# **BUDHA DAL PUBLIC SCHOOL, PATIALA**

#### FINAL EXAMINATION (19 March 2025)

Class : XI

### Subject : Mathematics (Applied) (241)

#### Time:3hrs.

#### **General Instructions :**

- 1. This Question paper contains five sections A, B, C, D and E. Each section is compulsory.
- 2. Section A has 20 MCQ's questions of 1 mark each.
- 3. Section B has 5 questions of 2 marks each.
- 4. Section C has 6 questions of 3 marks each.
- 5. Section D has 4 questions of 5 marks each.
- 6. Section E has 3 case based questions of 4 marks each.

#### Section – A

Q1. Which of the following number is equivalent to 24?

a) 1101111 b) 11000 c) 111111 d) 11001

Q2. Value of  $\frac{\log 8 - \log 2}{\log 32}$  is

a) 
$$\frac{2}{5}$$
 b)  $\frac{1}{4}$  c)  $-\frac{2}{5}$  d)  $\frac{1}{3}$ 

Q3. Value of  $(256)^{0.16} \times (256)^{0.09}$  is

- a) 4 b) 16 c) 64 d) 256.25
- Q4. It was Thursday on Feb 12, 2004. What was the day of the week on Feb 12, 2003?

a) Friday b) Wednesday c) Saturday d) Tuesday

- Q5. The average of 100 numbers is 50. If one of the number which was 50 is replaced by 150, the new average will be
  - a) 50.5 b) 51 c) 51.5 d) 52
- Q6. Which of the following is a null set?
  - a)  $\{x: x \in N, 2x 1 = 3\}$  b)  $\{x: x \in N, x^2 < 20\}$
  - c) {x: x is an even prime >2 d) { $x: x \in J, 3x + 7 = 1$ }
- Q7. If  $n(A \cup B) = 50$ , n(A) = 38, n(B) = 30, then  $n(A \cap B)$  is
  - a) 30 b) 19 c) 18 d) 20
- Q8. The sum of 11 terms of an A.P. whose 6<sup>th</sup> term is 5 is

a) 44 b) 55 c) 50 d) 66

Q9. If x, x + 3, x + 9 are first three terms of G.P, then x is

a) 1 b) 2 c) 3 d) 4

Q10. Value of  ${}^{15}C_{11}$  is

a) 1456 b) 1365 c) 1563 d) 1653

MM: 80

Q11. The number of possible outcomes when a coin is tossed 6 times

a)  $2^6$  b)  $6^2$  c) Both d) None

Q12. If  $P(A) = \frac{1}{3}$ ,  $P(B) = \frac{1}{2}$  and  $P(A \cup B) = \frac{5}{6}$  then events A and B are

- a) independent b) independent and mutually exclusive
- b) Mutually exclusive d) None of these
- Q13. Variance of first five natural numbers is

b) 1 b) 2 c) 3 d) 4

Q14. At what rate percent per annum will a sum of Rs. 12000 become Rs. 13230 in 2 years?

a) 5% b) 5.5% c) 6% d) 6.5%

Q15. How much maximum deduction is allowed under sec 80 C?

a) Rs. 25,000 b) Rs. 1,00,000 c) Rs. 1,50,000 d) Rs. 10,000

Q16. Health and Education cess is payable on

a) Gross income b) Taxable income c) Income tax d) Education loan

Q17. If parabola  $y^2 = 4ax$  passes through (3, 2), then length of latus rectum is

a) 
$$\frac{2}{3}$$
 b)  $\frac{4}{3}$  c)  $\frac{1}{3}$  d) 4

Q18. If 
$$P(A) = \frac{3}{10}$$
,  $P(B) = \frac{2}{5}$ ,  $P(A \cup B) = \frac{3}{5}$ , then  $P(B/A) + P(A/B)$  is  
a)  $\frac{1}{4}$  b)  $\frac{1}{3}$  c)  $\frac{5}{12}$  d)  $\frac{7}{12}$ 

In the following questions a statements – Assertion (A) and Reason (R). Answer the question selecting appropriate option given below:

- a) Both A and R are true and R is correct explanation for A.
- b) Both A and R are true but R is not correct explanation for A.
- c) A is true but R is false.
- d) A is false but R is true.

Q19. Assertion (A) : If  $f(x) = 2x^4 + 3x^2 + 2x$ , then  $f'(x) = 8x^3 + 6x + 2$ Reason (R) :  $\frac{d}{dx}(x^n) = nx^{n-1}$ 

Q20. Assertion (A):  $4^1 \times 4^{1/3} \times 4^{1/9} \times ... \infty = 8$ Reason (R) =  $S_{\infty} = \frac{a}{r-1}$ , if |r| > 1

#### Section – B

- Q21. If  $A = \{1, 2, 3, 4\}, B = \{3, 4, 5, 6\}$  and  $C = \{1, 3, 5\}$  then verify that  $A (B \cup C) = (A B) \cap (A C)$
- Q22. Ram and Raj together erect a shed in 12 days. Ram alone can do it in 20 days. How much time would Raj take working alone to erect the shed?
- Q23. The sum of three numbers in an A.P. is 24 and their product is 440. Find the numbers.

