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P.P.MEMORIAL ACADEMY

CLASS X

MID TERM EXAMINATION 2023-24

MATHEMATICS

Maximum Marks: 80 Time: 2hours 30 minutes

Attempt all questions from Section A and any four questions from Section B. All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks. The intended marks for questions or parts of questions are given in brackets [].

SECTION A (40 Marks)

Attempt all questions from this Section.

Question 1. [1 X 15 = 15]

Select the correct option for each of the following questions.

I. The percentage share of SGST of total GST for an Intra-State sale of an article is

(a) 25% (b) 50% (c) 75% (d) 100%

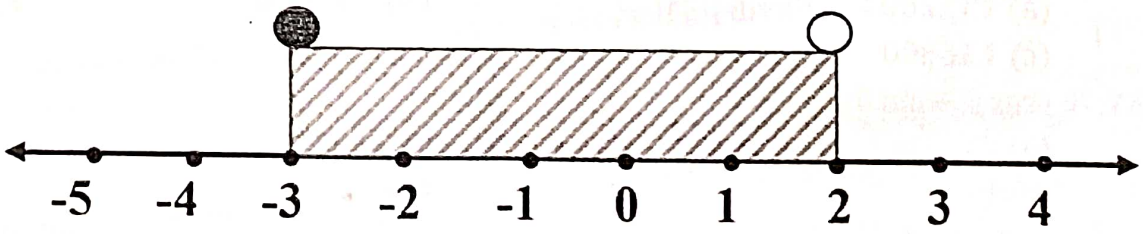
II. The mean proportion between 9 and 25 is

(a) 15 (b) 17 (c) 3 (d) 5

III. A man deposited ₹ 500 per month for 6 months and received ₹3400 as the maturity value. The interest received by him is: -

(a) 1950 (b) 400 (c) 2800 (d) none of these

IV. The solution set representing the following number line is



(a) $\{x: x \in R, -3 \leq x < 2\}$ (b) $\{x: x \in R, -3 < x < 2\}$

(c) $\{x: x \in R, -3 < x \leq 2\}$ (d) $\{x: x \in R, -3 \leq x \leq 2\}$

V. The first three terms of an arithmetic progression (A. P.) are 12, 9, 6, then the next two terms are

(a) 15 and 18 (b) 11 and 10 (c) 3 and 0 (d) none of these

VI. The roots of the quadratic equation $x^2 - x - 6 = 0$

(a) -2 and 3 (b) 2 and -3 (c) -2 and -3 (d) none of these

VII. If a polynomial $2x^2 - 7x + 1$ is divided by (x - 3), then the remainder is

(a) - 4 (b)38 (c)-3 (d) -2

VIII. If 48 is the nth term of the arithmetic progression 3, 8, 13, 18..., then 'n' is

(a) 8 (b) 10 (c) 11 (d) 9

IX. **Assertion(A):** The nature of roots of the quadratic equation $x^2 + 4x + 4 = 0$ are Real and equal

Reason(R): As the Discriminant D=0 of the above equation.

(a) A is true, R is false

(b) A is false, R is true

(c) both A and R are true

(d) both A and R are false

X. A man deposited ₹1200 in a recurring deposit account for 1 year at 5% per annum simple interest. The interest earned by him on maturity is

(a) 14790 (b) 390 (c) 4680 (d) 780

XI. The nth term of an arithmetic progression (A.P.) is $(3n + 1)$ The first three terms of this A. P. are

(a) 5, 6, 7 (b) 3, 6, 9 (c) 1, 4, 7 (d) 4, 7, 10

XII. If $x \in I$, then the solution set of the inequation $1 < 3x + 5 \leq 11$ is

(a) $\{-1, 0, 1, 2\}$ (b) $\{-2, -1, 0, 1\}$

(c) $\{-1, 0, 1\}$ (d) $\{x : x \in R, -4/3 < x \leq 2\}$

XIII. If $\begin{bmatrix} x+3 & 4 \\ y-4 & x+y \end{bmatrix} = \begin{bmatrix} 5 & 4 \\ 3 & 9 \end{bmatrix}$ then the values of x and y are

(a) $x = 2, y = 7$ (b) $x = 7, y = 2$

(c) $x = 3, y = 6$ (d) $x = -2, y = 7$

XIV. ₹ 40 shares of a company are selling at a 25% premium. If Mr. Jacob wants to buy 280 shares of the company, then the investment required by him is

(a) ₹ 11200 (b) ₹ 14000

(c) ₹ 16800 (d) ₹ 8400

XV. $(\cos\theta + \sin\theta)^2 + (\cos\theta - \sin\theta)^2$ is equal to

(a) -2 (b) 0

(c) 1 (d) 2

Question 2.

