

GREENLAWNS SCHOOL, WORLI
First Semester Examination 2024-25
Mathematics

STD: X
Date: 03/10/2024


Marks: 80
Time: 2½ min

Section A [40 marks]
(Answer all questions from this Section.)

Question 1 Choose the correct answers to the questions from the given options.

(Do not copy the question, write the correct answers only.)

[15]

- i. What will be the nature of the roots of the quadratic equation $5x^2 - 11x + 13$?
a) Imaginary b) Real c) Irrational d) Equal
- ii. The n^{th} term if an AP is $5n + 2$, then the sum of first n terms of the AP will be _____
a) $(n^2 - 8)/2$ b) $(n^2 + 8)/2$ c) $(n^2 - 9)/2$ d) $(n^2 + 9)/2$
- iii. Find the correct trigonometric identity.
a) $\cos^2 \theta = 1 - \sin^2 \theta$ b) $\cos^2 \theta = 1 + \sin^2 \theta$
c) $\tan^2 \theta + \sec^2 \theta = 1$ d) $\tan^2 \theta = \sec^2 \theta + 1$
- iv. The probability of occurring an event is 0.45. Find the probability of not occurring the event.
a) 0.5 b) 0.45 c) 0.55 d) 0.1
- v. Identify the correct solution set of the following number line.
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- a) $\{x : x \in Z, -4 < x < 5\}$ b) $\{x : x \in Z, -4 \leq x \leq 5\}$
c) $\{x : x \in R, -4 \leq x \leq 5\}$ d) $\{x : x \in R, -4 < x < 5\}$
- vi. The traders at each stage always pay GST to the Government on their _____
a) Profits b) C.P. c) Discount d) None of the above
- vii. The fourth proportional to 1.5, 4.5 and 3.5 is
a) 2.5 b) 8.5 c) 10 d) 10.5
- viii. Evaluate $(\operatorname{cosec}^2 \theta - \cot^2 \theta)^2 \cdot (\operatorname{cosec} \theta + \cot \theta)^2$.
a) 1 b) 0 c) $(\operatorname{cosec}^2 \theta - \cot^2 \theta)^2$ d) $(\operatorname{cosec} \theta + \cot \theta)^2$
- ix. What is the name of the event for which the probability is zero?
a) Impossible event b) Random event c) Exhaustive events d) Mutual events

- x. What happens to the angle of elevation if the height of a tower, the distance between the tower and the observer is doubled?
 a) Doubled b) halved c) Tripled d) Remains the same
- xi. Two matrices A and B are multiplied to get AB if
 a) both have same order. b) both are rectangular.
 c) number of columns in matrix A is equal to number of rows in matrix B.
 d) number of rows in matrix A is equal to number of columns in matrix B.
- xii. If $r = 1$ in a G.P. then what is the sum of n terms?
 a) na b) a/n c) $(n-1)/a$ d) $(n+1)/a$
- xiii. Find the Mean, Median, Mode of the following distribution: 8, 10, 7, 6, 10, 11, 6, 13, 10.
 a) 9, 9, 10 b) 9, 10, 10 c) 10, 8, 10 d) 8, 10, 6
- xiv. ₹25 shares of a company are selling at ₹ 20. If the company is paying a dividend of 12%, then the rate of return is:
 a) 10% b) 18% c) 15% d) 12%
- xv. In a single throw of a die, find the probability of getting a number: less than or equal to 4.
 a) $1/3$ b) $2/3$ c) $4/5$ d) $4/7$

Question 2

- (a) Renu has a cumulative deposit account of ₹ 200 per month at 10% per annum. If she gets ₹ 6775 at the time of maturity, find the total time for which the account was held. [4]
- (b) Solve $\frac{2}{3}x = \frac{-1}{6}x^2 - \frac{1}{3}$ giving your answer to 2 significant figures. [4]
- (c) A manufacturer sells a dish washer to a wholesaler for ₹ 18000. The wholesaler sells it to a dealer at a profit of ₹ 1500 and the dealer sells it to a consumer at a profit of ₹ 2500. If the rate of GST is 12% and assuming that all transactions occur within the same state, calculate
 (i) the total amount of GST received by the central and the state governments on the sale of this dish washer from the wholesaler and dealer.
 (ii) the amount paid by the consumer for the dish washer. [4]

