# Chapter 2 – Equations

## Linear Equation in one variable and two variable

### Past Year Questions

**PYQ May 18**

(1) If $2^{x+y} = 2^{2x-y} = \sqrt{8}$, then the respective values of x and y are ___

a. $1, \frac{1}{2}$ b. $\frac{1}{2}, 1$

c. $\frac{1}{2}, \frac{1}{2}$ d. None of these

**PYQ May 18**

(2) If $\frac{3}{x+y} + \frac{2}{x-y} = -1$ and $\frac{1}{x+y} - \frac{1}{x-y} = \frac{4}{3}$ then (x, y) is:

a. (2,1) b. (1,2)

c. (-1,2) d. (-2,1)

**PYQ Nov. 19**

(3) $\frac{2x+5}{10} + \frac{3x+10}{15} = 5$, find x

a. 10.58 b. 9.58

c. 9.5 d. None of these

**PYQ Nov. 19**

(4) Find value of $x^2 - 10x + 1$ if $x = \frac{1}{5-2\sqrt{6}}$

a. 25 b. 1

c. 0 d. 49

Note: Que to be shifted to Quadratic Equation Topic

**PYQ July 21**

(5) ☆ The cost of 2 oranges and 3 apples is ₹ 28. If the cost of an apple is doubled then the cost of 3 oranges and 5 apples is ₹ 75. The original cost of 7 oranges and 4 apples (in (₹)) is:

a. 59 b. 47

c. 71 d. 63

**PYQ Dec. 21**

(6) ☆ In a multiple choice question paper consisting of 100 questions of 1 mark each, a candidate gets 60% marks. If the candidate attempted all questions and there was a penalty of 0.25 marks for wrong answers is:

a. 32 b. 36

c. 40 d. 38

**PYQ June 22**

(7) The values of x and y satisfying the equations $\frac{3}{x+y} + \frac{2}{x-y} = 3, \frac{2}{x+y} + \frac{3}{x-y} = 3\frac{2}{3}$ are given by

a. (1,2) b. (-1, -2)

c. (1, ½) d. (2, 1)

**PYQ June 22**

(8) ☆ A plumber can be paid either ₹ 600 and ₹ 50 per hour or ₹ 170 per hour. If the job takes 'n' hour, for what value of 'n' the second method earns better wages for the plumber?

a. 5 b. 6

c. 4 d. 7

**PYQ Dec 22**

(9) The solution of the following system of linear equations $2x - 5y + 4 = 0$ and $2x + y - 8 = 0$ will be:

a. (2, -3) b. (1, -3)

c. (3, 2) d. (-2, 2)

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | b | 3 | b |
| 4 | c | 5 | a | 6 | a |
| 7 | d | 8 | a | 9 | c |

## Linear Equation in one variable and two variable

### Mock Test Paper Questions

**MTP May 18**

(1)

| x | 5 | 6 | 7 | 8 |
|---|---|---|---|---|
| y | 11 | 13 | 15 | 17 |

In the above table corresponding values of two variable x and y have been given. Which of the following equations establishes the relationship between the two variables?

a. $y = 3x+2$ b. $y = 2x-1$

c. $y = 2x+1$ d. $y = 3x+1$

**MTP Nov 20**

(2) ☆ If $2x - 3y = 1$ and $5x + 2y = 50$, then what is the value of $(x-2y)$?

a. - 2 b. 6

c. 7 d. 10

MTP Nov 21

(3) ☆ If $xy + yz + zx = -1$, then the value of $\left(\frac{x+y}{1+xy} + \frac{z+y}{1+zy} + \frac{x+z}{1+zx}\right)$ is

a. $xyz$ b. $-\frac{1}{yz}$

c. $\frac{1}{xyz}$ d. $\frac{1}{x+y+z}$

MTP Nov 21

(4) ☆ The value of 'k' for system of equations $kx+2y = 5$ and $3x+y = 1$ has no solution is:

a. 5 b. 2/3

c. 6 d. 3/2

MTP Nov 21

(5) ☆ The cab bill is partly fixed and partly varies on the distance covered. For 456 km the bill is ₹ 8252, for 484 km the bill is Rs. 8728. What will the bill be for 500km?

a. ₹ 8876 b. ₹ 9156

c. ₹ 9472 d. ₹ 9000

MTP Oct 21

(6) The point of intersection between the lines $3x+4y = 7$ and $4x - y = 3$ lie in the

a. 1st quadrant. b. 2nd quadrant.

c. 3rd quadrant d. 4th quadrant.

MTP Oct 21

(7) If $\sqrt{1+\frac{25}{144}} = 1+\frac{x}{12}$, then x is

a. 1 b. 2

c. 3 d. 0

MTP June 22

(8) If $2^{x+y} = 2^{2x-y} = \sqrt{8}$ then the respective values of x and y are ___

a. 1, ½ b. ½, 1

c. ½, ½ d. none of these

MTP Dec 22 Series II

(9) $\frac{2x+5}{10} + \frac{3x+10}{15} = 5$, then the value of x

a. 10.58 b. 9.58

c. 9.5 d. None of these

MTP June 2023 Series II

(10) Solve for x; y an z.

$\frac{xy}{y-x} = 210, \frac{xz}{z-x} = 140, \frac{yz}{y+z} = 140$

a. 105;210;420 b. 100;205;400

c. 95;215;395 d. None of these

## Answer Key

| | | |
|---|---|---|
| 1 c | 2 a | 3 c |
| 4 c | 5 d | 6 a |
| 7 a | 8 a | 9 b |
| 10 a | | |

## Word Problems on Equations

### Past Year Questions

PYQ May 18

(1) If the sides of an equilateral triangle are shortened by 3 units, 4 units and 5 units respectively and a right triangle is formed then the side of an equilateral triangle is:

a. 6 units b. 7 units

c. 8 units d. 10 units

PYQ June 19

(2) A number consist of two digits such that the digit in one's place in thrice the digit in ten's place. If 36 be added then the digits are reversed. Find the number _____.

a. 62 b. 26

c. 39 d. None of these

PYQ June 22

(3) ☆ If a person has cloth of total 91 cm. If he divides it into 3 parts then longest part is twice the shortest one and another part is 3 cm more than shortest one. What is the shortest one?

a. 25 b. 44

c. 22 d. 46

PYQ Dec 22

(4) If the cost of 3 bags and 4 pens is ₹257 whereas the cost of 4 bags and 3 pens is ₹ 324, then the cost of one bag is:

a. 8 b. 24

c. 32 d. 75

PYQ Jun 23

(5) The largest side of a triangle is 3 times the shortest side and third side is 4 cm shorter then largest side. If the perimeter of the triangle is at least 59 cm, what is the length of shortest side?

a. Less than 7 cm

b. Greater than or equal to 7 cm

c. Less than 9 cm

d. Greater than or equal to 9 cm

PYQ Jun 23

(6) The age of a man is four times the sum of the ages of his two sons and after 10 years, his age will be double the sum of their ages. The present age of the man must be

a. 56 years b. 45 years
c. 60 years d. 64 years

**Answer Key**

| | | |
|---|---|---|
| 1 c | 2 b | 3 c |
| 4 d | 5 d | 6 c |

## Word Problems on Equations

### Mock Test Paper Questions

MTP May 18

(1) A number consists of two digits. The digits in tens place is 3 times the digit in the unit's place. If 54 is subtracted from the digits are reversed. The number is

a. 39 b. 92
c. 93 d. 94

MTP Nov 18

(2) A number consist of three digit of which the middle one is zero and the sum of other digits is 9. The number formed by interchanging the first and third digits is more than the original number by 297 find the number?

a. 306 b. 309
c. 603 d. 307

MTP Nov 18

(3) The age of a person is twice the sum of the ages of his two sons and five years ago his age was thrice the sum of their ages. Find his present age.

a. 60 years b. 52 years
c. 51 years d. 50 years

MTP May 19

(4) Ten years ago the age of a father was four times his son. Ten years hence the age of the father will be twice that of his son. The present age of the father and the son are

a. (50, 20) b. (60, 20)
c. (55, 25) d. none of these

MTP Nov 19

(5) 5 chairs and 3 tables cost of ₹ 350. and 3 Chairs and 5 tables cost ₹ 370. What is the cost of the table and two chairs?

a. ₹ 130 b. ₹ 120
c. ₹ 150 d. ₹ 140

MTP Nov 19

(6) If thrice of A's age 6 years ago be subtracted from twice his present age, the result would be equal to his present age. Find A's Age

a. 9 b. 8
c. 10 d. 12

MTP May 20

(7) A The sum of two numbers is 62 and their product is 960. The sum of their reciprocals is

a. $\frac{31}{480}$ b. $\frac{29}{480}$
c. $\frac{61}{960}$ d. $\frac{41}{960}$

MTP May 20, ICAI SM

(8) Three persons Mr. Roy, Mr. Paul and Mr. Singh together have ₹ 51. Mr. Paul has ₹ 4 less than Mr. Roy and Mr. Singh has got ₹ 5 less than Mr. Roy. They have the money as.

a. (₹ 20, ₹ 16, ₹ 15)
b. (₹ 15, ₹ 20, ₹ 16)
c. (₹ 25, ₹ 11, ₹ 15)
d. none of these

MTP May 20, ICAI SM

(9) The wages of 8 men and 6 boys amount to ₹ 33. If 4 men earn ₹ 4.50 more than 5 boys determine the wages of each man and boy

a. (₹ 1.50, ₹ 3)
b. (₹ 3, ₹ 1.50)
c. (₹ 2.50, ₹ 2)
d. (₹ 2, ₹ 2.50)

MTP Nov 20

(10) The cost of 5 mangoes is equal to the cost of 20 oranges. If the total cost 2 mangoes and 10 oranges is ₹ 22.50, find the cost of two oranges.

a. ₹ 1.25 b. ₹ 2.50
c. ₹ 3 d. ₹ 3.50

MTP Nov 20

(11) A man sells 6 radios and 4 televisions for ₹ 18,480. If 14 radios and 2 televisions are sold for the same amount. What is the price of radio?

a. ₹ 1848 b. ₹ 840
c. ₹ 1680 d. ₹ 3360

Note: No ans is matching with the data of que, correct answer is ₹543.52

MTP Apr 21

(12) On the average an experienced person does 7 units of work while a fresh one work 5 units of work daily but the employer has to maintain an output of atleast 35 units of work per day. The situation can be expressed as:

a. $7x + 5y < 35$
b. $7x + 5y \leq 35$
c. $7x + 5y > 35$
d. $7x + 5y \geq 35$

Note: Shift to Chapter 3

MTP Nov 21

(13) ☆ X and Y have their present ages in the ratio 6:7. 14 years ago, the ratio of the ages of the two was 4:5. What will be the ratio of their ages 21 years from now?

a. 7: 11 b. 9: 10
c. 8: 11 d. 11: 13

MTP Dec 22 – Series I

(14) ☆ A man wants to cut three lengths from a single piece of board of length 91 cm. The Second length is to be 3 cm longer than the shortest and third length is to be twice as the shortest. What is the possible length for the shortest piece?

a. 22 b. 20
c. 15 d. 18

MTP Jun 23 – Series I

(15) If thrice of A's age 6 years ago be subtracted from twice his present age, the result would be equal to his present age. Find A's present age.

a. 7 b. 8
c. 9 d. 6

MTP Jun 23 – Series I

(16) The cost prices of 3 pens and 4 bags is ₹ 324, and 4 pens and 3 bags is ₹ 257, then cost price of 1 pen is equal to

a. ₹ 16 b. ₹ 18
c. ₹ 50 d. ₹ 75

MTP Jun 23 – Series I

(17) In a hostel ration stocked for 400 students upto 31 days. After 28 days 280 students were vacated the hostel. Find the number of days for which the remaining ration will be sufficient for the remaining students.

a. 5 b. 4
c. 7 d. 10

MTP Jun 23 – Series I

(18) The sum of the two numbers is 8 and the sum of their squares is 34. Taking one number as x from an equation in x and hence find the numbers. The numbers are

a. (7, 10) b. (4, 4)
c. (3, 5) d. (2, 6)

MTP Jun 23 – Series I

(19) The value of y of fraction $\frac{x}{y}$ exceeds with x by 5 and if 3 be added to both the fraction becomes $\frac{3}{4}$. Find the fraction,

a. $\frac{12}{17}$ b. $\frac{13}{17}$
c. $-\frac{1}{3}$ d. None of these

MTP Jun 23 – Series I

(20) If difference between a number and its positive square root is 12; the numbers are

a. 9 b. 16
c. 25 d. None of these

Answer Key

| | | | | | |
|---|---|---|---|---|---|
| 1 | c | 2 | a | 3 | d |
| 4 | a | 5 | a | 6 | a |
| 7 | a | 8 | a | 9 | b |
| 10 | b | 11 | b | 12 | d |
| 13 | b | 14 | a | 15 | c |
| 16 | d | 17 | d | 18 | c |
| 19 | a | 20 | b | | |

## Problems on Quadratic Equation

### Past Year Questions

**PYQ May 18**

(1) If $\alpha+\beta=-2$ and $\alpha\beta=-3$, then $\alpha,\beta$ are the roots of the equation, which is:

a. $x^2-2x-3=0$
b. $x^2+2x-3=0$
c. $x^2+2x+3=0$
d. $x^2-2x+3=0$

**PYQ May 18**

(2) If $\alpha,\beta$ are the roots of the equation $x^2+x+5=0$ then $\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}$ is equal to

a. $\frac{16}{5}$
b. 2
c. 3
d. $\frac{14}{5}$

**PYQ Nov. 18**

(3) Let $\alpha$ and $\beta$ be the roots of $x^2+7x+12=0$. Then the value of $\left(\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}\right)$ will be:

a. $\frac{7}{12}+\frac{12}{7}$
b. $\frac{49}{144}+\frac{144}{49}$
c. $-\frac{91}{12}$
d. None of these

**PYQ Nov. 18**

(4) When two roots of quadratic equations are $\alpha,\frac{1}{\alpha}$ then what will be the quadratic equation:

a. $\alpha x^2-(\alpha^2+1)x+\alpha=0$
b. $\alpha x^2-\alpha^2 x+1=0$
c. $\alpha x^2-(\alpha^2+1)x+1=0$
d. None of these

**PYQ June 19**

(5) Find the condition that one roots is double the other of $ax^2+bx+c=0$

a. $2b^2=3ac$
b. $b^2=3ac$
c. $2b^2=9ac$
d. $2b^2>9ac$

**PYQ Nov. 19**

(6) Find the value of K in $3x^2-2kx+5=0$ if $x=2$

a. 17/4
b. -7/14
c. 4/17
d. -4/17

**PYQ Nov. 20**

(7) ☆ The rational root of the equation $0=2p^3-p^2-4p+2$ is:

a. 2
b. -2
c. 1/2
d. -1/2

**PYQ Nov. 20**

(8) ☆ If $2x^2-(a+6)2x+12a=0$, then the roots are:

a. 6 and a
b. 4 and $a^2$
c. 3 and 2a
d. 6 and 3a

**PYQ Nov. 20**

(9) Solving equation $m+\sqrt{m}=6/25$, the value of m works out to:

a. 1/25
b. 2/25
c. 3/25
d. 1

**PYQ Jan. 21**

(10) ☆ The value of p for which the difference between the root of equation $x^2+px+8=0$ is 2

a. ±2
b. ±4
c. ±6
d. ±8

**PYQ Jan. 21**

(11) ☆ If the quadratic equation $x^2+px+q=0$ and $x^2+qx+p=0$ have a common root then $p+q=?$

a. 0
b. 1
c. -1
d. 2

**PYQ Jan. 21**

(12) ☆ The harmonic mean of the roots of the equation $(5+\sqrt{2})x^2-(4+\sqrt{5})x+8+2\sqrt{5}=0$ is

a. 2
b. 4
c. 6
d. 8

**PYQ July 21**

(13) ☆ If $\alpha$ and $\beta$ are the roots of the equation $2x^2+5x+k=0$, and $4(\alpha^2+\beta^2+\alpha\beta)=23$, then which of the following is true?

a. $k^2+3k-2=0$
b. $k^2-2k+3=0$
c. $k^2-2k-3=0$
d. $k^2-3k+2=0$

**PYQ July 21**

(14) ☆ The sum of square of any real positive quantity and its reciprocal is never less than:

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

PYQ Dec. 21

(15) If one root is half of the other of a quadratic equation and the difference in roots is a, then the equation is

a. $x^2+ax+2a^2=0$
b. $x^2-3ax-2a=0$
c. $x^2-3ax+2a^2=0$
d. $x^2+3ax-2a^2=0$

PYQ Dec. 21

(16) If the square of a number exceeds twice of the number by 15, then number that satisfies the condition is

a. -5 b. 3
c. 5 d. 15

PYQ June 22

(17) If the second root of the given equation is reciprocal of first root then value of 'K' in the equation $5x^2-13x+k=0$

a. 3 b. 2
c. 1 d. 5

PYQ Dec 22

(18) If the roots of the equation $x^2-px+q=0$ are in the ratio 2: 3, then:

a. $p^2=25q$ b. $p^2=6q$
c. $6p^3=5q$ d. $6p^2=25q$

PYQ Dec 22

(19) What will be the value of k, if the roots of the equation $(k-4)x^2-2kx+(k+5)=0$ are equal?

