion I :** All the harmoniums are flutes.  
**II :** All the flutes are instruments.
- Which of the following is correct  
 (a) Only conclusion I is true.  
 (b) Only conclusion II is true.  
 (c) Neither conclusion I nor conclusion II is true.  
 (d) Both the conclusions I and II are true.
15. Pointing to a photograph of a boy Suresh said, "He is the son of the only son of my mother." How is Suresh related to that boy? 1  
 (a) Father (b) Uncle (c) brother (d) Cousin
16. The annuity which refers to a debt payment for recovering the initial amount or capital in equal periodical payments, is known as; 1  
 (a) Present Worth Annuity (b) sinking value of annuity  
 (c) Compound annuity (d) Capital recovery annuity
17. The sum lent out at 10% per annum simple interest would produced ₹ 6,000 as interest in 6 years is : 1  
 (a) ₹ 30,000 (b) ₹ 15000 (c) ₹ 10,000 (d) ₹ 36,000

18. At what rate percent per annum will a sum of ₹ 12000 become ₹ 13230 in two years? 1  
 (a) 5%      (b) 5.5%      (c) 6%      (d) 6.5%

For questions 19 and 20, two statements are given – one labelled Assertion(A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below:

- (i) Both A and R are true and R is the correct explanation of the assertion  
 (ii) Both A and R are true but R is not the correct explanation of the assertion  
 (iii) A is true, but R is false  
 (iv) A is false, but R is true
19. **Assertion** : A bag has 3 red balls and 5 green balls. If we take a ball from the bag, then probability of getting red balls only  $\frac{3}{8}$ . 1

**Reason**: Probability of getting red balls = number of red balls/total number of balls

- (a) (i)      (b) (ii)      (c) (iii)      (d) (iv)
20. **Assertion** : Variance of  $2x_1, 2x_2, 2x_3, 2x_4, \dots, 2x_n$  is  $4\sigma^2$  1

**Reasons** : arithmetic mean of  $2x_1, 2x_2, 2x_3, 2x_4, \dots, 2x_n$  is  $4\bar{X}$

- a) (i)      b) (ii)      c) (iii)      d) (iv)

### SECTION – B

(All questions are compulsory. In case of internal choice, attempt any one question only)

21. Solve the following equation for x 2  
 $\log_2(x^2 - 1) = 3$
22. If 'POOR' is coded as 46 and 'BLOWER' is coded as 57 then how is ' TOWER'is coded? 2

OR

Introducing A, B said “ his brother’s father is only son of my grandfather”. How B is related to A?

23. If  $f(x) = \begin{cases} \frac{x^2-1}{x-1}, & x \neq 1 \\ k, & x = 1 \end{cases}$ , find k so that f may be continuous at  $x = 1$ . 2
24. Find the number of permutations of the letter of the word ‘ HYDERRABAD’ 2

OR

A polygon has 44 diagonals. Find the number of its sides.

25. In a school, there are 1000 students, out of which 430 are girls. It is known that out of 430 , 10% of the girls study in class XII. What is the probability that a student chosen randomly studies in class XII given that the chosen student is a girl? 2

### SECTION – C

26. If  $A = \{ 1,2,3,4, \dots, 14\}$  and the relation R is defined from A to A by  $R = \{ (x,y) : 3x - y = 0, x, y \in A\}$ . 3

- (i) Write R in roster form  
(ii) Write its domain, codomain and range.