Question 3

- (a) Use a graph paper to answer the following questions. (Take 1 cm = 1 unit on both axes)
 (i) Plot A (4, 4), B (4, -6) and C (8, 0) the vertices of a triangle AABC.
 (ii) Reflect ABC on the y-axis and name it as A'B'C'.
 (iii) Write the coordinates of the images A', B' and C'.
 (iv) Give a geometrical name for the figure AA'C'B'BC. [5]

- (b) Prove the identity: $\frac{\sin A}{1 + \cos A} + \frac{1 + \cos A}{\sin A} = 2 \operatorname{cosec} A$ [4]
- (c) Draw histograms for the following distributions and also find mode. [4]

Class	1-10	11-20	21-30	31-40	41-50	51-60
Frequency	7	3	5	2	6	4

Section – B [40 Marks]
(Attempt any four questions)

Question 4

- (a) By purchasing ₹ 25 shares for ₹ 40 each a man gets 4 per cent profit on his investment. What rate per cent is the company paying? What is his dividend if he buys 60 shares? [3]
- (b) The fourth term of an A.P. is 11. The sum of the fifth and seventh terms of the A.P. is 34, find its common difference. [3]
- (c) The numbers from 1-15 are each printed on a counter and the 15 counters are placed in a bag. If one counter is picked at random, what is the probability that the number on it is :
 (i) an odd and even number (ii) perfect square number
 (iii) a prime number (iv) a multiple of 4 [4]

Question 5

- (a) Draw a circle of radius 4.5 cm. Draw two tangents to this circle so that the angle between the tangents is 60° . [3]
- (b) Find the range of values of x which satisfies
 $-2 \frac{2}{3} \leq x + \frac{1}{3} < 3 \frac{1}{3}$; $x \in R$. [3]
 Graph these values of x on the number line.
- (c) Find the missing frequency in the following data if arithmetic mean is 19.92. [4]

Class	4-8	8-12	12-16	16-20	20-24	24-28	28-32	32-36	36-40
Frequency	11	13	16	14	–	9	17	6	4

Question 6

- (a) A boat takes 1 hour longer to go 36 km up a river than to return. If the river flows at 3 km/hr, find the rate at which the boat travels in still water. [4]

(b) Marks scored by 400 students in an examination are as follows:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	10	20	22	40	55	75	80	58	28	12

Draw an ogive and from it determine:

- (i) the median mark,
- (ii) the interquartile range
- (iii) pass marks if 80% of the students pass examination. [6]

Question 7

- (a) Let $M \times \begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix} = [1 \ 2]$, where M is a matrix,
- (i) State the order of the matrix M.
 - (ii) Find the matrix M. [3]
- (b) When $x^3 + 3x^2 - kx + 4$ is divided by $x - 2$, the remainder is k. Find the value of the constant k. [3]
- (c) Two men are on diametrically opposite side of a tower. They measure the angles of elevation of the top of the tower as 20° and 24° respectively. If the height of the tower is 40 m, find the distance between them. [4]

Question 8

- (a) If a, b, c are in continued proportion, prove that : [3]
 $(a + b + c)(a - b + c) = a^2 + b^2 + c^2$
- (b) Draw a circle circumscribing a regular hexagon of side 5 cm. [3]
- (c) How many terms of the G.P. $3, 3/2, 3/4, \dots$ are needed to give the sum is $\frac{3069}{512}$ [4]

Question 9

- (a) If $(4a + 9b) : (4a - 9b) = (4c + 9d) : (4c - 9d)$, Show that $a : b :: c : d$. [3]
- (b) Factorize: [3]
 $x^3 + 13x^2 + 32x + 20$, if it is given that $x + 2$ is its factor.
- (c) Let $A = \begin{bmatrix} 4 & -2 \\ 6 & -3 \end{bmatrix}, B = \begin{bmatrix} 0 & 2 \\ 1 & -1 \end{bmatrix}, C = \begin{bmatrix} -2 & 3 \\ 1 & -3 \end{bmatrix}$, find. [4]
- (i) A^2
 - (ii) BC
 - (iii) $A^2 - A + BC$