a. 18 b. 20
c. 19 d. 21

PYQ Jun 23

(20) If $\alpha$ and $\beta$ are roots of the quadratic equation $x^2-2x-3=0$ then the equation whose roots are $\alpha+\beta$ and $\alpha-\beta$ is:

a. 18 a. 20
c. 19 c. 21

PYQ Jun 23

(21) If $\alpha$ and $\beta$ are roots of the equation $x^2-(n^2+1)x+\frac{1}{2}(n^4+n^2+1)=0$ then the value of $\alpha^2+\beta^2$ is:

a. $2n$ b. $n^2$
c. $2n^2$ d. $n^3$

## Answer Key

| | | | | | |
|---|---|---|---|---|---|
| 1 | b | 2 | d | 3 | c |
| 4 | a | 5 | c | 6 | a |
| 7 | c | 8 | a | 9 | a |
| 10 | c | 11 | c | 12 | b |
| 13 | d | 14 | b | 15 | c |
| 16 | c | 17 | d | 18 | d |
| 19 | b | 20 | b | 21 | b |

## Problems on Quadratic Equations

### Mock Test Paper Questions

MTP May 18

(1) The equation $x^2-(P+4)x+2P+5=0$ has equal roots. The value of p is

a. 2 b. -2
c. $\pm 2$ d. 3

MTP May 19

(2) Let $\alpha$ and $\beta$ be the roots of equation $x^2+7x+12=0$, then the value of $\left(\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}\right)$ will be

a. $\frac{49}{144}+\frac{144}{49}$
b. $\frac{7}{12}+\frac{12}{7}$
c. $\frac{-91}{12}$
d. None of these

Note: Repeat PYQ Nov 18

MTP May 19

(3) When two roots of quadratic equations are $\alpha$ and $\frac{1}{\alpha}$ then what will be quadratic equation.

a. $\alpha x^2-(\alpha^2+1)x+\alpha=0$
b. $\alpha x^2-\alpha^2 x+1=0$
c. $\alpha x^2-(\alpha^2+1)x+1=0$
d. None of these

Note: Repeat PYQ Nov 18

MTP May 19 Series II

(4) If $\alpha$ and $\beta$ be the roots of the equation $2x^2-4x-3=0$ the value of $\alpha^2+\beta^2$ is

a. 5 b. 7
c. 3 d. -4

**MTP May 19 Series II**

**(5)** If one root of the equation $x^2+7x+p=0$ be reciprocal of the other, then the value of p is_____.

a. 1 b. -1
c. 7 d. -7

**MTP Nov 19**

**(6)** If one root of the quadratic equation is $2+\sqrt{3}$, the equation is ____.

a. $x^2-4x+1$ b. $x^2+4x+1$
c. $x^2-4x-1$ d. None of these

**MTP May 20**

**(7)** The roots of the quadratic equation $x^2-4x+k=0$ are coincident if

a. $k=4$ b. $k=3$
c. $k=2$ d. $k=1$

**MTP May 20**

**(8)** The roots of the equation $x^2+(2p-1)x+p^2=0$ are real if.

a. $p\geq 1$ b. $p\leq 4$
c. $p\geq 1/4$ d. $p\leq 1/4$

Note: Type in MTP

**MTP Nov 20**

**(9)** The roots of the quadratic equation $9x^2+3kx+4=0$ are equal if

a. $k=\pm 2$
b. $k=\pm 3$
c. $k=\pm 4$
d. $k=\pm 5$

**MTP Nov 20**

**(10)** If one root of a equation is $2+\sqrt{5}$, then the quadratic equation is

a. $x^2+4x-1=0$
b. $x^2-4x-1=0$
c. $x^2+4x+1=0$
d. $x^2-4x+1=0$

**MTP March 21**

**(11)** If one root of the equation $x^2-3x+k=0$ is 2, then the value of k will be

a. -10 b. 0
c. 2 d. 10

**MTP March 21**

**(12)** ☆ If arithmetic mean between roots of a quadratic equation is 8 and the geometric mean between them is 5, the equation is _____

a. $x^2-16x-25=0$ b. $x^2-16x+25=0$
c. $x^2+16x+25=0$ d. None of these

**MTP Apr 21**

**(13)** Roots of the equation $3x^2-14x+k=0$ will be reciprocal of each other if:

a. $k=-3$ b. $k=0$
c. $k=3$ d. $k=14$

**MTP Apr 21**

**(14)** If one root of the equation $x^2-3x+k=0$ is 2, then the value of k will be

a. -10 b. 0
c. 2 d. 10

Note: Repeat Que 11 MTP Mar 21

**MTP Apr 21**

**(15)** If arithmetic mean between roots of a quadratic equation is 8 and the geometric mean between them is 5, the equation is

a. $x^2-16x-25=0$ b. $x^2-16x+25=0$
c. $x^2+16x+25=0$ d. None of these

Note: Repeat Que 12 MTP Mar 21

**MTP Nov 21**

**(16)** ☆ The equation $3x^2+mx+n=0$ has roots that are double that of the equation $x^2+10x+12=0$. What is the value of m + n?

a. 104 b. 204
c. 102 d. 202

**MTP Nov 21**

**(17)** If $\alpha$ and $\beta$ are the roots of the equation $x^2+7x+12=0$, then the equation whose roots $(\alpha+\beta)^2$ and $(\alpha-\beta)^2$ will be

a. $x^2-14x+49=0$
b. $x^2-24x+144=0$
c. $x^2-50x+49=0$
d. $x^2-19x+49=0$

**MTP Oct 21**

**(18)** Given the Quadratic Equation $\frac{x+1}{x}-\frac{x}{x+1}=\frac{3}{2}$

a. 1 and -2/3 b. -1 and 2/3
c. -1 and -2/3 d. 1 and 2/3

Note: Ans wrong in MTP, Correct Ans is **Option a**

**MTP Oct 21**

**(19)** The roots of equation $9^{x+2}-6.3^{x+1}+1=0$ are

a. -2 b. 2
c. $\sqrt{2}$ d. 0

MTP Oct 21

(20) The roots of the equation $x^2 - x + 1 = 0$ are

a. Imaginary and unequal
b. Real and unequal
c. Real and equal
d. Imaginary and equal

MTP Oct 21

(21) If one root of the quadratic equation is $2 + \sqrt{3}$ the equation is _____

a. $x^2 - 4x + 1 = 0$ b. $x^2 + 4x + 1 = 0$
c. $x^2 - 4x - 1 = 0$ d. None of these

MTP Mar 22

(22) If $\alpha$ and $\beta$ are the roots of the equation $x^2 + 7x + 12 = 0$, then the equation whose roots $(\alpha + \beta)^2$ and $(\alpha - \beta)^2$ will be:

a. $x^2 - 14x + 49 = 0$
b. $x^2 - 24x + 144 = 0$
c. $x^2 - 50x + 49 = 0$
d. $x^2 - 19x + 144 = 0$

Note: Repeat - Q17 MTP Nov 21

MTP March 22

(23) Roots of the equation $2x^2 + 3x + 7 = 0$ are $\alpha$ and $\beta$ then the value of $\alpha\beta^{-1} + \beta\alpha^{-1}$ is

a. 2 b. 3/7
c. 7/2 d. -19/14

MTP June 22

(24) If the ratio of the roots of the equation $4x^2 - 6x + p = 0$ is 1: 2 then the value of p is:

a. 1 b. 2
c. -2 d. -1

Note: MTP Ans is wrong, Correct Option is b

MTP June 22

(25) ☆ If roots of equation $x^2 + x + r = 0$ are $\alpha$ and $\beta$ and $\alpha^3 + \beta^3 = -6$. Find the value of 'r'

a. -5/3 b. 7/3
c. -4/3 d. 1

MTP Dec 22 – Series I

(26) If one root is $5z^2 + 13z + y$ is 0 be reciprocal of the other, then the value of y is

a. $\frac{1}{5}$ b. $-\frac{1}{5}$
c. 5 d. -5

MTP Dec 22 Series II

(27) Find value of $x^2 - 10x + 1$, if $x = \frac{1}{5 - 2\sqrt{6}}$

a. 25 b. 1
c. 0 d. 49

MTP Dec 22 Series II

(28) Find the value of k in $3x^2 - 2kx + 5 = 0$, if $x = 2$.

a. 17/4 b. -7/14
c. 4/17 d. - 4/17

MTP Jun 23 Series I

(29) If one root of the quadratic equation is from the equation given that the roots are irrational. Then find the Quadratic equation.

a. $x^2 - 4x + 1 = 0$ b. $x^2 + 4x - 1 = 0$
c. $x^2 - 4x - 1 = 0$ d. $x^2 + 4x + 1 = 0$

MTP Jun 23 Series I

(30) If the roots of $(k-4)x^2 - 2kx + (k+5) = 0$ are coincident. Then the value of K?

a. 14 b. 20
c. 18 d. 22

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | c | 2 | c | 3 | a |
| 4 | b | 5 | a | 6 | a |
| 7 | a | 8 | d | 9 | c |
| 10 | b | 11 | c | 12 | b |
| 13 | c | 14 | c | 15 | b |
| 16 | b | 17 | c | 18 | b |
| 19 | a | 20 | a | 21 | a |
| 22 | c | 23 | d | 24 | a |
| 25 | a | 26 | c | 27 | c |
| 28 | a | 29 | a | 30 | b |

## Problems on Cubic Equations

### Past Year Questions

PYQ Nov. 19

(1) Roots of the equation $x^3 + 9x^2 - x - 9 = 0$.

a. 1, 2, 3 b. 1, -1, -9
c. 2, 3, -9 d. 1, 3, 9

PYQ July 21

(2) The value of 'k' is _____, if 2 is the root of the following cubic equation: $x^3 - (k+1)x + k = 0$

a. 2 b. 6
c. 1 d. 4

PYQ Dec. 21

(3) Solve $x^3 - 7x + 6 = 0$

a. $x = 6, 7, -4$ b. $x = -1, -2, -3$

c. $x = 1, 2, -3$ d. $x = 2, 4, 6$

Answer Key

1 b 2 b 3 c

## Problems on Cubic Equations

### Mock Test Paper Questions

MTP Nov 18

(1) *if* $\alpha, \beta, \gamma$ *are the roots of equation* $x^3 - 4x^2 + x + 6 = 0$ *then the equation having roots are* $\frac{1}{\alpha}, \frac{1}{\beta}, \frac{1}{\gamma}$ *is*

a. $x^3 - 4x^2 + x + 6 = 0$

b. $4x^3 - 6x^2 + x - 1 = 0$

c. $6x^3 + x^2 - 4x + 1 = 0$

d. $6x^3 - x^2 + 4x - 1 = 0$

*Note: Out of syllabus – you can leave this.*

MTP May 19

(2) If $x = 5^{1/3} + 5^{-1/3}$, then $5x^3 - 15x$ is given by

a. 25 b. 26

c. 27 d. 30

MTP Nov 21

(3) $(x + 4)$ is a factor of $x^4 + 4x^3 - ax^2 - bx + 24$.

☆ Also, $a + b = 29$. Find the value of $b$.

a. 7 b. 16

c. 22 d. 13

MTP Dec 22 Series II

(4) Roots of the equation $x^3 + 9x^2 - x - 9 = 0$.

a. 1, 2, 3 b. 1, - 1, - 9

c. 2, 3, - 9 d. 1, 3, 9

Answer Key

1 c 2 b 3 c

4 b

# Chapter 3: Linear Inequalities

## Linear Inequalities

### Past Year Questions

**PYQ May 18**

(1) The linear relationship between two variables in an inequality:

a. $ax+by \le c$

b. $ax.by \le c$

c. $axy+by \le c$

d. $ax+bxy \le c$

**PYQ Nov. 18**

(2) On solving the inequalities $5x+y \le 100, x+y \le 60, x \ge 0, y \ge 0$, we get the following solution:

a. (0, 0), (20, 0), (10, 50) & (0, 60)

b. (0, 0), (60, 0), (10, 50) & (0, 60)

c. (0, 0), (20, 0), (0, 100) & (10, 50)

d. None of these

**PYQ June 19**

(3) An employer recruits experienced (x) and fresh workmen (y) for his under the condition that he cannot employ more than 11 people. x and y can related by the inequality.

a. $x+y \ne 11$

b. $x+y \le 11, x \ge 0, y \ge 0$

c. $x+y \ge 11, x \ge 0, y \ge 0$

d. None of these

**PYQ June 19**

(4) The solution set of the equations $x + 2 > 0$ and $2x - 6 > 0$ is

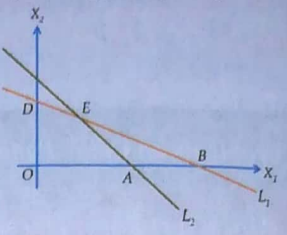
a. $(-2, \infty)$ b. $(3, \infty)$

c. $(-\infty, -2)$ d. $(-\infty, -3)$

**PYQ June 19**

(5) The common region represented by the following in equalities

$L_1 = X_1 + X_2 < 4; L_2 = 2X_1 + X_2 > 6$




a. $\Delta ABC$

b. Outside of $OAB$

c. $\Delta BCE$

d. $\Delta ABE$

**PYQ Nov. 19**

(6) $6x+y \ge 18, x+4y \ge 12, 2x+y \ge 10$

On solving the inequalities; we get

a. (0, 18), (12, 0), (4, 2), & (7, 6)

b. (3, 0), (0, 3), (4, 2), & (7, 6)

c. (5, 0), (0, 10), (4, 2), & (7, 6)

d. (0, 18), (12, 0), (4, 2), (0, 0), & (7, 6)

**PYQ Nov. 20**

(7) ☆ Solve for x of the inequalities

$2 \le \frac{3x-2}{5} \le 4$ where $x \leftarrow N$

a. $\{5,6,7\}$

b. $\{3,4,5,6\}$

c. $\{4,5,6\}$

d. None of these

**PYQ Jan. 21**

(8) ☆ The common region in the graph of the inequalities $x+y \le 4, x-y \le 4, x \ge 2$ is

a. Equilateral triangle

b. Isosceles triangle

c. Quadrilateral

d. Square

**PYQ Dec. 21**

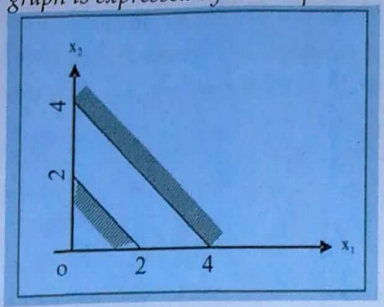
(9) ☆ XYZ Company has a policy for its recruitment as: it should not recruit more than eight men (x) to three women (y). How can this fact be expressed in inequality?

a. $3y \ge 8x$ b. $3y \le x/8$

c. $8y \ge 3x$ d. $8y \le 3x$

PYQ Dec. 21

(10) The region indicated by the shading in the graph is expressed by the inequalities




a. $x_1 + x_2 \le 2; x_1 + x_2 \ge 4; x_1 \ge 0, x_2 \ge 0$

b. $x_1 + x_2 \le 2; x_2 x_1 + x_2 \le 4; x_1 \ge 0, x_2 \ge 0$

c. $x_1 + x_2 \ge 2; x_1 + x_2 \ge 4; x_1 \ge 0, x_2 \ge 0$

d. $x_1 + x_2 \le 2; x_1 + x_2 \ge 4; x_1 \ge 0, x_2 \ge 0$

PYQ Dec 22

(11) If $2x + 5 > 3x + 2$ and $2x - 3 \le 4x - 5$, the 'x' can take which of the following value?