27. If  $y = \sqrt{\frac{x}{a}} + \sqrt{\frac{a}{x}}$ , prove that  $2xy \frac{dy}{dx} = \frac{x}{a} - \frac{a}{x}$  3

OR

If  $y = x + \frac{1}{x}$ , prove that  $x^2 \frac{dy}{dx} - xy + 2 = 0$

28. Find the mean, standard deviation and variance of the first n natural numbers. 3

29. Find the present value of a sequence of annual payment of ₹ 10000 each, the first being made at the end of 5<sup>th</sup> year and the last being made at the end of 12<sup>th</sup> year, if money is worth 6%.  $[(1.06)^{-4} = 0.7921, (1.06)^{-12} = 0.4971]$  3

30. The test marks of 12 students are given as 22, 23, 25, 22, 24, 27, 28, 24, 30, 33, 24, 27. Find the percentile rank of 25 marks. 3

OR

Find the mean deviation about the median for the following data:

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Number of girls	8	10	10	16	4	2

31. If p is the length of perpendicular from the origin to the line which makes intercepts a, b on axes, prove that  $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$  3

### SECTION - D

32. If a machine is correctly set up, it produces 90% acceptable items. If it is incorrectly set up only 40% items produced are acceptable. Past experience shows that 80% of the set ups are correctly done. If after a certain set up, the machine produces 2 acceptable items, find the probability that the machine is correctly set up? 5

OR

There are two bags. One bag contains six green and three red balls. The second bag contains five green and four red balls. One ball is transferred from the first bag to the second bag. Then one ball is drawn from the second bag. Find the probability that it is a red ball.

33. in a survey of 60 people, it was found that 21 people liked product A, 26 liked product B and 29 liked product C. if 14 people liked product A and B, 12 people liked product C and A, 14 people liked product B and C and 8 people liked all the three products, find 5

- (i) How many people liked product C only?  
(ii) How many people like atleast one of the three product?  
(iii) How many people do not like any of the three products?

34. Find the following data, find the values of a and b and Karl Pearson`s coefficient of correlation : 5

x	10	13	16	A	25	26	30
y	6	8	10	12	B	15	19

35. In a financial year 2019-20, the gross salary of Sanjay (age 29 years) was ₹ 8,50,000 (exclusive HRA) he deposited ₹ 9200 per month in G.P.F. and paid ₹ 43000 as life insurance premium. He donated ₹ 25,000 in Prime Minister Relief Fund. He took a home loan of Rs 24,00,000 from state bank of India and paid ₹ 76000 as interest on home loan and ₹ 20000 as principal of home loan. Calculate his income tax at the end of the financial year.

5

Income tax slab for FY 2019-20

Taxable income	Income tax
Upto ₹ 2,50,000	Nil
₹ 2,50,000 to ₹ 5,00,000	5% of taxable income exceeding ₹ 2,50,000
₹ 5,00,001	₹ 12,500 + 20% of taxable income exceeding ₹ 5,00,000
Above ₹ 10,00,000	₹ 1,12,500 + 30% of taxable income exceeding ₹ 10,00,000

#### SECTION - E

36. Read the Case study given below and attempt any 4 sub parts:

4

A manufacturer listed the price of his goods at ₹ 1600 per article. He allowed a discount of 25% to a wholesaler, who in turn allowed a discount of 20% on the listed price to a retailer. The retailer sells one article to a consumer at a discount of 5% on the listed price. All sells are intra-state and rate of GST is 5%.

Based on the above information, answer the following questions: (any four)

- Find GST paid by the wholesaler
- Find the price per article inclusive of GST paid by the retailer
- Find the amount which the consumer pays for the article

OR

The GST paid by the wholesaler to the State Government for the article

37. An open wooden box has the outer dimensions as length 14 cm, breadth 11 cm and depth 9 cm. the thickness of wood is 1 cm.

4



Based on the above information, answer the following questions: (any four)

- Find the internal length of the box
- Find the internal depth of the box
- Find Capacity of the box

OR

If wooden weighs 0.5 g per cubic centimetre, then find the weight of

the box.

**38. Read the Case study given below and attempt any 4 sub parts:**

**4**

an auditorium has 20 seats in the first row, 24 seats in the second row and 28 seats in the third row and so on.



find the following :

- (i) How many seats are there in 16<sup>th</sup> row?
- (ii) Find the total number of rows in the auditorium if there are 116 seats in the last row.
- (iii) Find the total number of seats in the auditorium?

OR

The hall was full on last Saturday for a show, how much were the total collections for the day, if a ticket was for ₹ 200?