- Q24. How many words can be made from the letters in the word 'MONDAY' assuming that no letter is repeated if
  - a) 4 letters are used at a time?
  - b) All letters are used at a time?
- Q25. How much will Rs. 25000 amount to in 2 years at a compound interest if the rates for the successive years are 4% and 5% per year?

#### Section – C

- Q26.a) Multiply the binary numbers 11010 by 111
  - b) Divide the given binary numbers 1110101 by 1001

Q27. Let  $A = \{1, 2, 3, 4, 5, 6\}$ . Define a relation R from A to A by  $R = \{(x, y): x > y, x, y \in A\}$ 

- a) Represent above relation in roster form and by an arrow diagram.
- b) Write its domain and range
- Q28. A man saves Rs. 500 in the first month and in successive month he saves twice as much as in the previous month. This process continued for 6 months. From seventh month onwards he is able to save Rs. 500 less than previous month. Find his total savings for the year.
- Q29a) If MADAM is coded as \*?#?\* and LOOM is coded as @%%\*, then how will you code LAD?
  - b) Find A, B, C in A B × 3

САВ

- Q30. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that
  - a) both balls are red
  - b) first ball is black and second is red
  - c) one of them is black and other is red.
- Q31. Find co-ordinates of focus, equation of directrix and length of latus rectum of the conic represented by the equation  $5x^2 = -12y$

### Section – D

- Q32. A man borrows Rs. 10,000 and agrees to pay back in 3 equal instalments of 6 month each. The first payment to be made at the end of 6 months of borrowing. Calculate the value of each instalment if the interest is charged 10% per annum. [Use (1.05)<sup>-3</sup>=0.8638]
- Q33. From following data, find values of a and b and Karl Pearsons' coefficient of correlation

x	10	13	16	а	25	26	30
У	6	8	10	12	b	15	19

Q34. Three machines  $E_1$ ,  $E_2$  and  $E_3$  in a certain factory producing electric bulbs, produce 50%, 25% and 25% respectively, of the total output of electric bulbs. It is known that 4% of the bulbs produced by each machines  $E_1$  and  $E_2$  are defective and that 5% of those produced by machine  $E_3$  are defective. If one bulb is picked up at random from a day's production, calculate the probability that it is defective.

Q35. If the function 
$$f(x) = \begin{cases} 3ax + b, x > 1 \\ 11, x = 1 \\ 5ax - 2b, x < 1 \end{cases}$$
 is

continues at x = 1. Find values of a and b.

### Section – E

### Case Study based questions:

## Q36. Read the following information carefully and answer the questions given below:

Seven friends T, U, V, W, X, Y and Z are sitting around a circular table facing towards centre. Z is second to the left of W and is the neighbour of X and Y. W is not a neighbour of V or X. T is the neighbour of U and V.

a)	Write the seating arrangement.	(2)
b)	Write the neighbours of U.	(1)
c)	Who are the neighbours of X?	(1)

## Q37. Read the following information carefully and answer the questions given below:

In financial year 2019-20, Mr. Narendra Kumar Mani's (age 55 years) income from salary was Rs. 15,00,000 (exclusive of HRA) and income from interest on savings account was Rs. 18600. He deposited Rs. 15000 per month in GPF and paid Rs. 57000 as LIC premium. He donated Rs. 1,00,000 in Prime Minister's National relief fund. He paid Rs. 31,600 as interest on education loan for higher studies of his daughter. He also paid Rs. 2,12,500 as interest on home loan and Rs. 63,450 as principal of home loan.

### Income Tax Slab for Financial Year 2019-20

### (For individual tax payers below the age of 60 years)

Taxable Income	Income Tax
Upto Rs. 2,50,000	NIL
Rs. 2,50,0001 to Rs. 50,00,000	5% of taxable income exceeding Rs. 2,50,000
Rs. 5,00,001 to Rs. 10,00,000	Rs. 12,500 + 20% of taxable income exceeding Rs. 5,00,000
Above Rs. 10,00,000	Rs. 1,12,500 + 30% of taxable income exceeding Rs. 10,00,000

a) Find the amount invested or paid by Mr. Mani under section 80 – C. (2)

b) Under which section PM's National Relief Fund is deducted? (1)

c) Under which section interest on education loan is deducted? (1)

#### **38.** Read the following information carefully and answer the questions given below:

In a survey of 40 students, it was found that 21 had taken Mathematics, 16 had taken Physics and 15 had taken Chemistry, 7 had taken mathematics and Chemistry, 12 had taken Mathematics and Physics, 5 had taken Physics and Chemistry and 4 had taken all the three subjects.

i) Find the number of students who had taken Mathematics only. (2)

ii) Find the number of students who had taken Physics and Chemistry but not Mathematics. (1)

iii) Find the number of students who had taken exactly one of the three subjects. (1)