☆ a. 4 b. - 4

c. 2 d. - 2

PYQ Jun 23

(12) In a garment factory, an average experienced tailor can stich 5 shirts while a fresh tailor can stitch 3 shirts daily, but the employer has to maintain an output of at least 30 shirts stitched per day. This can be formulated as

a. $5x + 3y \le 30$

b. $5x + 3y > 30$

c. $5x + 3y \ge 30, x \ge 0, y \ge 0$

d. $5x + 3y \le 30, x \ge 0, y \ge 0$

PYQ Jun 23

(13) A fertilizer company produces two types of fertilizers called grade I and grade II. Each of these types is processed through a critical chemical plant unit. The plant has maximum of 180 hours available in a week. Manufacturing one bag of grade I fertilizer requires 4 hours in the plant. Manufacturing one bag of grade II fertilizer requires 10 hours in the plant. Express this using linear inequalities.

a. $2x_1 + 5x_2 \le 180$

b. $4x_1 + 10x_2 > 180$

c. $2x_1 + 5x_2 > 180$

d. $4x_1 + 10x_2 \le 180$

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | a | 3 | b |
| 4 | b | 5 | d | 6 | a |
| 7 | d | 8 | b | 9 | c |
| 10 | a | 11 | c | 12 | c |
| 13 | d | | | | |

## Linear Inequalities

### Mock Test Paper Questions

MTP May 18

(1) A manufacturer produces two items A and B. He has ₹10,000 to invest and a space to store 100 items. A table costs him ₹400 and a chair ₹100. Express this in the form of linear inequalities

a. $x + y \le 100, 4x + y \le 100, x \ge 0, y \ge 0$

b. $x + y \le 1000, 2x + 5y < 100, x \ge 0, y \ge 0$

c. $x + y > 100, 4x + y \ge 100, x \ge 0, y \ge 0$

d. none of these

MTP Nov 18

(2) The Solution of the in equality $8x + 6 < 12x + 14$ is

a. (-2,2) b. (0, -2)

c. (2, ∞) d. (-2, ∞)

MTP Nov 18

(3) The rules and representations demand that employed should employ not more than 8 experienced leads to 1 fresh one and then fact can be expressed as

a. $y \ge x/8$ b. $8y \le x$

c. $8y = x$ d. $y = 8x$

MTP Nov 18

(4) On the average experienced person does 6 units work while A person 2 units of work daily but employer has to maintain as output of at least 24 units of per day. This situation can be expressed as

a. $6x + 2y \le 24$ b. $6x+2y = 24$

c. $6x+2y \ge 24$ d. $6x+2y \ne 4$

MTP May 19

(5) On solving the inequalities $5x + y \leq 100$, $x + y \leq 60$, $x \geq 0$ and $y \geq 0$, we get the following situation

a. (0, 0), (20, 0), (10, 50) and (0,60)
b. (0, 0), (60, 0), (10, 50) and (0,60)
c. (0, 0), (20, 0), (0, 100) and (10,50)
d. none of these

Note: Repeat

MTP May 19 Series II

(6) Mr. A plans to invest up to ₹ 30,000 in two stocks X and Y. Stock X(x) is priced at ₹ 175 and Stock Y(y) at ₹ 95 per share. This can be shown by

a. $175x+95y < 30,000$
b. $175x+95y > 30,000$
c. $175x+95y = 30,000$
d. None of these

MTP Nov 19

(7) A company produces two products A and B, each of which requires processing in two machines. The first machine can be used at most for 60 hours, the second machine can be used at most for 40 hours. The product A requires 2 hours on machine one and one hour on machine two. The product B requires one hour on machine one and two hours on machine two. Express above situation using linear inequalities

a. $2x+y \leq 60$ and $x+y \geq 40$
b. $2x+y \geq 60$ and $x+y \geq 40$
c. $2x+y \leq 60$ and $x+y \leq 40$
d. $2x+y \geq 60$ and $x+y \leq 40$

MTP Nov 19

(8) The solution set of the inequation $x+2 > 0$ and $2x-6 > 0$ is

a. $(-2, \infty)$ b. $(3, \infty)$
c. $(-\infty, 2)$ d. $(-\infty, -2)$

Note: Repeat

MTP May 20, ICAI SM

(9) On solving the inequalities $2x + 5y \leq 20$, $3x + 2y \leq 12$, $x \leq 0$, $y \leq 0$, we get the following situation

a. (0, 0), (0, 4), (4, 0) and (20/11, 36/11)
b. (0, 0), (10, 0), (0, 6) and (20/11,36/11)
c. (0, 0), (0, 4), (4, 0) and (2, 3)
d. (0, 0), (10, 0), (0, 6) and (2, 3)

MTP May 20

(10) On the average experienced person does 5 units of work while a fresh one 3 units of work daily but the employer has to maintain an output of at least 30 units of work per day. This situation can be expressed as,

a. $5x + 3y \leq 30$
b. $5x + 3y > 30$
c. $5x + 3y \geq 30\ x \geq 0, y \geq 0$
d. none of these

MTP Nov 20

(11) The solution set of the equations $x+2 > 0$ and $2x - 6 > 0$ is

a. $(-2, \infty)$ b. $(3, \infty)$
c. $(-\infty, -2)$ d. $(-\infty, -3)$

Note: Repeat

MTP Nov 20

(12) The solution space of the inequalities $2x + y \leq 10$ and $x-y \leq 5$:

☆ (i) includes origin
(ii) includes the point (4,3)

Which one is correct?

a. Only (i)
b. Only (ii)
c. Both (i) and (ii)
d. None of these

MTP March 21

(13) The solution of the inequality $\frac{(5-2x)}{3} \leq \frac{x}{6} - 5$ is

a. $x \geq 8$ b. $x \leq 8$
c. $x = 8$ d. None of these

MTP March 21

(14) On the average, experienced person does 5 units of work while a fresh one 3 units work daily but the employer have to maintain the output of at least 30 units of work per day. The situation can be expressed as.

a. $5x+3y \leq 30$ b. $5x+3y \geq 30$
c. $5x+3y = 30$ d. None of these

MTP Apr 21

(15) Solution space of the inequalities $2x + y \leq 10$ and $x-y \leq 5$:

(i). Includes the origin
(ii). Includes the point (4,3)

Which one is correct?

a. Only (i) b. Only (ii)
c. Both (i) and (ii) d. None of above

MTP Nov 21

(16) What is the smallest integral value of n for which $n^3 + 7n^2 - 50n - 336 > 0$

☆ a. 8 b. 6
c. 7 d. None of these

Note: Correct ans is 4 (check by putting n as 1, 2, 3, 4)

MTP Nov 21

(17) On the average, experienced person does 5 units of work while a fresh one 3 units of work daily, but the employer have to maintain the output at least 30 units of work per day. The situation can be expressed as

a. $5x + 3y \le 30$ b. $5x + 3y \ge 30$
c. $5x + 3y = 30$ d. None of these

Note: Repeat

MTP Oct 21

(18) A dealer has only ₹ 5760 to invest in fans (x) and sewing machines (y). The cost per unit of fan and sewing machine is ₹ 360 and ₹ 240 respectively. This can be shown by:

a. $360x + 240y \ge 5760$
b. $360x + 240y \le 5760$
c. $360x + 240y = 5760$
d. none of these

MTP March 22

(19) On solving the inequalities $5x + y \le 100$, $x + y \le 60$, $x \ge 0$, $y \ge 0$, we get the following situation:

a. (0,0), (20,0), (10,50), & (0,60)
b. (0,0), (60,0), (10,50), & (0,60)
c. (0,0), (20,0), (0,100) & (10,50)
d. none of these

Note: Repeat

MTP March 22

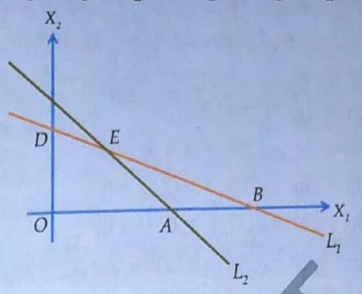
(20) The rules and regulations demand that the employer should employ not more than 5 experienced hands to 1 fresh one and this fact is represented by (Taking experienced person as x and fresh person as y)

a. $y \ge \frac{x}{5}$ b. $5y \le x$
c. $5y \ge x$ d. none of these

MTP June 22

(21) The common region represented by the following in equalities

$L_1 = X_1 + X_2 < 4; L_2 = 2X_1 + X_2 > 6$




a. $\Delta ABC$ b. outside of OAB
c. $\Delta BCE$ d. $\Delta ABE$

Note: Repeat

MTP June 22

(22) An employer recruits experienced (x) and fresh workmen(y) for his under the condition that he cannot employ more than 11 people and y can be related by the inequality.

a. $x+y \ne 11$
b. $x+y \le 11, x \ge 0, y \ge 0$
c. $x+y \ge 11, x \ge 0, y \ge 0$
d. none of these

MTP June 22

(23) $6x + y \ge 18$, $x + 4y \ge 12$, $2x + y \ge 10$ On solving the inequalities; we get:

a. (0, 18), (12, 0), (4, 2) & (7, 6)
b. (3, 0), (0, 3), (4, 2) & (7, 6)
c. (5, 0), (0, 10), (4, 2) & (7, 6)
d. (0, 18), (12, 0), (4, 2), (0, 0) & (7, 6)

Note: Repeat PYQ Nov 19

MTP Dec 22 – Series I

(24) A Labour can be paid under two methods given below :

☆ (i) ₹ 600 fixed and ₹ 50 per hour
(ii) ₹ 170 per hour
If a labour job work takes 'r' hours to complete, find out the value of r for which the method (ii) gives the labour gets the better wages.

a. $x = 6$ b. $x = 4$
c. $x = 3$ d. $x = 2$

**MTP Dec 22 – Series I**

**(25)** *The time required to produce a unit of product A is 3 hours and that for product B is 5 hours. The total available time is 220 hours. If x and y are the number of units of A and B that are produced then*

*a.* $3x + 2y = 220$

*b.* $3x + 5y \geq 220, x \geq 0, y \geq 0$

*c.* $3x + 5y \leq 220, x \geq 0, y \geq 0$

*d.* $5x + 2y \geq 220, x \geq 0, y \geq 0$

**MTP Dec 22 – Series II**

**(26)** $6x + y \geq 18, x + 4y \geq 12, 2x + y \geq 10$, *On solving the inequalities; we get:*

*a.* (0, 18), (12, 0), (4, 2), (7, 6)

*b.* (3, 0), (0, 3), (4, 2), (7, 6)

*c.* (5, 0), (0, 10), (4, 2), (7, 6)

*d.* (0, 18), (12, 0), (4, 2), (0, 0), (7, 6)

*Note: Repeat*

**MTP Jun 23 – Series I**

**(27)** *If* $3x + 2 < 2x + 5$ *and* $4x - 5 \geq 2x - 3$, *then x can take from the following values*

*a.* 3

*b.* -1

*c.* 2

*d.* -3

**MTP Jun 23 – Series I**

**(28)** *On solving the inequalities* $6x + y > 18, x + 4y > 12, 2x + y > 10$, *we get the following situation:*

*a.* (0, 18), (12, 0), (4, 2) & (7, 6)

*b.* (3, 0), (0, 3), (4, 2) & (7, 6)

*c.* (5, 0), (0, 10), (4, 2) & (7, 6)

*d.* (0, 18), (12, 0), (4, 2), (0, 0) & (7, 6)

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | d | 3 | a |
| 4 | c | 5 | a | 6 | a |
| 7 | c | 8 | b | 9 | a |
| 10 | c | 11 | b | 12 | a |
| 13 | a | 14 | b | 15 | a |
| 16 | d | 17 | b | 18 | b |
| 19 | a | 20 | a | 21 | d |
| 22 | b | 23 | a | 24 | a |
| 25 | c | 26 | a | 27 | c |
| 28 | a | | | | |

# Chapter 4 – Time Value of Money

## Simple Interest and Compound Interest

### Past Year Questions

PYQ May 18

(1) ☆ If ₹ 1,000 be invested at interest rate of 5% and the interest be added to the principal every 10 years, then the number of years in which it will amount to ₹ 2,000 is:

a. $16\frac{2}{3}$ years  b. $6\frac{1}{4}$ years

c. 16 years  d. $6\frac{2}{3}$ years

PYQ May 18

(2) A person borrows ₹ 5,000 for 2 years at 4% per annual simple interest. He immediately leads to another person at $6\frac{1}{4}$ % per annum for 2 years find his gain in the transaction for year:

a. ₹ 112.50  b. ₹ 225

c. ₹ 125  d. ₹ 107.50

PYQ May 18

(3) If an amount is kept at S I. it earns an interest of ₹ 600 in first two years but when kept at compound interest it earns an interest of ₹ 660 for the same period, then the rate of interest and principal amount respectively are:

a. 20%, ₹ 1,200  b. 20%, ₹ 1,500

c. 10%, ₹ 1,200  d. 10%, ₹ 1,500

PYQ Nov. 18

(4) If ₹ 10,000 is invested at 8% per year compounded quarterly, then the value of the investment after 2 years is:
(Given $(1+0.02)^8 = 1.171659$)

a. ₹ 11,716.59  b. ₹ 10,716.59

c. ₹ 117.1659  d. None of these

PYQ Nov. 18

(5) A bank pays 10% rate of interest compounded annually. A sum of ₹ 400 is deposited in the bank. The amount at the end if 1 year will be

a. ₹ 440  b. ₹ 439

c. ₹ 441  d. ₹ 442

PYQ Nov. 18

(6) A certain amount of money doubles itself in 10 years when deposited on simple interest. It would triple itself in

a. 20 years  b. 15 years

c. 25 years  d. 30 years

PYQ Nov. 18

(7) A man deposited ₹ 8,000 in a bank for 3 years at 5% per annum compound interest, after 3 years he will get

a. ₹ 8,800  b. ₹ 9,261

c. ₹ 9,200  d. ₹ 9,000

PYQ Nov. 18

(8) If in two years' time a principal of ₹ 100 amounts to ₹ 121 when the interest at the rate of r % is compounded annually, then the value of r will be

a. 10.5%  b. 10%

c. 15%  d. 14%

PYQ Nov. 18

(9) A certain sum of money Q was deposited for 5 years and 4 months at 4.5% simple interest and amounted to ₹ 248, then the value of Q is

a. ₹ 200  b. ₹ 210

c. ₹ 220  d. ₹ 240

PYQ Nov. 18

(10) If compound interest on a sum for 2 years at 4% per annum is ₹ 102, then the simple interest on the same sum for the same period at the same rate will be

a. ₹ 99  b. ₹ 101

c. ₹ 100  d. ₹ 95

PYQ Nov. 18

(11) If the difference between the compound interest compounded annually and simple interest on a certain amount at 10% per annum for two years is ₹ 372, then the principal amount is

a. ₹ 37,200  b. ₹ 37,000

c. ₹ 37,500  d. None of these

Repeat Jan 21 - PYQ Nov. 18

(12) The effective rate of interest for one year deposit corresponding to a nominal 7% rate of interest per annum convertible quarterly is

a. 7%  b. 7.5%

c. 7.4%  d. 7.18%

PYQ Nov. 18

(13) How much will ₹ 25,000 amount to in 2 years at compound interest if the rates for the successive years are 4% and 5% per year

a. ₹ 27,300 b. ₹ 27,000
c. ₹ 27,500 d. ₹ 27,900

PYQ Nov. 18

(14) ₹ 8,000/- at 10% per annum interest compounded half yearly will become at the end of one year

a. ₹ 8,800 b. ₹ 8,820
c. ₹ 8,900 d. ₹ 9,600

PYQ June 19

(15) The certain sum of money became ₹ 692/- in 2 years and ₹ 800/- in 5 years then the principal amount is _____

a. ₹ 520 b. ₹ 620
c. ₹ 720 d. ₹ 820

PYQ June 19

(16) A sum of money amount to ₹ 6,200 in 2 years and ₹ 7,400 in 3 years as per S.I. then the principal is

a. ₹ 3,000 b. ₹ 3,500
c. ₹ 3,800 d. None of these

PYQ June 19

(17) A sum was invested for 3 years as per C.I. and the rate of interest for first year is 9%, 2nd year is 6% and 3rd year is 3% p.a. respectively. Find the sum if the amount in three years is ₹ 550?

a. ₹ 250 b. ₹ 300
c. ₹ 462.16 d. ₹ 350

PYQ June 19

(18) $P = ₹ 5,000\ R = 15\%\ T = 4\frac{1}{2}$ y using $I = \frac{PTR}{100}$ then I will be

a. ₹ 3,375 b. ₹ 3,300
c. ₹ 3,735 d. None o these

PYQ June 19

9) The effective rate of interest does not depend upon

a. Amount of Principal
b. Amount of Interest
c. Number of Conversion Periods
d. None of these

PYQ June 19

If $P\ i^2 = ₹ 96$, and R = 8% compounded annually then P =

a. ₹ 14,000 b. ₹ 15,000
c. ₹ 16,000 d. ₹ 17,000

PYQ June 1

(21) In simple interest if the principal is ₹ 2,000 and the rate and time are the roots of the equation $x^2 - 11x + 30 = 0$ then simple interest is

a. ₹ 500 b. ₹ 600
c. ₹ 700 d. ₹ 800

PYQ Nov. 1

(22) A man invests ₹ 12,000 at 10% p.a. and another sum of money at 20% p.a. for one year. ☆ The total investment earns at 14% p.a. simple interest the total investment is:

a. ₹ 8,000 b. ₹ 20,000
c. ₹ 14,000 d. ₹ 16,000

PYQ Nov. 1

(23) The difference in simple interest of a sum invested of ₹ 1,500 for 3 years is ₹ 18. The difference in their rates is:

a. 0.4 b. 0.6
c. 0.8 d. 0.10

PYQ Nov. 1

(24) Find the effective rate of interest on ₹ 10,000 on which interest is payable half yearly at 5% p.a.

a. 5.06% b. 4%
c. 0.4% d. 3%

PYQ Nov. 19

(25) Find the effective rate of interest at 10% p.a. when interest is payable quarterly

a. 10.38% b. 5%
c. 5.04% d. 4%

PYQ Nov. 19

(26) What will be the population after 3 years when present population is ₹ 25,000 and population increases at the rate of 3% in 1 year, at 4% in 2nd year and 5% in 3rd year?

a. ₹ 28,119 b. ₹ 29,118
c. ₹ 27,000 d. ₹ 30,000

PYQ Nov. 19

(27) The value of scooter is ₹ 10,000 find its value after 7 years if rate of depreciation is 10% p.a.

a. ₹ 4,782.96 b. ₹ 4,278.69
c. ₹ 42,079 d. ₹ 42,000

PYQ Nov. 19

(28) SI = 0.125P at 10% p.a. Find time.

