

BUDHA DAL PUBLIC SCHOOL, PATIALA

FINAL EXAMINATION (10 March 2026)

Class : XI (Set – B)

Subject : Mathematics (Applied) (241)

MM: 80

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. Sum of binary numbers 101101 and 110010 is
a) 101111 b) 1011111 c) 110111 d) 111111
- Q2. The 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. How many odd days are there in 300 years?
a) 0 b) 1 c) 2 d) 3
- Q4. If $A = \{1, 3, 5, B\}$ and $B = \{2, 4\}$, then
a) $4 \in A$ b) $\{4\} \subset A$ c) $B \subset A$ d) None of these
- Q5. If $A = \{1, 2, 3, 4, 5\}$, then number of proper subsets of A is
a) 120 b) 30 c) 31 d) 32
- Q6. If sum of n-terms of an AP is $3n^2 - n$ and its common difference is 6, then its first term is
a) 2 b) 3 c) 1 d) 4
- Q7. If second term of a GP is 2 and sum of its infinite terms is 8, then its first term is
a) $1/4$ b) $1/2$ c) 2 d) 4
- Q8. The number of ways to arrange the letters of the word CHEESE are
a) 120 b) 240 c) 720 d) $6!$
- Q9. If 'BLEPIN' is coded as '987416', 'MATPLN' is coded as '123416' then 'TABLE' is coded as
a) 32987 b) 32987 c) 38987 d) 21987
- Q10. Let A be a finite set containing 3 elements, then the number of functions from A to A is
a) 512 b) 511 c) 27 d) 26
- Q11. If $f(x) = 5^x + \log x$, then $f'(x)$ is
a) $\frac{5^x \log 5}{x}$ b) $x 5^x \log 5$ c) $x 5^x \log 5 + \frac{1}{x}$ d) $\frac{5^x \log 5}{x^2}$

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- Q12. The probability that a non-leap year selected at random is a Wednesday is
- a) $\frac{2}{7}$ b) $\frac{3}{7}$ c) $\frac{1}{7}$ d) $\frac{4}{7}$
- Q13. An urn contains 9 red, 7 white and 4 black balls. A ball is drawn at random. The probability that ball drawn is neither black nor red is
- a) $\frac{13}{20}$ b) $\frac{7}{20}$ c) $\frac{9}{20}$ d) $\frac{11}{20}$
- Q14. A sequence of equal payments made at equal intervals of time is called
- a) term b) annuity c) interest d) principal
- Q15. The distance between the lines $y = mx + c_1$ and $y = mx + c_2$ is
- a) $\frac{c_1 - c_2}{\sqrt{m^2 + 1}}$ b) $\frac{|c_1 - c_2|}{\sqrt{m^2 + 1}}$ c) $\frac{c_2 - c_1}{\sqrt{m^2 + 1}}$ d) 0
- Q16. Deduction of tuition fee of two children is allowed under section
- a) 80C b) 80D c) 80E d) 80TTA
- Q17. The variance of first five natural numbers is
- a) 1 b) 2 c) 3 d) 4
- Q18. $\lim_{x \rightarrow 0} \frac{|x|}{x}$ is equal to
- a) 1 b) -1 c) 2 d) doesn't exist

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) : Mean deviation about median of the following data : 1, 3, 5, 7, 9, 11 is 3.
 Reason (R) : Median of observation 1, 3, 5, 7, 9, 11 is 5
- Q20. Assertion (A): If A & B are independent events such that $P(A) = 0.4$, $P(B) = p$ and $P(A \cup B) = 0.8$, then $p = \frac{2}{3}$
 Reason (R) = For two independent events A and B, $P(A \cup B) = P(A) + P(B)$

Section - B

- Q21. A and B together can dig a pond in 20 days. They worked together for 8 days and then B leaves the work. How long will A take to finish the work if A alone can dig the pond in 30 days?
- Q22. Everybody in a room shakes hand with everybody else. The total number of shake hands is 66. How many people are there in the room?
- Q23. Find the domain of $f(x) = \frac{x+7}{x^2-8x+4}$

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Q24. Evaluate $\lim_{x \rightarrow -3} \frac{x^2 - 9}{\sqrt{x^2 + 16} - 5}$

Q25. What sum of money will amount to Rs. 3704.40 in 3 years at 5% compound interest?

Section – C

Q26. A man borrows Rs. 1000 and agrees to pay back in 3 equal instalments of 6 months 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 $(1.05)^{-3} = 0.8638$]

Q27. Calculate Spearman's rank correlation for the following data and interpret the result.