[5 + 4 + 4]

a. A shopkeeper bought an article with market price ₹ 1200 from the wholesaler at a discount of 10%. The shopkeeper sells this article to the customer on the market price printed on it. If the rate of GST is 6%, then find:

i. GST paid by the wholesaler.

ii. Amount paid by the customer to buy the item.

b. Mr. Gupta opened a recurring deposit account in a bank. He deposited ₹ 2500 per month for two years. At the time of maturity he got ₹ 67500. Find:

(i) the total interest earned by Mr. Gupta.

(ii) the rate of interest per annum.

Solving the following inequation, write the solution set and represent it on the number line.

$-3(x-7) \geq 15-7x > \frac{x+1}{3}, n \in R$

Question 3.

[4 + 4 + 4]

a. Amit Kumar invests ₹ 36,000 in buying ₹ 100 shares at ₹ 20 premium. The dividend is 15% per annum. Find :

(i) The number of shares he buys 300

(ii) His yearly dividend 4500

(iii) The percentage return on his investment. 12.5

Give your answer correct to the nearest whole number.

b. If $x = \frac{8ab}{a+b}$ find the value of $\frac{x+4a}{x-4a} + \frac{x+4b}{x-4b}$

c.

If $A = \begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix}$, $C = \begin{bmatrix} -3 & 2 \\ -1 & 4 \end{bmatrix}$

Find $A^2 + AC - 5B$ check.

$= \begin{matrix} -23 & 3 \\ 16 & 6 \end{matrix}$

SECTION B (40 Marks)

Attempt any four questions from this Section

Question 4.

a. Find the 16th term of the A.P. 7, 11, 15, 19.... Find the sum of the first 6 terms. [3] 67, 102

b. Using remainder theorem, find the value of k if on dividing $2x^3 + 3x^2 - kx + 5$ by $x - 2$, leaves a remainder 7 [3]

c. The difference of the squares of two natural numbers is 84. The square of the larger number is 25 times the smaller number. Find the numbers. [4]

Question 5.

[3 + 3 + 4]

a.

Solve the following inequation:

$-\frac{x}{3} - 4 \leq \frac{x}{2} - \frac{7}{3} < -\frac{7}{6}, x \in R$

Represent the solution set on a number line.

b. *Evaluate*: $\frac{sec17°}{cosec73°} + \frac{tan68°}{cot22°} + cos^2 44° + cos^2 46°$

c. If $x = \frac{2ab}{a+b}$ find the value of $\frac{x+a}{x-a} + \frac{x+b}{x-b}$

Question 6.

[3 + 4 + 3]

a. How many terms of the G.P. 3, 3^2, 3^3, ... are needed to give the sum 120?

b. A shopkeeper buy goods worth ₹ 4000 and sells these at a profit of 20% to a consumer in the same state. If GST is charged at 5%, find:
(i) the selling price (excluding tax) of the goods.
(ii) CGST paid by the consumer.
(iii) SGST paid by the consumer.
(iv) the total amount paid by the consumer.

c. Rekha opened a recurring deposit account for 20 months. The rate of interest is 9% per annum and Rekha receives ₹ 441 as interest at the time of maturity. Find the amount Rekha deposited each month.

Question 7.

[3 + 4 + 3]

a. Solve the following equations by using quadratic formula and give your answer correct to 2 decimal places :
(i) $4x^2 - 5x - 3 = 0$

b. *If* $\frac{5x+7y}{5u+7v} = \frac{5x-7y}{5u-7v}$, *Show that* $\frac{x}{y} = \frac{u}{v}$

c. At an annual function of a school, each student gives the gift to every other student. If the number of gifts is 1980, find the number of students.

Question 8.

[3 + 4 + 3]

a. What number must be subtracted from $2x^2 - 5x$ so that the resulting polynomial leaves the remainder 2, when divided by $2x + 1$?

b. Show that (x – 2) is a factor of $3x^2 - x - 10$ Hence factorise $3x^2 - x - 10$

c. If $(3x - 2)$ is a factor of $3x^3 - kx^2 + 21x - 10$, find the value of k.

Question 9.

[3 + 4 + 3]

a. Prove that : $(1+\tan A)^2+(1-\tan A)^2=2\sec^2 A$

b. Given $A = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$, evaluate $A^2 - 4A$

c. Yasmeen saves ₹ 32 during the first month, ₹ 36 in the second month and ₹ 40 in the third month. If she continues to save in this manner, in how many months will she save ₹ 2000?