a. 1.25 years b. 25 years
c. 0.25 years d. None of these

PYQ Nov. 19

(29) Scrap value of a machine valued at ₹ 10,00,000, after 10 years within depreciation at 10% p.a.:
a. ₹ 3,48,678.44 b. ₹ 3,84,679.45
c. ₹ 4,00,000 d. ₹ 3,00,000

PYQ Nov. 19

(30) The difference between CI and SI for 2 years, is 21. If rate of interest is 5% find principal
a. ₹ 8,400 b. ₹ 4,800
c. ₹ 8,000 d. ₹ 8,200

PYQ Nov. 20

(31) On what sum will the compound interest at 5% per annum for 2 years compounded annually be ₹ 3,280.
a. ₹ 32,000 b. ₹ 16,000
c. ₹ 48,000 d. ₹ 64,000

PYQ Nov. 20

(32) An amount P becomes ₹ 5,100.5 and ₹ 5,203 after second and fourth years respectively at 1% of interest per annum compounded annually. Thus value of P and R are:
a. ₹ 4,000 and 1.5 b. ₹ 5,000 and 1
c. ₹ 6,000 and 2 d. ₹ 5,500 and 3

PYQ Nov. 20

(33) A certain sum invested at 4% per annum compounded semi-annually amounts to ₹ 1,20,000 at the end of one year. Find the sum:
a. 1,15,340 b. 1,10,120
c. 1,12,812 d. 1,13,113

Repeat Jan 21 - PYQ Nov. 20

(34) Find the compound interest if an amount of ₹ 50,000 is deposited in bank for one year at the rate of 8% per annum compounded semi-annually.
a. ₹ 3,080 b. ₹ 4,080
c. ₹ 5,456 d. ₹ 7,856

PYQ Nov. 20

(35) An amount is lent at a nominal rate of 4.5% per annum compounded quarterly. What would be ☆ the gain in rupees over when compounded annually?
a. 0.56 b. 0.45
c. 0.076 d. 0.85

PYQ Nov. 20

(36) What sum of money will produce ₹ 42,800 as an interest in 3 years and 3 months at 2.5% p.a. simple interest?
a. ₹ 3,78,000 b. ₹ 5,26,769
c. ₹ 4,22.000 d. ₹ 2,24.000

PYQ Nov. 20

(37) The ratio of principal and the compound interest value for three years (compounded ☆ annually) is 216 : 127. The rate of interest is:
a. 0.1777 b. 0.1567
c. 0.1666 d. 0.1587

Repeat Q34 | PYQ Jan. 21

(38) A certain sum amounted to ₹ 575 at 5% in a time in which ₹ 750 amounted to ₹ 840 at 4%. If the rate of interest is simple, find the sum-
a. 525 b. 550
c. 515 d. 500

PYQ Jan. 21

(39) Find the amount of compounded interest, if an amount of ₹ 50,000 is deposited in a bank for one year at the rate of 8% per annum compounded semiannually
a. 3,080 b. 4,080
c. 5,456 d. 7,856

PYQ Jan. 21

(40) The population of a town increase by 2% of the population at the beginning of the year. The number of year by which the total increases in population would be 40% is:
a. 7 years
b. 10 years
c. 17 years
d. 19 years (approx.)

PYQ Jan. 21

(41) Two equal amounts of money an deposited in two banks each at 15% p.a. fix 3.5 year in the ☆ bank and fix 5 years in the either. The difference between the interest amount from the bank in ₹ 144. Find the sum
a. ₹ 620 b. ₹ 640
c. ₹ 820 d. ₹ 840

PYQ Jan. 21

(42) The simple interest on sum at 4% p.a. for 2 years is ₹ 80. Find the CI on the same sum for the same period.
a. ₹ 81.60 b. ₹ 80.80
c. ₹ 83.20 d. ₹ 82.30

PYQ Jan. 21

(43) Which is a better investment 9% p.a. compounded quarterly or 9.1% p.a. simple interest?

a. 9% compounded
b. 9.1% S.T.
c. Both are same
d. Cannot be said

Repeat Q12 | PYQ Jan. 21

(44) The effective rate of interest corresponding to a nominal rate of 7% p.a. compounded quarterly is

a. 7.5% b. 7.6%
c. 7.7% d. 7.18%

PYQ Jan. 21

(45) A man invested one-third of his capital at 7% one fourth at 8% and the remainder at 10%. If ☆ the annual income is ₹ 561. The capital is -

a. ₹ 4,400 b. ₹ 5,500
c. ₹ 6,600 d. ₹ 5,800

PYQ Jan. 21

(46) A sum of money is lent at C.I. rate 20% p.a. 2 years. It would fetch ₹ 482 more if the interest is compounded half yearly. The sum is:

a. ₹ 19,800 b. ₹ 19,900
c. ₹ 20,000 d. ₹ 20,100

PYQ Jan. 21

(47) What 'I' denote the actual rate of interest in decimal, and n denote the number of conversion periods, the formula for computing the effective rate of interest E is given by.

a. $(1+i)^n$ b. $(1+i)^n - 1$
c. $1-(1+i)^n$ d. $(1+i)^{-n}$

PYQ July 21

(48) The effective rate of return for 24% per annum convertible monthly is given as:

a. 24% b. 26.82%
c. 18% d. 24.24%

PYQ July 21

(49) What is the compound interest (in ₹) on a sum of ₹ 12,600 for $1\frac{1}{2}$ years at 20% per annum if the interest is compounded half yearly? (Nearest to a rupee)

a. 4,271 b. 4,171
c. 4,711 d. 4,117

PYQ July 21

(50) A sum of ₹ 7,500 amounts to ₹ 9,075 at 10% p.a., interest being compounded yearly in a ☆ certain time. The simple interest (in ₹) on the same sum for the same time and the same rate is:

a. 1,000 b. 1,250
c. 1,800 d. 1,500

PYQ July 21

(51) A certain sum amounts to ₹ 15,748 in 3 years at simple interest at r% p.a. The same sum amounts to ₹ 16,510 at (r + 2) % p.a. simple interest in the same time. What is the value of r?

a. 10% b. 8%
c. 12% d. 6%

PYQ July 21

(52) What is the difference (in ₹) between the simple interest and the compound interest on a sum of ₹ 8,000 for $2\frac{2}{5}$ years at the rate of 10% p.a. when the interest is compounded yearly?

a. 136.12 b. 129.50
c. 151.75 d. 147.20

PYQ July 21

(53) A sum of ₹ x amounts to ₹ 27,900 in 3 years and to ₹ 41,850 in 6 years at a certain rate percent per annum, when the interest is compounded yearly. The value of x is:

a. 16,080 b. 18,600
c. 18,060 d. 16,800

PYQ Dec. 21

(54) Rahul invested ₹ 70,000 in a bank at the rate of 6.5% p.a. simple interest rate. He received ₹ 85,925 after the end of term. Find out the period for which sum was invested by Rahul.

a. 2 years b. 3 years
c. 3.5 years d. 2.5 years

PYQ Dec. 21

(55) A company needs ₹ 10,000 in five years to replace as equipment. How much (in ₹) should be invested now at an interest rate of 8% p.a. is order to provide for this equipment?

a. 6,000 b. 6,805
c. 10,000 d. 11,000

PYQ Dec. 21

(56) R needs money to pay ₹ 5,00,000 in 10 years. He invested a sum in a scheme at 9% rate of interest compounded half-yearly. How much amount (in ₹) he invested?
$(1.046^{20} = 2.41171)$
a. 3,07,321 b. 2,70,321
c. 2,07,321 d. 3,40,321

PYQ Dec. 21

(57) ☆ An amount is lent at R% simple interest for R years and the simple interest amount was one-fourth of the principal amount. Then R is _____
a. 5 b. 6
c. $5^{1/2}$ d. $6^{1/2}$

PYQ Dec. 21

(58) ☆ A sum of money is put at 20% compound interest rate p.a. at which year the aggregated amount just exceeds the double of the original sum?
a. 6 b. 5
c. 4 d. 3

PYQ June 22

(59) In how much time a sum of amount doubles at simple interest at 12.5% rate?
a. 7 years b. 8 years
c. 9 years d. 10 years

PYQ June 22

(60) The effective rate of interest corresponding a nominal rate of 7% p.a. convertible quarterly.
a. 7% b. 7.5%
c. 5% d. 7.18%

PYQ Dec 22

(61) ☆ A machine worth ₹ 4,90,740 is depreciated at 15% on its opening value each year. When would its value reduce to ₹ 2,00,750?
a. 5 years 5 months
b. 5 years 6 months
c. 5 years 7 months
d. 5 years 8 months

PYQ Dec 22

(62) If ₹ 64 amount to ₹ 83.20 in 2 years, what will ₹86 amount to in 4 years at the same Rate percent per annum?
a. ₹ 127.60 b. ₹ 147.60
c. ₹ 145.34 d. ₹ 117.60

PYQ Dec 22

(63) A farmer borrowed ₹ 3,600 at the rate of 15% simple interest per Annum. At the end of 4 years, he cleared this account by paying ₹ 4,000 and a cow. The cost of the cow is:
a. ₹ 1,000 b. ₹ 1,200
c. ₹ 1,550 d. ₹ 1,760

PYQ Dec 22

(64) The effective annual rate of interest corresponding to a normal rate of 6% per annum payable half yearly is:
a. 6.06% b. 6.07%
c. 6.08% d. 6.09%

PYQ Dec 22

(65) ☆ Mr. Prakash invested money in two schemes 'A' and 'B' offering compound interest at the rate of 8% and 9% per annum respectively. If the total amount of interest accrued through these two schemes together in two years was ₹4,818.30 and total amount invested was ₹ 27,000. What was the amount invested in schemes 'A'?
a. ₹ 12,000 b. ₹ 12,500
c. ₹ 13,000 d. ₹ 13,500

PYQ Dec 22

(66) ☆ A sum of money invested of compound interest double itself in four years. In how many years it become 32 times of itself at the same rate of compound interest?
a. 12 years b. 16 years
c. 20 years d. 24 years

PYQ Dec 22

(67) The difference between compound interest and simple interest on an amount of ₹ 15,000 for 2 years is ₹ 96. What is the rate of interest per annum?
a. 9% b. 8%
c. 10% d. 11%

PYQ Dec 22

(68) A sum of money doubles itself in 4 years at certain compound interest rate. In how many years this sum will become 8 times at the same compound interest rate?
a. 12 years b. 14 years
c. 16 years d. 18 years

PYQ Jun 23

(69) Mr. Ram invested a total of ₹ 1,00,000 in two different banks for a fixed period. The first bank yields an interest of 9% per annum and second, 11% per annum. If the total interest at the end of one year is 9.75% per annum, there the amount invested in these banks are respectively:

a. ₹ 52,500, ₹47,500
b. ₹ 62,500, ₹ 37,500
c. ₹ 57,500, ₹ 42,500
d. ₹ 67,500, ₹ 32,500

PYQ Jun 23

(70) The nominal rate of interest is 10% per annum. The interest is compounded quarterly. The effective rate of interest per annum will be:

a. 10% b. 10.10%
c. 10.25% d. 10.38%

PYQ Jun 23

(71) The difference between compound interest and simple interest on a certain sum of money invested for 3 years at 6% per annum is ₹ 110.16. The principal is

a. ₹ 3,000 b. ₹ 3,700
c. ₹ 12,000 d. ₹ 10,000

PYQ Jun 23

(72) A machine depreciates 10% of its value at the beginning of the year. The cost and scrap value realized at the time of sale being ₹ 23,240 and ₹ 9,000 respectively. Approximately, for how many years the machine is put to use?

a. 7 b. 8
c. 9 d. 10

PYQ Jun 23

(73) The population of a town increases every year by 2% of the population at the beginning of that year. The approximate number of years, by which the total increase of population will be 40%, is _____ (Given $1.02^8 = 1.17166$)

a. 15 b. 17
c. 19 d. 20

PYQ Jun 23

(74) The compound interest on ₹ 15,625 for 9 months at 16% per annum compounded quarterly is:

a. ₹ 1,851 b. ₹ 1,941
c. ₹ 1,951 d. ₹ 1,961

PYQ Jun 23

(75) Jonny wants to have ₹ 2,00,000 in his saving account after three year. The rate of interest offered by bank is 8% per annum compounded annually. How much should he invest today to achieve his target amount?

a. ₹ 1,47,489.10 b. ₹ 1,58,766.44
c. ₹ 1,71,035.59 d. ₹ 1,84,417.96

**Answer Key**

| | | |
|---|---|---|
| 1 a | 2 b | 3 b |
| 4 a | 5 a | 6 a |
| 7 b | 8 b | 9 a |
| 10 c | 11 a | 12 d |
| 13 a | 14 b | 15 b |
| 16 c | 17 c | 18 a |
| 19 a | 20 b | 21 b |
| 22 b | 23 a | 24 a |
| 25 a | 26 a | 27 a |
| 28 a | 29 a | 30 a |
| 31 a | 32 b | 33 a |
| 34 b | 35 c | 36 b |
| 37 c | 38 d | 39 b |
| 40 c | 41 b | 42 a |
| 43 a | 44 d | 45 c |
| 46 c | 47 b | 48 b |
| 49 b | 50 d | 51 b |
| 52 a | 53 b | 54 c |
| 55 b | 56 c | 57 a |
| 58 c | 59 b | 60 d |
| 61 b | 62 c | 63 d |
| 64 d | 65 a | 66 c |
| 67 b | 68 a | 69 b |
| 70 d | 71 d | 72 c |
| 73 b | 74 c | 75 b |

## Simple Interest and Compound Interest

### Mock Test Paper Questions

**MTP May 18**

(1) Nominal rate of Interest 9.9% p.a. If Interest is compounded monthly. What will be the effective rate of Interest? (Given $\left(\frac{4033}{4000}\right)^{12} = 1.1036$)

a. 10.36% b. 9.36%
c. 11.36% d. 9.9%

**MTP May 18**

(2) A machine worth of ₹ 4,90,740 is depreciated at 15% on its opening value each year. When its value reduce to ₹ 2,00,000

a. 5 years 6 months
b. 5 years 7 months
c. 5 years 5 months
d. None of these

**MTP May 18**

(3) A sum of money doubles itself at compound interest in 10 years. In how many years will it become eight times

a. 10 b. 30
c. 40 d. 35

**MTP May 18**

(4) The time in which a sum of money will be doubled at 6% compound interest compounded interest compounded interest compounded annually approximately.

a. 10 years b. 12 years
c. 13 years d. 14 years

**MTP Nov 18**

(5) A lent ₹ 6000 to B for 2 years and 1500 to C for 4 years and received total interest of ₹ 900 from both. The rate of interest when simple interest method calculated.

a. 5% b. 6%
c. 7.5% d. 9%

Note: There was a typo in que of MTP which is corrected here.

**MTP Nov 18**

(6) If the difference between the interests received from two different banks on ₹ 5000 for 2 years is ₹ 50 then the difference between this rates.

a. 0.25% b. 0.40%
c. 0.50% d. 0.75%

**MTP Nov 18**

(7) The simple interest of P % for P years will be ₹ P on a sum of :

☆

a. $₹ \frac{p}{100}$
b. $₹ \frac{100}{p}$
c. $₹ \left(\frac{p}{100}+1\right)$
d. $₹ \left(\frac{100}{p}-1\right)$

**MTP Nov 18**

(8) The compound interest on a certain sum is ₹ 209 simple interest is ₹ 200 for 2 years. What is the rate per cent for 2 years? what is the rate percent?

☆

a. 9% b. 18%
c. 4.5% d. 10%

**MTP Nov 18**

(9) The value of a machine depreciates 12% annually. If the present value of ₹ 68,150 then its value in 3 years ago was.

a. ₹ 1,10,000 b. ₹ 1,00,004
c. ₹ 92,000 d. ₹ 97,000

**MTP Nov 18**

(10) What principal will amount to ₹ 370 in 6 years at 8% p.a. at simple interest

a. ₹ 210 b. ₹ 250
c. ₹ 310 d. ₹ 310

**MTP Nov 18**

(11) The effective rate of interest is an amount ₹ 25,000 is deposited in a bank for one year at value of 6% per annum compounded semi-annually is

a. 5.99% b. 5.95%
c. 6.09% d. 6.90%

**MTP Nov 18**

(12) A Sum of money doubles itself in 10 years. The number of years it would be trebled itself is:

a. 25 years b. 15 years
c. 20 years d. None of these

MTP May 19

(13) A certain money doubles itself in 10 years when deposited on simple interest. It would triple itself in

a. 30 years b. 20 years
c. 25 years d. 15 years

MTP May 19

(14) A man deposited ₹ 8,000 in a bank for 3 years at 5% per annum compound interest, after 3 years he will get

a. ₹ 9000 b. ₹ 8800
c. ₹ 9200 d. ₹ 9261

MTP May 19 – Error in MTP

(15) The effective rate of interest for one year corresponding to a nominal at 7% rate of interest per annum convertible quarterly is

a. 7% b. 7.02%
c. 8% d. 7.18 %

Note: All the options given in MTP were wrong, we have revised here as per que.