Marks in Maths	36	48	27	36	29	30	36	39	42	48
Marks in Stats	27	45	24	27	31	33	35	45	41	45

Q28. Find derivative of a) $\frac{x^2-1}{x}$ b) $x^{-3}(5+3x)$

Q29. In a family, there are six members P, Q, R, S, T and U. Q is wife of P. S is the only son of R, who is brother of P. T is sister of S. Q is daughter-in-law of U, who is widow

- How U is related to P?
- How T is related to R?
- How R is related to Q?

Q30. A substance initially weighting 64g is decaying at a rate such that after 8 hours there are only 32 grams remaining. In another 4 hours there are only 16 grams left and after 2 more hours only 8 grams remain. How much time passes before none of the substance remains?

Q31. Find centre and radius of circle of the equation $2x^2 + 2y^2 - 3x + 5y - 7 = 0$

Section – D

Q32a) In an University, out of 100 students 15 offered Mathematics only; 12 offered Statistics only; 8 offered only Physics; 40 offered Physics and Mathematics; 20 offered Physics and Statistics; 10 offered Mathematics and Statistics; 65 offered Physics. By drawing a Venn diagram, find the number of students who

- offered Mathematics
- offered Statistics
- did not offer any of the above three subjects

b) The adjoining diagram shows a relation between the sets P and Q. Write this relation.

- In roster form
- What is its domain and range?

selection is made randomly, committee.

- b) In a school, there are 1000 students, out of which 430 are girls. It is known that 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?

Q34. Find mean, variance and S.D. of

Classes	0-30	30-60	60-90	90-120	120-150	150-180	180-210
Frequencies	2	3	5	10	3	5	2

Q35. a) Find the angle between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$

b) A quadrilateral has vertices at the points (7, 3), (3, 0), (0, -4), (4, -1). Using slopes, show that the mid points of the sides of quadrilateral form a parallelogram.

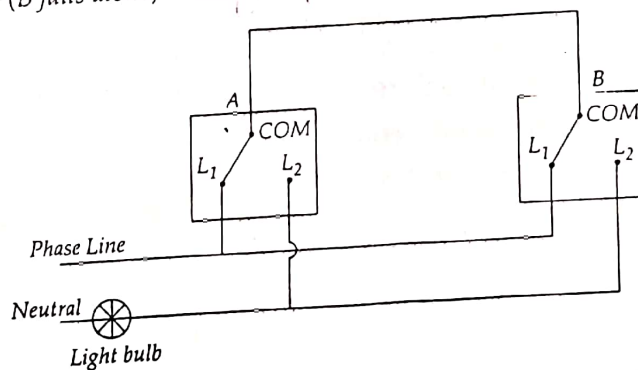
Section - E

Case Study based questions:

36. Following is a circuit diagram showing an electronic assembly consists of two sub-systems say A and B:

From previous testing procedures, the following probabilities are assumed to be known.

$$P(A \text{ fails}) = 0.2; P(B \text{ fails alone}) = 0.15; P(A \text{ and } B \text{ fail}) = 0.15.$$



Based on the above information, answer the following questions:

- (a) What is probability that A fails alone?

OR

What is probability that neither A nor B fails?

- (b) What is conditional probability that A fails given that B has failed?
(c) What is conditional probability that B fails given that A has failed?

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37 Logarithm of a positive real number n has two parts:

- (i) Characteristic (ii) Mantissa.
(i) **Characteristic:** It is an integral part of $\log n$ which may be negative, zero or positive.

If n is greater than or equal to 1, then

characteristic = number of digits to the left of decimal $- 1$.

If n is less than 1, then

characteristic = $-(\text{number of 0's just after the decimal} + 1)$

- (ii) **Mantissa:** It is positive fractional part of $\log n$. It is same for same significant figures in the same order and does not depend on the position of the decimal point.

Based on the above information, answer the following questions:

- (a) If $\log 0.0004598 = \bar{4}.6626$, then find $\log 45.98$,
(b) If $\log 6832 = 3.8345$, then find $\log 0.06832$.
(c) If $\log 712.5 = 2.8528$ and $\log x = \bar{3}.8528$, then find x .

OR

If $\log 0.0009236 = \bar{4}.9653$ and $\log x = 4.9653$, then find x .

38 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 sales are intra-state and rate of GST is 5%.

Based on the above information, answer the following questions:

- (a) Find the price per article inclusive of GST, which the wholesaler pays.
(b) Find the price per article inclusive of GST, which the retailer pays.
(c) Find the GST paid by the wholesaler to the State Government for the article.

OR

Find the GST paid by the retailer to the Central Government for the article.

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