MTP May 19

(16) The population of a town increases every year by 2 % of the population beginning of that year. The number of years by which the total increase of population be 40% is

a. 7 years b. 10 years
c. 17 years (apx.) d. None of these

MTP May 19, ICAI SM

(17) The annual birth rates per 1,000 are 39.4 and 19.4 respectively. The number of years which the population will be doubled assuming there is no immigration or emigration is

a. 35 years b. 30 years
c. 25 years d. none of these

MTP May 19 Series II

(18) ₹ 10,000 is invested at annual rate of interest of 10% p.a. The amount after two years at annual compounding is

a. ₹ 21100 b. ₹ 12100
c. ₹ 12110 d. None of these

MTP May 19 Series II - Error in MTP

(19) The annual birth rate and death rate per 1000 are 39.4 and 19.4 respectively. The number of years in which population will be doubled assuming that there is no immigration or emigration is approximately

a. 40 Years b. 30 years
c. 35 Years d. 25 years

MTP May 19 Series II

(20) If the effective rate of interest is 12% per annum and the interest is compounded quarterly, the nominal rate of interest per annum

a. 11.78 % b. 11.21 %
c. 11.89% c d. 11.49 %

Note: The nominal rate should be 11% but given wrong in MTP as 12%

MTP May 19 Series II, ICAI SM

(21) The difference between CI and SI on a certain money invested for three years at 6% per annum is ₹ 110.16. The sum is

a. ₹ 3000 b. ₹ 3700
c. ₹ 12000 d. ₹ 10000

MTP May 19 Series II

(22) Simple interest on ₹ 3500 for 3 years at 12% per annum is

a. ₹ 1200 b. ₹ 1260
c. ₹ 2260 d. ₹ 2000

MTP Nov 19

(23) ₹ 1000 is invested at annual rate of interest of 10% p.a. The amount after two years if compounding is done annually is _____.

a. ₹ 121 b. ₹ 1210
c. ₹ 2110 d. None of these

MTP Nov 19

(24) If A person invests ₹ 3,000 in a three years' investment that pays you 12% per annum. Calculate the future value of the investment.

a. ₹ 4214.78 b. ₹ 4124.78
c. ₹ 4324.48 d. ₹ 4526.48

MTP Nov 19

(25) ☆ A person deposited a sum of ₹ 10,000 in a bank. After 2 years, he withdrew ₹ 4,000 and at the end of 5 years, he received an amount of ₹ 7,900; then the rate of simple interest is:

a. 6% b. 5%
c. 10% d. None of these

MTP Nov 19

(26) ☆ A trust fund has invested ₹ 30,000 in two different types of bonds which pays 5% and 7% interest respectively. Determine how much amount is invested in second type of bond if trust obtains an annual total interest of ₹ 1600.

a. ₹ 5000 b. ₹ 6000
c. ₹ 7000 d. ₹ 8000

MTP Nov 19 – Error in MTP

(27) ☆ At six months intervals A deposited ₹ 1000 in a savings account which credit interest at 10% p.a., compounded semi-annually. The first deposit was made when A's son was 6 months old and last deposit was made when his son was 8 years old. The money remained in the account and was given to the son on his 10th birthday. How much did he receive?
$(1.05)^{16} = 2.1829$

a. ₹ 25740 b. ₹ 23740
c. ₹ 27860 d. ₹ 29760

Note: All options are incorrect, right ans is ₹ 28755

MTP Nov 19

(28) What is the effective rate of interest if the nominal rate 5 % p.a converted quarterly?

a. 6.09 % b. 5.09 %
c. 5.55% d. 5.60 %

MTP Nov 19

(29) A sum of money doubles itself at compound interest in 10 years. In how many years will it become eight times?

a. 20 b. 30
c. 40 d. 35

MTP Nov 19

(30) Certain sum of money borrowed at simple interest amount to Rs.2688 in three years and to ₹ 2784 in four years at the rate per annum equal to.

a. 7% b. 6%
c. 5% d. 4%

MTP May 20

(31) A sum of ₹ 46,875 was lent out at simple interest and at the end of 1 year 8months the total amount was ₹ 50,000. Find the rate of interest percent per annum.

a. 5% b. 6%
c. 4% d. 8%

MTP May 20

(32) A = ₹ 5,200, R = 5% p.a., T = 6 years, P will be

a. ₹ 2,000 b. ₹ 3,880
c. ₹ 3,000 d. none of these

MTP May 20

(33) The time by which a sum of money would treble itself at 8% p. a C. I is

a. 14.28 years b. 14 years
c. 12 years d. none of these.

MTP May 20

(34) A machine depreciates at 10% of its value at the beginning of a year. The cost and scrap value realized at the time of sale being ₹ 23,240 and ₹ 9,000 respectively. For how many years the machine was put to use?

a. 7 years b. 8 years
c. 9 years d. 10 years

MTP May 20

(35) The compound interest on half-yearly rests on ₹ 10,000 the rate for the first and second years being 6% and for the third year 9% p.a. is

a. ₹ 2,200 b. ₹ 2,287
c. ₹ 2,285 d. ₹ 2290.84

MTP May 20

(36) The effective rate of interest corresponding to a nominal rate 3% p.a payable half yearly is

a. 3.2% p.a b. 3.25% p.a
c. 3.0225% p.a d. none of these

MTP Nov 20

(37) A sum of money triples itself in 18 years under simple interest. what is the rate of interest per annum?

a. 9% b. 9.09%
c. 11.11% d. 13%

MTP Nov 20

(38) What time will be required for a sum of money to double itself at 8 % Simple interest?

a. 8 years b. 8.5 years
c. 12.5 years d. 12 years

MTP Nov 20

(39) The difference between simple interest and compound interest on a sum of ₹ 6,00,000 for two years is ₹ 6000. What is the annual rate of interest?

a. 8% b. 10%
c. 6% d. 12%

MTP Nov 20

(40) What is the sum of money will amount to ₹ 11035.50 in four years at compound interest for 1st, 2nd, 3rd and 4th years being 4%, 3%, 2% and 1% respectively.

a. ₹ 10,000 b. ₹ 11,000
c. ₹ 1035 d. ₹ 11,305

MTP Nov 20

(41) A Machine was purchased for ₹ 10,000. Its rate of depreciation is 10% in the first year and 5 % per annum afterwards. Find the depreciated value of Machine after 7 years of purchase
(Given $(0.95)^6 = 0.7351$)

a. ₹ 6606 b. ₹ 6616
c. ₹ 6660 d. ₹ 6661

MTP Nov 20

(42) The effective rate of interest for one-year deposit corresponding to a nominal 7 % rate of interest per annum convertible quarterly is

a. 7% b. 7.5%
c. 7.4% d. 7.18%

MTP Nov 20

(43) What will be the population after three years when present population is ₹25,000 and population increases at the rate of 3 % in first year, 4 % in second year and 5 % in third year?

a. 28119 b. 29118
c. 27000 d. 30000

MTP Nov 20

(44) SI = 0.125 P at 10% p.a find the time

a. 1.25 years b. 25 years
c. 0.25 years d. None of these

MTP March 21

(45) ₹ 8,000 becomes ₹ 10,000 in two years at simple interest. The amount that will become ₹ 6,875 in 3 years at the same rate of interest is:

a. ₹ 4850 b. ₹ 5000
c. ₹ 5500 d. ₹ 5275

Note: All options are incorrect, correct is ₹4828

MTP March 21

(46) The difference between the simple and compound interest on a certain sum for 3 year at 5% p.a. is ₹ 228.75. The compound interest on the sum for 2 years at 5% p.a. is:

a. ₹ 3175 b. ₹ 3075
c. ₹ 3275 d. ₹ 2975

MTP March 21

(47) A sum of money doubles itself in 10 years. The number of years it would treble itself is:

a. 25 years b. 15 years
c. 20 years d. None of these

MTP March 21

(48) The effective rate equivalent to nominal rate of 6% compounded monthly is:

a. 6.05 b. 6.17
c. 6.26 d. 6.07

MTP March 21

(49) A person borrows ₹ 5,000 for 2 years at 4% p.a. simple interest. He immediately lends to another person at $6\frac{1}{4}$% p.a. for 2 years. Find his gain in the transaction per year:

a. ₹ 112.50 b. ₹ 125
c. ₹ 225 d. ₹ 167.50

MTP March 21

(50) The cost of machinery is ₹ 1,25,000/- if its useful life is estimated to be 20 years and the rate of depreciation of its cost is 10% p.a., then the scrap value of the Machinery is [given that $(0.9)^{20} = 0.12158$ ]

a. 15,197 b. 15,400
c. 15,300 d. 15,250

MTP March 21

(51) If A person invests ₹ 5,000 in a three years' investment that pays you 12% per annum. Calculate the future value of the investment.

a. ₹ 7024.64 b. ₹ 7124.78
c. ₹ 7324.48 d. ₹ 7526.48

MTP Apr 21

(52) Two equal sums were lent out at 7% and 5% simple interest respectively. The interest earned on the two loans adds up to ₹ 960 for four years. Find the total sum lent out.

a. ₹ 4000 b. ₹ 3000
c. ₹ 5000 d. ₹ 6000

MTP Apr 21

(53) A sum of money amounts to Rs. 20,800 in 5 years and ₹ 22720 in 7 years. Find the principle and rate of interest.

a. ₹ 5000, 6% b. ₹ 16000, 6%
c. ₹ 80000, 8% d. ₹ 10000, 10%

MTP Apr 21, ICAI SM

(54) The annual birth and death rates per 1000 are 39.4 and 19.4 respectively. The number of years in which the population will doubled assuming there is no immigration or emigration is:

a. 35 years b. 30 years
c. 25 years d. None of these

MTP Apr 21

(55) The effective annual rate of interest corresponding to nominal rate 6% p.a. payable half yearly is

a. 6.06 b. 6.07
c. 6.08 d. 6.09

MTP Apr 21

(56) The cost of machinery Rs.1,25,000 if its useful life estimated to the 20 years and the rate of depreciation of its cost is 10% p.a . Then scrap value of machinery is (given that $(0.9)^{20}$ = 0.1215)

a. Rs. 15,187 b. Rs. 15,400
c. Rs. 15,300 d. Rs. 15,250

MTP Apr 21

(57) If a simple interest on a sum of money at 6% p.a for 7 years is equal to twice of simple interest on another sum for 9 years at 5% p.a. The ratio will be

a. 2:15 b. 7:15
c. 15:7 d. 1:7

MTP Apr 21

(58) In what will be a sum of money double itself at 6.25% p.a . Simple interest?

a. 5 years b. 8 years
c. 12 years d. 16 years

MTP Apr 21

(59) What will be population after 3 years when present population is 25,000 and population increase at the rate of 3% in first year , at 4% in second year and at 5 % in third year ?

a. 28,119 b. 29,118
c. 30,100 d. 27,100

MTP Apr 21

(60) A sum amount to Rs. 1331 at a principal of Rs.1000 at 10% compounded annually. Find the time

a. 3.31 years b. 4 years
c. 3 years d. 2 years

MTP Nov 21

(61) The sum of money doubles itself in 10 years. The number of years it would be treble itself is:

a. 25 years b. 15 years
c. 20 years d. None of these

MTP Nov 21

(62) ☆ Arun purchased a vaccum cleaner by giving ₹1700 as cash down payment, which will be followed by five EMIs of ₹480 each. The vaccum cleaner can also be bought by paying ₹3900 cash. What is the approx. rate of interest p.a. (at simple interest) under this instalment plan?

a. 18% b. 19%
c. 22% d. 20%

MTP Nov 21

(63) If a sum triples itself in 15 years at simple rat of interest, the rate of interest per annum will be:

a. 13% b. 13.3%
c. 13.5% d. 18.0%

MTP Nov 21

(64) What will be population after 3 years when present population is 25, 000 and population increases at the rate of 3% in I year, at 4% in II year and 5% in III year?

a. Rs.28,119 b. Rs.29,118
c. Rs.27, 000 d. Rs.30, 000

MTP Nov 21

(65) He effective rate of interest equivalent to the nominal rate of 7% converted monthly:

a. 7.26% b. 7.22%
c. 7.02% d. 7.20%

MTP Nov 21

(66) How much will be Rs.25,000 to in 2 years at compound interest if the rates for the successive years are at 4% and 5% per year

a. Rs.27,300 b. Rs.27,000
c. Rs.27,500 d. Rs.27,900

MTP Oct 21

(67) A sum of ₹ 46,875 was lent out at simple interest and at the end of 1 year 8 months, the total amount was ₹ 50,000. Find the rate of interest per annum.

a. 8% b. 10%
c. 12% d. None

Note: Given ans in MTP is wrong, correct is 4%

MTP Oct 21, ICAI SM

(68) A sum of money amount to ₹ 6,200 in 2 years and ₹ 7,400 in 3 years. The principal and rate of interest are

a. ₹ 3,800, 31.57% b. ₹3,000, 20%
c. ₹3,500, 15% d. none of these

MTP Oct 21

(69) The effective rate of interest corresponding to a nominal rate 3% p.a payable half yearly is

a. 3.2% p.a b. 3.25% p.a
c. 3.0225% p.a d. none of these

MTP Oct 21

(70) ☆ 1A sum of money gets doubled in 5 years at X% simple interest. If the interest was Y%, the sum of money would have become ten-fold in thirty years. What is Y – X (in %)

a. 10 b. 5
c. 8 d. none of these

MTP Oct 21

(71) The difference between Compound Interest and Simple Interest on a certain sum for 2 years at 6% p.a. is ₹ 13.50. Find the sum

a. 3750 b. 2750
c. 4750 d. none of these

MTP Oct 21, ICAI SM

(72) The sum required to earn a monthly interest of Rs 1200 at 18% per annum Simple Interest is

a. ₹ 50,000 b. ₹ 60,000
c. ₹ 80,000 d. none of these

MTP Oct 21

(73) The compound interest earned by a money lender on ₹ 7,000 for 3 years if the rate of interest for 3 years are 7%, 8% and 8.5% respectively is

a. ₹ 1750 b. ₹ 1800
c. ₹ 1776 d. none of these

MTP Oct 21

(74) A Maruti Zen cost ₹ 3,60,000. Its price depreciates at the rate of 10% of a year during the first two years and at the rate of 20% in third year. Also find the total depreciation.

a. ₹ 1,26,720 b. ₹ 1,15,620
c. ₹ 1,25,000 d. ₹1,10,520

MTP March 22

(75) In what time will be a sum of money doubles itself at 6.25% p.a simple interest?

a. 5 years b. 8 years
c. 12 years d. 16 years

MTP March 22

(76) The difference between the simple and compound interest on a certain of 3 years at 5% p.a is ₹₹ 228.75. The compound interest on the sum of for 2 years at 5% per annum is

a. ₹3175 b. ₹3075
c. ₹3275 d. ₹2975

MTP March 22

(77) How much time would the simple interest on a certain sum be 0.125 times the principal at 10% per annum

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

MTP March 22

(78) The time in by which a sum of money is 8 times of itself if it doubles itself in 15 years interest compounded annually.

a. 42 years b. 43 years
c. 45 years d. 46 years

MTP March 22

(79) Present value of a scooter is ₹7290, if its value decreases every year by 10% then the value before 3 years is equal to

a. 10,000 b. 10,500
c. 20,000 d. 20,500

MTP March 22

(80) Find the effective rate of interest at 10% p.a when the interest is payable quarterly.

a. 10.38% b. 5%
c. 5.04% d. 4%

MTP March 22

(81) The difference between in simple interest on a sum invested of ₹1500 for 3 years is ₹18. The difference in their rate is

a. 0.4 b. 0.6
c. 0.8 d. 0.10

MTP March 22

(82) What will be the population after 3 years when present population is 25000, if the population increases at the rate 3 % in I year, 4 % in II year and 5% in III year.

a. 28,119 b. 29,118
c. 27,000 d. 30,000

MTP March 22

(83) If ₹10,000 is invested at 8 % per annum, then compounded quarterly. Then value of investment after 2 years is

a. ₹ 11,716.59 b. ₹ 10,716.59
c. ₹ 12,715.59 d. none of these

MTP March 22

(84) In how many years will a sum of money become double at 5% p.a compound interest

a. 14 years b. 15 years
c. 16 years d. 14.3 years

MTP June 22

(85) Find the effective rate of interest if an amount of 30,000 deposited in a bank. For 1 year at the rate of 10% per annum compounded semi-annually.

a. 10.05% b. 10.10%
c. 10.20% d. 10.25%

MTP June 22

(86) The present population of a town is 25,000. If it grows at the rate of 4%, 5%, 8% during 1st year, 2nd year, 3rd year respectively. Then find the population after 3 years.

a. 29,484 b. 29,844
c. 29,448 d. 28,944

MTP June 22

(87) The present value of a scooter is ₹ 7290. The rate of depreciation is 10%. What was its value 3 years ago?

a. 10000 b. 10010
c. 9990 d. 12000

MTP June 22

(88) The rate of interest for the first 2 year is 3% per annum, for next 3 years is 8% per annum and for the period beyond 5 years, 10% per annum. If a man gets ₹ 1520 as a simple interest for 6 years; how much money did he deposit?

a. ₹ 3800 b. ₹ 3800
c. ₹ 4000 d. None of these

MTP June 22

(89) The difference between simple interest and compound interest on a certain for 2 years at 10% p.a . is ₹ 10. Find the Sum

a. ₹ 1010 b. ₹ 1095
c. ₹ 1000 d. ₹ 990

MTP June 22

(90) In how many years will a sum of money becomes four times at 12% p.a. simple interest?

a. 18 years b. 21 years
c. 25 years d. 28 years

MTP June 22

(91) The effective rate of interest does not depend upon

a. Amount of Principal
b. Amount of Interest
c. Number of Conversion periods
d. None of these

MTP June 22

(92) Find the effective rate of interest at 10% p.a. When interest is payable quarterly.

a. 10.38% b. 5%
c. 5.04% d. 4%

MTP June 22

(93) In simple interest if the principle is ₹ 2,000 and the rate and time are roots of the equation $x^2 - 11x + 30 = 0$

a. ₹ 500 b. ₹ 600
c. ₹ 700 d. ₹ 800

MTP Dec 22 – Series I

(94) Rajesh deposits ₹ 3,000 at the start of each quarter in his savings account. If the account earns interest of 5.75% per annum compounded quarterly, how much money (in ₹) will he have at the end of 4 years? [Given that $(1.014375)^{16} = 1.25654$ ]

a. ₹ 54308.6 b. ₹ 58553.6
c. ₹ 68353.6 d. ₹ 63624.4

Note: Que belong to Annuity Topic

MTP Dec 22 – Series I

(95) The annual rate of simple interest is 12.5%. In how many years does principal doubles?

a. 11 years b. 9 years
c. 8 years d. 7 years

MTP Dec 22 – Series I

(96) Certain sum of money borrowed at simple interest to ₹ 2688 in three years and to ₹ 2784 in four years at the rate per annum equal to -

a. 4% b. 6%
c. 5% d. 7%

MTP Dec 22 – Series I

(97) An investment is earning compounded interest ₹ 100 invested in the year 2 accumulated to ₹ 105 by year 4. If ₹ 500 is invested in the year 5, will become ₹ _____ by year 10. ☆

a. ₹ 364.80 b. ₹ 564.80
c. ₹ 464.80 d. ₹ 664.80

MTP Dec 22 – Series I

(98) An investor is saving to pay off an obligation of ₹ 15,250 which will due in seven years, if the investor is earning 7.5% simple interest rate per annum, he must deposit ₹ _____ to meet the obligation.

a. ₹ 8000 b. ₹ 9000
c. ₹ 10000 d. ₹ 11000

MTP Dec 22 – Series I

(99) The value of the scooter is ₹ 1,00,000 find its depreciation is 10% p.a. Calculate the total depreciation value at the end of seven years.

a. ₹ 47829.70 b. ₹ 47000.90
c. ₹ 42709 d. ₹ 42,000

Note: Que requirement should be to calculate WDV value and not the depreciation.

MTP Dec 22 – Series I

(100) Effective rate of interest does not depend upon

a. Amount of Principal
b. Amount of Interest
c. Number of conversion periods
d. none of these

MTP Dec 22 Series II

(101) A man invests ₹ 12,000 at 10% p.a. and another sum of money at 20% p.a for one year. The total investment earns at 14% p.a. simple interest the total investment is:

a. ₹ 8000 b. ₹ 20000
c. ₹ 14000 d. ₹ 16000

MTP Dec 22 Series II

(102) The difference in simple interest of a sum invested of ₹ 1,500 for 3 years is ₹ 18. The difference in their rates is:

a. 0.4 b. 0.6
c. 0.8 d. 0.10

MTP Dec 22 Series II

(103) Find the effective rate of interest on ₹ 10,000 on which interest is payable half yearly at 5% p.a.

a. 5.06% b. 4%
c. 0.4% d. 3%

MTP Dec 22 Series II

(104) Find the effective rate of interest at 10% p.a. when interest is payable quarterly.

a. 10.38% b. 5%
c. 5.04% d. 4%

MTP Dec 22 Series II

(105) What will be the population after 3 years when the present population is 25,000 the and population increases at the rate of 3% in 1st year, at 4% in, 2nd year and at 5% in 3rd year?

a. 28,119 b. 29,118
c. 27,000 d. 30,000

MTP Dec 22 Series II

(106) The value of scooter is ₹ 10,000. Find its value after 7 years if rate of depreciation is 10% p.a.

a. ₹ 4,782.96 b. ₹ 4,278.69
c. ₹ 42,079 d. ₹ 42,000

MTP Dec 22 Series II

(107) The difference between the CI and SI for 2 years is 21. If the rate of interest is 5%, the final principle is:

a. ₹ 8,200 b. ₹ 4,800
c. ₹ 8,000 d. ₹ 8,400

MTP Dec 22 Series II

(108) Mr. X lent some amount of money at 4% S.I. and he obtained ₹ 520 less than he lent in 5 years. The sum lent is ☆

a. ₹ 620 b. ₹ 650
c. ₹ 750 d. none of these

MTP Dec 22 Series II

(109) ₹ 8,829 is invested into three different sectors in such a way that their amounts at 4% p.a. S.I. after 5 years; 6 and 8 years are equal. Find each part of the sum. ☆

a. ₹ 3,069, ₹ 2,970; ₹ 2,790
b. ₹ 3,089, ₹ 2,970; ₹ 2,790
c. ₹ 3,609, ₹ 2,970; ₹ 2,790
d. ₹ 3,069, ₹ 2,960; ₹ 2,760

MTP Jun 23 Series I

(110) ₹ 80,000 is invested to earn a monthly interest of ₹ 1200 at the rate of _____p.a. Simple interest.

a. 12% b. 14%
c. 16% d. 18%

MTP Jun 23 Series I

(111) The effective annual rate of interest corresponding to a normal rate of 6% per annum payable half yearly is:

a. 6.06% b. 6.07%
c. 6.08% d. 6.09%

MTP Jun 23 Series I

(112) A trust fund has invested ₹ 27000 money in two schemes 'A' and 'B' offering compound interest at the rate of 8% and 9% per annum respectively. If the total amount of interest accrued through these two schemes together in two years was ₹ 4818.30. What was the amount invested in schemes 'A'?

a. ₹ 12,000 b. ₹ 12,500
c. ₹ 13,000 d. ₹ 12,500

MTP Jun 23 Series I

(113) A sum of money invested of compound interest double itself in four years. In how many years it become 32 times of itself at the same rate of compound interest.

a. 12 years b. 16 years
c. 20 years d. 18 years

MTP Jun 23 Series I

(114) The difference between compound interest and simple interest on an amount of ₹ 15,000 for 2 years is ₹ 96. What is the rate of interest per annum?

a. 9% b. 8%
c. 11% d. 10%

MTP Jun 23 Series II

(115) Mr. A invested ₹ x in an organization, it amounts to ₹ 150 at 5% p.a. S.I. and to ₹ 100 at 3% p.a. S.I. Then the value of x is

a. ₹ 70 b. ₹ 40
c. ₹ 25 d. None of these

MTP Jun 23 Series II

(116) Mrs. Sudha lent ₹ 4,000 in such a way that some amount to Mr. A at 3% p.a. S.I. and rest amount to B at 5% p.a. S.I., the annual interest from both is ₹ 144, Find the amount lent to Mr. A

a. ₹ 2,800 b. ₹ 1,200
c. ₹ 2,500 d. None of these

MTP Jun 23 Series II

(117) A certain sum of money becomes double at 5% rate of S.I. p.a. in a certain time, the time in years is

a. 10 years b. 20 years
c. 25 years d. None of these

MTP Jun 23 Series II

(118) A certain sum of money amounts to ₹ 5,000 in 5 years at 10% p.a. In how many years will it amount to ₹ 6,000 at same rate of S.I p.a.

a. 10 years b. 8 years
c. 6 years d. None of these

MTP Jun 23 Series II

(119) ₹ 1,25,000 is borrowed at compound interest at the rate of 2% for the 1st year, 3% for the second year and 4% for the 3rd year. Find the amount to be paid after 3 years

a. ₹ 125678 b. ₹ 136587
c. ₹ 163578 d. ₹ 136578

MTP Jun 23 Series II

(120) A certain sum of money amounts to double in 5 years placed at a compound interest. In how many years will it amount to 16 times at same rate of interest?

a. 12 years b. 20 years
c. 24 years d. None of these

MTP Jun 23 Series II

(121) If the compound interest on a certain sum of money for 3 years at 5% p.a. be ₹ 50.44, then the simple interest (S.I) is

a. ₹ 50 b. ₹ 49
c. ₹ 48 d. None of these

MTP Jun 23 Series II

(122) If the difference between C.I and S.I on a certain sum of money at 5% p.a. for 2 years is ₹ 1.50. Find the sum of money

a. ₹ 600 b. ₹ 500
c. ₹ 400 d. None of these

## Answer Key

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | a | 2 | a | 3 | b |
| 4 | b | 5 | a | 6 | c |
| 7 | b | 8 | a | 9 | b |
| 10 | b | 11 | c | 12 | c |
| 13 | b | 14 | d | 15 | d |
| 16 | c | 17 | a | 18 | b |
| 19 | c | 20 | d | 21 | d |
| 22 | b | 23 | b | 24 | a |
| 25 | b | 26 | a | 27 | b |
| 28 | b | 29 | b | 30 | d |
| 31 | c | 32 | b | 33 | a |
| 34 | c | 35 | d | 36 | c |
| 37 | c | 38 | c | 39 | b |
| 40 | a | 41 | b | 42 | d |
| 43 | a | 44 | a | 45 | b |
| 46 | b | 47 | c | 48 | b |
| 49 | a | 50 | a | 51 | a |
| 52 | a | 53 | b | 54 | a |
| 55 | d | 56 | a | 57 | c |
| 58 | d | 59 | a | 60 | c |
| 61 | c | 62 | c | 63 | b |
| 64 | a | 65 | b | 66 | a |
| 67 | b | 68 | a | 69 | c |
| 70 | a | 71 | a | 72 | c |
| 73 | c | 74 | a | 75 | d |
| 76 | b | 77 | a | 78 | c |
| 79 | a | 80 | a | 81 | a |
| 82 | a | 83 | a | 84 | d |
| 85 | d | 86 | a | 87 | a |
| 88 | a | 89 | c | 90 | c |
| 91 | a | 92 | a | 93 | b |
| 94 | a | 95 | c | 96 | a |
| 97 | b | 98 | c | 99 | a |
| 100 | a | 101 | b | 102 | a |
| 103 | a | 104 | a | 105 | a |
| 106 | a | 107 | d | 108 | b |
| 109 | a | 110 | d | 111 | d |
| 112 | a | 113 | c | 114 | c |
| 115 | c | 116 | a | 117 | b |
| 118 | b | 119 | d | 120 | b |
| 121 | b | 122 | a | | |

## Future Value and Present Value of Annuity

### Past Year Questions

PYQ May 1

(1) *Mr. X invest ₹ 10,000 every year starting from today for next: 10 years suppose interest rate is 8% per annual compounded annually. Calculate future value of the annuity.*

a. ₹ 1,56,454.88
b. ₹ 1,56,554.88
c. ₹ 1,44,865.625
d. None of these

PYQ May 1

(2) *How much amount is required to be invested every year so as to accumulate ₹ 3,00,000 at the end of the 10 years, if interest is compounded annually at 10%?*

a. ₹ 18,823.65
b. ₹ 18
c. ₹ 18,828.65
d. ₹ 18,882.65

PYQ Nov 18

(3) ☆ *A man invests an amount of ₹ 15,860 in the names of his three sons A, B and C in such a way that they get the same interest after 2, 3 and 4 years respectively. If the rate of interest is 5%, then the ratio of amount invested in the name of A, B and C is:*

a. 6 : 4 : 3 b. 3 : 4 : 6
c. 30 : 12 : 5 d. None of these

PYQ Nov 18

(4) *The value of furniture depreciates by 10% a year, it the present value of the furniture in an office is ₹ 21,870. Calculate the value of furniture 3 years ago*

a. ₹ 30,000 b. ₹ 35,000
c. ₹ 40,000 d. ₹ 50,000

*Note: Que to be classified under CI Category*

PYQ June 19

(5) *Let a person invest a fixed sum at the end of each month in an account paying interest 12% per year compounded monthly. If the future value of this annuity after the 12th payment is ₹ 55,000 then the amount invested every month is?*

a. ₹ 4,837 b. ₹ 4,637
c. ₹ 4,337 d. ₹ 3,337

PYQ Nov. 19

(6) Present value of a scooter is ₹ 7,290 if its value decreases every year by 10% then its value before 3 years is equal to:

a. 10,000 b. 10,500
c. 20,000 d. 20,500

PYQ Nov. 20

(7) Find the future value of annuity of ₹ 1,000 made annually for 7 years at interest rate of 14% compounded annually. Given that $1.14^7 = 2.5023$

a. 10,730.7 b. 5,365.35
c. 8,756 d. 9,892.34

PYQ Nov. 20

(8) Find the present value of ₹ 1,00,000 to be required after 5 years if the interest rate be 9% . Given that $1.09^5 = 1.5386$

a. 78,995.98 b. 64,994.15
c. 88,992.43 d. 93,902.12

PYQ Nov. 20

(9) A five year annuity due has periodic cash flow of ₹ 100 each year. If the interest rate is 8% the future value of this annuity is given by:

a. (₹ 100) × (future value at rate 8% for 5 years) × (0.08)
b. (₹ 100) × (future value at rate 8% for 5 years) × (1 - .08)
c. (₹ 100) × (future value at rate 8% for 5 years) × (1 + 0.08)
d. (₹ 100) × (future value at rate 8% for 5 years) × (1/0.08)

PYQ Nov. 20

(10) A person decides to invest ₹ 1,25,000 per year for the next five years in an annuity which gives 5% per annum compounded annually. What is the approx future value?
(use $1.05^5 = 1.2762$, if needed)

a. 1,59,535 b. 6,90,500
c. 5,90,704 d. 3,59,535

PYQ Nov. 20

(11) Which of the following statements is True? (assume that the yearly cash flow? Are identical for both annuities)

a. The present value of annuity due is greater than the present value of an ordinary annuity
b. The present value of an ordinary annuity is greater than the present value of an annuity due
c. The future value of an ordinary annuity is greater than the future value of an annuity due
d. The future value of an annuity due is equal to future value of an ordinary annuity.

PYQ Nov. 20

(12) ₹ 2,500 is paid every year for 10 years to pay off a loan. What is the loan amount if interest rate be 14% per annum compounded annually?

a. ₹ 15,847.90 b. ₹ 13,040.27
c. ₹ 14,674.21 d. ₹ 16,345.11

PYQ Jan. 21

(13) Find the future value of annuity of ₹ 1,000 made annually for 7 year at interest rate of 14% compounded annually (Given that $1.14^7 = 2.5023$)

a. ₹ 10,730.7
b. ₹ 5,365.35
c. ₹ 8,756
d. ₹ 9892.34

PYQ Jan. 21

(14) ₹ 800 is invested at the end of each month in an account paying interest 5% per year compounded monthly. What is the future value of this annually after $10^{th}$ payment?

a. ₹ 4,444 b. ₹ 8,756
c. ₹ 3,491 d. ₹ 8,151.67

PYQ Jan. 21

(15) The present value of an annuity immediate is the same as

a. Annuity regular for (n - 1) year plus the initial receipt in the beg. of the period.
b. Annuity regular for (n - 1) years
c. Annuity regular for (n + 1) years
d. Annuity regular for (n + 1) years plus the initial receipt in the beginning of the period.

PYQ July 21

(16) If the desired future value after 5 years with 18% interest rate is ₹ 1,50,000, then the present value (in ₹) is (Given that $(1.18)^5 = 2.2877$)?

a. 63,712 b. 65,568
c. 53,712 d. 41,712

PYQ July 21

(17) A loan of ₹ 1,02,000 is to be paid back in two equal annual instalments. If the rate of interest ☆ is 4% p.a. compounded annually, then the total interest charged (in ₹) under this instalment plan is:

a. 6,160 b. 8,120
c. 5,980 d. 7,560

PYQ July 21

(18) The future value of annuity of ₹ 2,000 for 5 years at 5% compounded annually is given (in nearest ₹) as:

a. 51,051 b. 21,021
c. 11,051 d. 61,254

PYQ Dec. 21

(19) Mr. X wants to accumulate ₹ 50,00,000 at the end of 10 years. Then how much amount is required to be invested every year if interest is compounded annually at 10%? (Given that P (10,0.10) = 15.9374298)

a. ₹ 3,13,726.87
b. ₹ 4,13,726.87
c. ₹ 3,53,726.87
d. ₹ 4,53,726.87

PYQ Dec. 21

(20) The present value of an **annuity** of ₹ 25,000 to be received after 10 years at 6% per annum compounded annually is ₹ _____

a. ₹ 15,960 b. ₹ 13,960
c. ₹ 11,960 d. ₹ 17,960

Note: Options are as per single cashflow so annuity word should not be there.

PYQ June 22

(21) ₹ 2500 is paid every year for 10 years to pay off a loan. What is the loan amount if interest rate be 14% per annum compounded annually?

a. ₹ 15,841.90 b. ₹ 13,040.27
c. ₹ 14,674.21 d. ₹ 14,010.90

PYQ June 22

(22) ₹ 200 is invested at the end of each month in an account paying interest 6% per year compounded monthly. What is the future value of this annuity after 10th payment?

a. ₹ 2,044 b. ₹ 12,044
c. ₹ 2,040 d. ₹ 12,000

PYQ June 22

(23) Anshika took a loan of ₹ 1,00,000 @ 8% for 5 years. What amount will she pay if she wants to pay the whole amount in five equal installments?

a. ₹ 25,045.63 b. ₹ 26,045.68
c. ₹ 28,045.50 d. None of these

PYQ June 22

(24) Ankit invests ₹ 3,000 at the end of each quarter receiving interest @ 7% per annum for 5 years. What amount will be receive at the end of the period?

a. ₹ 71,200.20 b. ₹ 71,104.83
c. ₹ 73,204.83 d. None of these

PYQ June 22

(25) A company establishes a sinking fund to provide for the payment ₹ 2,00,000 debt maturity in 20 years contribution to the fund are to be made at the end of every year. Find amount of each deposit of interest is 10% per annum?

a. ₹ 3,592.11 b. ₹ 3,492.11
c. ₹ 3,392.11 d. None of these

PYQ Dec 22

(26) How much amount is required to be invested every year so as to accumulate ₹ 5,00,000 at the end of 12 years if interest is compounded annually at 10% (Where A (12, 0.1) = 21.384284)

a. ₹ 23381.65 b. ₹ 24385.85
c. ₹ 26381.65 d. ₹ 28362.75

PYQ Dec 22

(27) 10 years ago the earning per share (EPS) of ABC Ltd. was ₹ 5 share. Its EPS for this year is ☆ ₹ 22. Compute at what rat, EPS of the company grow annually?

a. 15.97% b. 16.77%
c. 18.64% d. 14.79%

PYQ Dec 22

(28) Raju invests ₹ 20,000 every year in a deposit scheme starting from today for next 12 years. Assuming that interest rate on this deposit is 7% per annum compounded annually. What will be the future value of this annuity? Given that $(1+0.07)^{12} = 2.25219159$.

a. ₹ 540,526 b. ₹ 382,813
c. ₹ 643, 483 d. ₹ 357, 769

PYQ Dec 22

(29) Mr. A invested ₹ 10,000 every year for next 3 years at the interest rate of 8 percent per annum compounded annually. What is future value of the annuity?

a. ₹ 32,644 b. ₹ 32,464
c. ₹ 34,264 d. ₹ 36,442

PYQ Dec 22

(30) ₹ 5,000 is invested every month end in an account paying interest @12% per annum compounded monthly. What is the future value of this annuity just after making $11^{th}$ payment? (Given that $(1.01)^{11} = 1.1156$ )

a. ₹ 57,800 b. ₹ 56,100
c. ₹ 56,800 d. ₹ 57,100

PYQ Dec 22

(31) Sinking fund factor is the reciprocal of:

a. Present value interest factor of a single cash flow
b. Present value interest factor of an annuity
c. Future value interest factor of an annuity
d. Future value interest factor of a single cash flow

PYQ Jun 23

(32) Suppose you have decided to make a Systematic Investment Plan (SIP) in a mutual fund with ₹ 1,00,000 every year from today for next 10 years where you get return at the rate of 10% per annum compounded annually. What is the future value of this annuity? Given $1.1^{10} = 2.59374$

a. ₹ 17,35,114 b. ₹ 17,53,411
c. ₹ 17,35,411 d. ₹ 17,53,114

PYQ Jun 23

(33) A company want to replace its existing tool room machine at the end of 10 years, the expected cost of machine would be ₹ 10,00,000. If management of the company creates a sinking fund, how much provision needs to be made out of revenue each year which can earn at the rate of 10% compounded annually?

a. ₹ 74,625 b. ₹ 72,514
c. ₹ 62,745 d. ₹ 67,245

PYQ Jun 23

(34) A car is available for ₹ 4,98,200 cash payment or ₹ 60,000 cash down payment followed by three equal annual instalments. If the rate of interest charged is 14% per annum compounded yearly, then total interest charged in the instalment plan is (Given P(2,0.14) = 2.32163):

a. ₹ 1,46,314 b. ₹ 1,46,137
c. ₹ 1,28,040 d. ₹ 1,58,040

PYQ Jun 23

(35) Govinda's mother decides to gift him ₹ 50,000 every year starting from today for the next five years. Govinda deposits this amount in a bank as and when he receives and gets 10% per annum interest rate, compounded annually. What is the present value of this annuity? Given P(4,0.10) = 3.16987.

a. ₹ 2,80,493.5 b. ₹ 2,08,493.5
c. ₹ 2,08,943.5 d. ₹ 2,58,493.5

**Answer Key**

| | | |
|---|---|---|
| 1 a | 2 a | 3 a |
| 4 a | 5 c | 6 a |
| 7 a | 8 b | 9 c |
| 10 b | 11 a | 12 b |
| 13 a | 14 d | 15 a |
| 16 b | 17 a | 18 c |
| 19 a | 20 b | 21 b |
| 22 a | 23 a | 24 b |
| 25 b | 26 a | 27 a |
| 28 b | 29 b | 30 a |
| 31 c | 32 a | 33 c |
| 34 c | 35 b | |

## Future Value and Present Value of Annuity

### Mock Test Paper Questions

MTP May 18

(1) Future value of Ordinary Annuity

a. $A(n,i) = A\left[\frac{(1+i)^n - 1}{i}\right]$

b. $A(n,i) = A\left[\frac{(1+i)^n + 1}{i}\right]$

c. $A(n,i) = A\left[\frac{1-(1+i)^n}{i}\right]$

d. $A(n,i) = A\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right]$

MTP May 18, ICAI SM

(2) A sinking fund is created redeeming debentures worth ₹ 5,00,000 at the end of 25 years. How much provision need to be made out of profits each year provided sinking fund investments can earn at 4 % per annum

a. 12,006
b. 12,040
c. 12,039
d. 12,035

MTP Nov 18

(3) Find the future value of annuity ₹ 1000 made annually for 7 years at interest rate of 14% compounded annually is ____ Given $(1.14)^7 = 2.5023$

a. ₹ 10730.71 b. ₹ 10735
c. ₹ 10734 d. ₹ 10237

MTP Nov 18

(4) ₹ 10,000 is paid every year to off a loan, the loan amount if interest be 14% per annum compounded annually is (Given P(10, 0.14) = 5.21611)

a. ₹ 5216.11 b. ₹ 1917.13
c. ₹ 52,161.1 d. ₹ 19,171. 3

Note: Duration was not given in the question, we have taken it as 10 from here $(1.14)^7 = 2.5023$

MTP Nov 18

(5) The present value of ₹ 1 to be receive after 3 year compounded annually at 11% interest is

a. 0.713 b. 0.811
c. 0.731 d. 0.658

MTP Nov 18

(6) Suppose your father decides to gift you ₹ 5,000 every year starts from today for the next four years. You deposit the amount is a bank as and when you receive and get 10% per annum interest rate compound annually. The present value of this annuity is --------(given P(3,0.10) = 2.48685)

a. ₹ 17,434.25 b. ₹ 17,344.25
c. ₹ 17434.52 d. ₹ 17,344.52

MTP Nov 18

(7) Find the Present value of ₹ 10,000 to be required after 5 years, If the Interest be 9%. Given $(1.09)^5 = 21.5386$ (Error in MTP it is 1.5386)

a. Rs.6500 b. Rs.6499.42
c. Rs.6600.52 d. Rs.6700.52

Note: When factor are given in the question better to use that to get accurate answer.

MTP Nov 18

(8) Rs.500 is invested is invested at the end of each month is an account paying interest 8% per year compounded monthly. The future value of annuity after 10th payment is $(1.08)^{10} = 2.15893$

a. Rs.7243.31 b. Rs.7423.30
c. Rs.3451.50 d. Rs.3541.50

Note: Error in MTP Que – it should be annually not monthly then only we can get option a as the ans.

MTP May 19

(9) The value of furniture depreciates by 10% a year, if the present value of the furniture in an office is ₹ 21870, calculate the value of furniture 3 years ago.

a. ₹ 30000 b. ₹ 35000
c. ₹ 40000 d. ₹ 45000

MTP May 19

(10) Find the future value of an annuity of ₹ 500 made annually for 7 years at interest rate of 14 % per annum [Given the $(1.14)^7 = 2.5023$]

a. ₹ 5365.35 b. ₹ 5000
c. ₹ 5325.65 d. ₹ 6000.35

MTP May 19

(11) ₹ 200 invested at the end of each month in an account paying interest 6% per year compounded monthly. What is the future value of this annuity after 10th payment? [Given the $(1.005)^{10} = 1.0511$]

a. ₹ 2045 b. ₹ 5055
c. ₹ 2044 d. ₹ 2065

MTP May 19

(12) Suppose your father decides to gift you ₹ 10,000 every year starting from today for the next five years, you deposit this amount in a bank as and when you receive and get 10% per annum interest rate compounded annually. What is the present value of this annuity? (P (4, 0.10) = 3.16987)

a. ₹ 41, 698.70 b. ₹ 45, 698.70
c. ₹ 41, 698.70 d. ₹ 41, 698.70

Note: There is an error in options given in MTP as option c and d are same as a.

MTP May 19

(13) Y bought Motor Bike Costing 80,000 by making down payment of ₹ 30000 and agreeing to make annual payment for four years. How much would be each payment if the interest on unpaid amount be 14% compounded annually. [Given P (4, 0.14) = 2.91371]

a. ₹ 17160.25 b. ₹ 17600.25
c. ₹ 15600.25 d. ₹ 16600.25

MTP May 19 Series II

(14) A machine costs ₹ 1,00, 000. The depreciation rate is 10% per annum. The scrap value of the machine at the end of 5 years is

a. ₹ 49490 b. ₹ 59049
c. ₹ 61029 d. ₹ 51049

MTP May 19 Series II

(15) X bought a TV costing 25,000 making down payment of ₹ 5000 and agreeing to make equal annual payment for four years. How much would be each payment if the interest on unpaid amount be 14% compounded annually? [P(4, 0.14) = 2.91371]

a. ₹ 6864.10 b. ₹ 6850.63
c. ₹ 6859 d. ₹ 6871

MTP May 19 Series II

(16) The future value of annuity on ₹ 5000 a year for 7 years at 14% per annum compound interest is given $(1.14)^7 = 2.5023$

a. ₹ 5300 b. ₹ 53653.57
c. ₹ 5480 d. ₹ 5465.23

MTP May 19 Series II

(17) ₹ 5000 paid for ten years to off a loan. What is the loan amount if interest rate be 14% per annum compounded annually? (Given P (10, 0.14) = 5.21611

a. ₹ 26080.55 b. ₹ 26580.55
c. ₹ 26280.55 d. ₹ 27080.55

Note: Option b is wrong as given in MTP, correct answer is option a.

MTP May 19 Series II

(18) Suppose your friend decided gift to you ₹ 10000 every year starting from today for the next five years. Your deposit this amount in a bank as and when you receive and get 10% per annum interest compounded annually. What is the present value of this annuity?

a. Rs. 42698.70 b. Rs. 43698.70
c. Rs. 45698.70 d. Rs. 41698.70

MTP May 19 Series II

(19) ₹ 1000 is invested at the end of each month in an account paying interest 6% per year compounded monthly. What is the future value of annuity after 10th payment? (Given that $(1.005)^{10} = 1.0511$)

a. ₹ 10220 b. ₹ 1022
c. ₹ 20000 d. ₹ 1020

MTP Nov 19

(20) Anil bought a motor cycle costing ₹ 1,30,000 by making a down payment of ₹ 30,000 and agreeing to make equal annual payment for five years. How much would be each payment if the interest on unpaid amount be 10% compounded annually? [P (5, 0.10) = 3.7908].

a. ₹ 28379.70 b. ₹ 26300.70
c. ₹ 26500.70 d. ₹ 26379.70

MTP Nov 19

(21) Shoba borrows ₹ 50,00,000 to buy a house. If he pays equal instalments for 20 years and 10% interest on outstanding balance, what will be the equal annual instalment? [Given: P(20,0.10) =8.51356].

a. ₹ 687298.4 b. ₹ 685298.4
c. ₹ 585298.4 d. ₹ 587298.4

MTP Nov 19

(22) An overdraft of ₹ 50,000 to be paid back in equal annual installments over a period of 20 years. Find the value of Installment, if interest is compounded annually at 14% per annum. [Given $(1.14)^{20} = 13.74349$]

a. ₹ 550.50 b. 549.30
c. ₹ 559.50 d. ₹ 560.50

Note: Options are wrong, may be they have missed first digit 7 in all options. Correct Ans is 7549.3

MTP May 20

(23) The present value of an annuity of ₹ 80 for 20 years at 5% p.a is [Given $(1.05)^{20} = 2.6533$]

a. ₹ 997 (appx.) b. ₹ 900
c. ₹ 1,000 d. none of these

MTP May 20, ICAI SM

(24) A person bought a house paying ₹ 20,000 cash down and ₹ 4,000 at the end of each year for 25 yrs. at 5% p.a. C.I. The cash down price is[ Given $(1.05)^{25} = 3.386355$ ]

a. ₹ 75,000 b. ₹ 76,000
c. ₹ 76,375.80 d. none of these.

MTP May 20, ICAI SM

(25) A man purchased a house valued at ₹ 3,00,000. He paid ₹ 2,00,000 at the time of purchase and agreed to pay the balance with interest at 12% per annum compounded half yearly in 20 equal half yearly instalments. If the first instalment is paid after six months from the date of purchase then the amount of each instalment is.

a. ₹ 8,718.45 b. ₹ 8,769.21
c. ₹ 7,893.13 d. none of these

MTP May 20, ICAI SM

(26) A person invests ₹ 500 at the end of each year with a bank which pays interest at 10% p.a C.I. annually. The amount standing to his credit one year after he has made his yearly investment for the 12th time is. [Given $(1.1)^{12} = 3.1384$]

a. ₹ 11,761.36 b. ₹ 10,000
c. ₹ 12,000 d. none of these

MTP May 20

(27) The present value of ₹ 10,000 due in 2 years at 5% p.a. compound interest when the interest is paid on half-yearly basis is

a. ₹ 9,070 b. ₹ 9,070
c. ₹ 9,060 d. none of these

MTP Nov 20

(28) Find the present value of ₹ 10,000 to be required after 5 years, if the interest rate be 9 per cent compounded annually.

a. ₹ 5500
b. ₹ 5600
c. ₹ 6000
d. ₹ 6500

MTP Nov 20

(29) A man borrows ₹ 4000 from a bank at 10% compound interest. At the end of every year ₹ ☆ 1,500 as part of repayment of loan and interest. How much is still owe to the bank after three such installments.

a. ₹ 359
b. ₹ 820
c. ₹ 724
d. ₹ 720

MTP Nov 20

(30) The future value of annuity of ₹ 1,000, made annually for 5 years at the interest of 14% compounded annually is (Given $(1.14)^5 = 1.925410$ )

a. ₹ 5610
b. ₹ 6610
c. ₹ 6160
d. ₹ 6160

MTP March 21

(31) Future value of an ordinary annuity

a. $A(n,i) = A\left[\frac{(1+i)^n - 1}{i}\right]$

b. $A(n,i) = A\left[\frac{(1+i)^n + 1}{i}\right]$

c. $A(n,i) = A\left[\frac{1-(1+i)^n}{i}\right]$

d. $A(n,i) = A\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right]$

MTP March 21

(32) Anil bought a motor cycle costing ₹ 1,50,000 by making a down payment of ₹ 50, 000 and agreeing to make equal annual payment for five years. How much would be each payment if the interest on unpaid amounts be 10% compounded annually? [ P (5, 0.10) = 3.7908]

a. ₹ 26379.66 b. ₹ 26300.70
c. ₹ 26500.70 d. ₹ 26370.70

MTP March 21

(33) Shoba borrows ₹ 50,00,000 to buy a house. If he pays equal instalments for 20 years and 10% interest on outstanding balance, what will be the equal annual instalment? [Given : P(20,0.10) =8.51356 ]

a. ₹ 687298.4 b. ₹ 685298.4
c. ₹ 585298.4 d. ₹ 587298.4

Note: Repeat

MTP March 21

(34) How much money is to be invested every year so to accumulate ₹ 3,00,000 at the end of 10 years if interest is compounded annually at 10% [ A (10,0.1) = 15.9374)

a. ₹ 18823.65 b. ₹ 18833.64
c. ₹ 18223.60 d. ₹ 16823.65

MTP Jun 23 Series I

(35) Find the present value of an ordinary annuity of 8 quarterly payments of ₹ 500 each, the rate of interest being 8% p.a. compound quarterly

a. 4275.00 b. 4725.00
c. 3662.50 d. 3266.50

MTP Jun 23 Series I

(36) How much amount is required to be invested every year so as to accumulate ₹ 5,00,000 at the end of 12 years if interest is compounded annually at 10% (Where A (12,0.1) = 3.1384284)

a. ₹ 23381.65 b. ₹ 24385.85
c. ₹ 26381.65 d. ₹ 28362.75

MTP Jun 23 Series I

(37) Raju invests ₹ 20,000 every year in a deposit scheme starting from today for next 12 years. Assuming that interest rate on this deposit is 7% per annum compounded annually. What will be the future value of this annuity? Given that $(1+0.07)^{12} = 2.25219150$

a. ₹ 540,576 b. ₹ 382,813
c. ₹ 643,483 d. ₹ 357,769

MTP Jun 23 Series I

(38) Mr. A invested ₹ 20,000 every year for next 3 years at the interest rate of 8 percent per annum compounded annually. What is future value of the annuity?

a. 62644 b. 62464
c. 64928 d. 63442

MTP Jun 23 Series I

(39) ₹ 10,000 is invested every month and in an account paying interest @12% per annum compounded monthly. What is the future value of this annuity just after making 11th payment (Given that $(1.01)^{11} = 1.1156$ )

a. ₹ 115,600 b. ₹ 156,100
c. ₹ 156,800 d. ₹ 157,100

MTP Jun 23 Series I

(40) Sinking fund factor is the reciprocal of:

a. Present value interest factor of a single cash flow
b. Present value interest factor of an annuity
c. Future value interest factor of an annuity
d. Future value interest factor of a single cash flow.

MTP Jun 23 Series II

(41) Find the present value of an annuity which pays ₹ 200 at the end of each 3 months for 10 years assuming money to be worth 5% converted quarterly?

a. ₹ 3473.86 b. ₹ 3108.60
c. ₹ 6265.38 d. None of these

MTP Jun 23 Series II

(42) The amount of an annuity due consisting of 15 annual payments invested at 8% effective is ₹ 10,000. Find the size of each payment.

a. ₹ 873.86 b. ₹ 108.60
c. ₹ 341.01 d. None of these

MTP Jun 23 Series II

(43) The future value of an annuity of ₹ 5,000 is made annually for 8 years at interest rate of 9% compounded annually. ( Given that $(1.09)^8 = 1.99256$)

a. ₹ 55,142.22 b. ₹ 65, 142.22
c. ₹ 65,532.22 d. ₹ 57,425.22

MTP Jun 23 Series II

(44) Paul borrows ₹ 20,000 on condition to repay it with compound interest at 5% p.a. in annual instalment of ₹ 2,000 each. Find the number of years in which the debt would be paid off.

a. 10 years b. 12 years
c. 14 years d. 15 years

**Answer Key**

| | | |
|---|---|---|
| 1 a | 2 a | 3 a |
| 4 c | 5 c | 6 a |
| 7 b | 8 a | 9 a |
| 10 a | 11 c | 12 a |
| 13 a | 14 b | 15 a |
| 16 b | 17 b | 18 d |
| 19 a | 20 d | 21 d |
| 22 b | 23 a | 24 c |
| 25 a | 26 a | 27 c |
| 28 d | 29 a | 30 b |
| 31 a | 32 a | 33 d |
| 34 a | 35 c | 36 a |
| 37 b | 38 b | 39 a |
| 40 c | 41 c | 42 c |
| 43 a | 44 c | |

## Application of Time Value and Other Concepts

### Past Year Questions

PYQ June 19

(1) A person wants to lease out a machine costing ₹ 5,00,000 for a 10 year period. It has fixed a rental of ₹ 51,272 per annum payable annually starting from the end of first year. Suppose rate of interest is 10% per annum compounded annually on which money can be invested. To whom this agreement is favourable?

a. Favour of Lessee
b. Favour of Lessor
c. Not for both
d. Can't be determined

PYQ June 21

(2) ABC Ltd. Wants to lease out an asset costing ₹3,60,000 for a five year period. It has a fixed rental of ₹ 1,05,000, per annum payable annually starting from the end of first year. Suppose rate of interest is 14% per annum compounded annually on which money can be invested by the company. Is this agreement favourable to the company.

a. Yes b. No
c. It depends d. None of these

PYQ Nov. 18

(3) What is the net present value of piece of property which would be valued at ₹ 2 lakh at the end of 2 years? (Annual rate of increase = 5%)

a. ₹ 1.81 lakh b. ₹ 2.01 lakh
c. ₹ 2.00 lakh d. None of these

PYQ June 19

(4) Determine the present value of perpetuity of ₹ 50,000 per month @ rate of interest 12% p.a. is

a. ₹ 45,00,000 b. ₹ 50,00,000
c. ₹ 55,00,000 d. ₹ 60,00,000

PYQ Nov. 20

(5) ☆ A stock pays annually an amount of ₹ 10 from 6th year onwards. What is the present value of the perpetuity, if the rate of return is 20%?

a. 20.1 b. 19.1
c. 21.1 d. 22.1

PYQ Jan. 21

(6) Assuming that the discount rate is 7% p.a. how much would pay to receive ₹ 200 growing at 5% annually for ever?

a. ₹ 2,500 b. ₹ 5,000
c. ₹ 7,500 d. ₹ 10,000

PYQ July 21

(7) If discount rate is 14% per annum, then how much a company has to pay to receive ₹ 280 growing at 9% annually forever?

a. ₹ 5,600 b. ₹ 2,800
c. ₹ 1,400 d. ₹ 4,200

PYQ July 21

(8) If the nominal rate of growth is 17% and inflation is 9% for the five years. Let P be the Gross Domestic Product (GDP) amount at the present year then the projected real GDP after 6 years is:

a. 1.587 P b. 1.921 P
c. 1.403 P d. 2.51 P

PYQ July 21

(9) If a person bought a house by paying ₹ 45,00,000 down payment and ₹ 80,000 at the end of each year till the perpetuity. Assuming the rate of interest as 16% the present value of house (in ₹) is given as:

a. 47,00,000 b. 45,00,000
c. 57,80,000 d. 50,00,000

PYQ July 21

(10) Let the operating profit of a manufacturer for five years is given as:

| Years | Operating profit (in lakh ₹) |
|---|---|
| 1 | 90 |
| 2 | 100 |
| 3 | 106.4 |
| 4 | 107.14 |
| 5 | 120.24 |
| 6 | 157.34 |

Then the operating profit of Compound Annual Growth Rate (CAGR) for year 6 with respect to year 2 is given that:

a. 9% b. 12%
c. 11% d. 13%

PYQ July 21

(11) If the cost of capital be 12% per annual, then the net present value (in nearest ₹) from the given cash flow is given as:

| Years | Operating profit (in thousands ₹) |
|---|---|
| 0 | -100 |
| 1 | 60 |
| 2 | 40 |
| 3 | 50 |

a. 31048 b. 34185
c. 21048 d. 24187

PYQ June 22

(12) Assuming that the discount rate is 7% P.A. How much would you pay to receive ₹ 200, growing at 5% annually for ever?

a. ₹ 2,500 b. ₹ 5,000
c. ₹ 7,500 d. ₹ 10,000

PYQ June 22

(13) The CAGR of a initial value of a investment of ₹ 15,000 and final value of ₹ 25,000 in 3 years is:

a. 19% b. 18.56%
c. 17.56% d. 17%

PYQ Jun 23

(14) Ms. Paul invested ₹ 1,00,000 in a mutual fund scheme in January 2018. After one year in January 2019, she got a dividend amounting to ₹ 10,000 for first year, ₹ 12,000 for second year, ₹ 16,000 for third year, ₹ 18,000 for fourth year and ₹ 21,000 for fifth year in January 2023. What is Compounded Annual Growth Rate (CAGR) of dividend return? Given $1.2038^4 = 2.1$.

a. 20.38% b. 18.59%
c. 16.36% d. 15.89%

PYQ Jun 23

(15) If the discount rate is 10% per annum, how much amount would you pay to receive ₹ 2,500 growing at 8%, annually forever?

a. ₹ 1,25,000 b. ₹ 2,50,000
c. ₹ 1,50,000 d. ₹ 2,00,000

PYQ Jun 23

(16) Mr. Sharad got his retirement benefits amounting to ₹ 50,00,000. He want to receive a fixed monthly sum of amount for his rest of life, starting after one month and thereafter he want to pass on the same to future generation. He expects to earn an interest of 9% compounded annually. Determine how much perpetuity amount he will receive every month?

a. ₹ 39,500 b. ₹ 38,500
c. ₹ 37,500 d. ₹ 36,600

**Answer Key**

| | | |
|---|---|---|
| 1 a | 2 a | 3 a |
| 4 b | 5 a | 6 d |
| 7 a | 8 a | 9 d |
| 10 b | 11 c | 12 d |
| 13 b | 14 a | 15 a |
| 16 c | | |

## Application of Time Value and Other Concepts

### Mock Test Paper Questions

**MTP May 19 Series II, ICAI SM**

(1) A machine can be purchased for ₹ 50,000. Machine will be contributing ₹ 12,000 per year for the next five years. Assuming borrowing cost is 10% per annum. Determine whether machine should be purchased or not

a. Should be purchased
b. Should not be purchased
c. Can't say about purchase
d. none of the above

**MTP Nov 19, ICAI SM**

(2) A company is considering proposal of purchasing a machine either by making full payment of ₹ 4000 or by leasing it for four years at an annual rate of ₹ 1250. Which course of action is preferable if the company can borrow money at 14% compounded annually? [P (4,0.14) = 2.9137]

a. leasing is not preferable
b. leasing is preferable
c. cannot determined
d. none of these

**MTP May 20, ICAI SM**

(3) A person desires to create a fund to be invested at 10% CI per annum to provide for a prize of ₹ 300 every year. Using V = a/I find V and V will be

a. ₹ 2,000 b. ₹ 2,500
c. ₹ 3,000 d. none of these.

**MTP Nov 20**

(4) A company is considering proposal of purchasing a machine either by making full payment of ₹ 4,000 or by leasing it for 4 years at an annual rent of ₹ 1250. Which course of action is preferable? if the company can borrow money at 14 % per annum?

[ Given: $(1.14)^4 = 1.6870$ ]

a. Leasing preferable
b. Leasing is not preferable
c. Can't say
d. None of these

**MTP March 21**

(5) A company is considering proposal of purchasing a machine either by making full payment of ₹ 4000 or by leasing it for four years at an annual rate of ₹ 1250. Which course of action is preferable if the company can borrow money at 14% compounded annually? [P (4,0.14) = 2.9137]

a. Leasing is not preferable
b. Leasing is preferable
c. Cannot be determined
d. None of these above.

**MTP Apr 21**

(6) A machine can be purchased for ₹ 50,000. Machine will contribute ₹ 12,000 per year for the next five years. Assume borrowing cost is 10% per annum. Determine whether machine should be purchased or not: (P(5,0.10) = 3.79079

a. Should be purchased
b. Should not be purchased
c. Can't say about purchase
d. none of the above

**MTP Dec 2022 Series II**

(7) A ₹1000 bond paying annual dividends at 8.5% will be redeemed at par at the end of 10 years. ☆ Find the purchase price of this bond if the investor wishes a yield rate of 8%

a. ₹ 907.135 b. ₹ 1033.54
c. ₹ 945.67 d. None of these

**MTP May 18**

(8) Nominal Rate of Return =

a. Real Rate of Return – Inflation
b. Real Rate of Return + Inflation
c. Real Rate of Return / Inflation
d. Real Rate of Return × Inflation

**MTP May 18**

(9) Net Present value ≥ 0, then

a. Accept the Proposal
b. Reject the proposal
c. Not Feasible
d. None of the above

**MTP May 19**

(10) Nominal Rate of Return =

a. Real Rate of Return – Inflation
b. Real Rate of Return + Inflation
c. Inflation -Real Rate of return
d. None of the above

MTP May 19

(11) Net Present Value (NPV)

a. Present value of net cash Inflow – Total net Investment

b. Present value of net cash Inflow – Present value of cash outflow

c. Total net Investment- Present value of net cash Inflow

d. a or b

MTP Nov 21

(12) If the cost of capital be 12% per annum, then the Net Present Value (in nearest Rs.) from the given cash flow is given as ₹ in thousands

| Year | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Operating profit | (100) | 60 | 40 | 50 |

a. ₹ 34,048 b. ₹ 34,185

c. ₹ 51,048 d. ₹ 21,048

MTP Nov 21

(13) Find CAGR, if the operating profit of a manufacturer for five years is given as

☆

| Yr. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| OP | 90 | 100 | 106.4 | 107.14 | 120.24 | 157.35 |

a. 9% b. 12%

c. 11% d. 13%

MTP Oct 21

(14) The nominal rate of growth is 17% and inflation is 9% for the five years. Let P be the Gross Domestic Product (GDP) amount at the present year then the projected real GDP after 6 years is

a. 1.587P b. 1.921 P

c. 1.403 P d. 2.51 P

MTP Oct 21

(15) A person desires to create a fund to be invested at 10% CI per annum to provide for a prize of ₹ 300 every year. Using V = a/I find V and V will be

a. ₹ 2,000 b. ₹ 2,500

c. ₹ 3,000 d. none of these

MTP June 22

(16) Determine the present value of perpetuity of ₹ 50,000 per month at the rate interest 12% per annum is

a. ₹ 45,00,000 b. ₹ 50,00,000

c. ₹ 55,00,000 d. ₹ 60,00,000

MTP Dec 22 – Series I

(17) Assuming that the discount rate is 7% p.a. How much would you pay to receive ₹ 500. Growing at 5% annually forever?

a. ₹ 2500 b. ₹ 5000

c. ₹ 7500 d. ₹ 25000

MTP Dec 22 – Series I

(18) Ravi made an investment of ₹ 15,000 in a scheme and at the time of maturity, the amount was ₹ 25,000. If the Compound Annual Growth Rate (CAGR) for this investment is 8.88%. Calculate the approximate number of years for which he has invested the amount.

a. 6 b. 7.7

c. 5.5 d. 7

MTP Jun 23 – Series I

(19) A machine with useful life of 7 years costs ₹ 10,000 while another machine with useful life of 5 years costs ₹ 8000. The first machine saves labour expenses of ₹ 1900 annually and the second one saves labour expenses of ₹ 2200 annually. Determine the preferred course of action. Assume cost of borrowing as 10% compounded per annum.

a. 1st machine should be purchased

b. 2nd machine should be purchased

c. Information is not sufficient

d. None of these

MTP Jun 23 – Series I

(20) 10 years ago the earning per share (EPS) of ABC Ltd. was ₹ 5 share its EPS for this year is ₹ 22. Compute at what rate, EPS of the company grow annually?

a. 15.97% b. 16.77%

c. 18.64% d. 14.79%

MTP Jun 23 – Series II

(21) A company is considering proposal of purchasing a machine full payment of ₹ 4000 or by leasing it for 4 years at an annual rate of ₹ 1250. Which course of action is preferable if the company can borrow money at 14% compounded annually?

a. Purchasing b. Leasing

c. Both are same d. None of these

MTP Jun 23 – Series II

(22) Find the purchase price of a ₹ 1000 bond redeemable all the paying annual dividends at 4% if the yield rate is to be 5% effective.

a. ₹ 884.16 b. ₹ 984.17

c. ₹ 1084.16 d. None of these

**Answer Key**

| | | |
|---|---|---|
| 1 b | 2 b | 3 c |
| 4 a | 5 b | 6 b |
| 7 b | 8 b | 9 a |
| 10 b | 11 d | 12 d |
| 13 b | 14 a | 15 c |
| 16 b | 17 d | 18 a |
| 19 b | 20 a | 21 b |
| 22 b | | |

# Chapter 5: Permutations and Combinations

## Permutations

### Past Year Questions

**PYQ Nov. 18**

(1) The value of N in $\frac{1}{7!}+\frac{1}{8!}=\frac{N}{9!}$ is

a. 81 b. 78
c. 89 d. 64

**PYQ Jan. 21**

(2) There are ten flights operating between city A and city B. The number of ways in which a person can travel from city A to city B and return by different flight is:

a. 90 b. 95
c. 80 d. 78

**PYQ July 21**

(3) A person can go from place 'A' to 'B' by 11 different modes of transport but is allowed to return to 'A' by any mode other than the one earlier. The number of different ways in which the entire journey can be completed is:

a. 110 b. $10^{10}$
c. $9^5$ d. $10^9$

**PYQ June 22**

(4) If a man travels from place A to B in 10 ways then by how many ways can he come back by another train?

a. 94 b. 110
c. 90 d. 99

**PYQ June 22**

(5) If $\frac{n!}{10}=\frac{(n-1)!}{(n-1-n+3)!}$, find 'n'.

a. 4 b. 5
c. 6 d. 7

**PYQ June 19**

(6) Which of the following is a correct statement.

☆ a. ${}^{n}p_{n}={}^{n}p_{n-1}$
b. ${}^{n}p_{n}={}^{2n}p_{n-2}$
c. ${}^{n}p_{n}={}^{3n}p_{n-3}$
d. ${}^{n}p_{n}={}^{n.(n-1)}p_{n-1}$

**PYQ Nov. 19**

(7) ${}^{n}P_{3}:{}^{n}P_{2}=2:1$. Find n.

a. 4 b. 7/2
c. 5 d. 2/7

**PYQ Nov. 20**

(8) If ${}^{n}p_{4}=20\,{}^{n}p_{2}$ where p denotes the number of permutations, then n is:

a. 4 b. 2
c. 5 d. 7

**PYQ Jan. 21**

(9) Eight chairs are numbered from 1 to 8. Two women and three men are to be seated by ☆ allowing one chair for each. First, the women choose the chairs from the chairs numbered 1 to 4 and then men select the chairs from the remaining. The number of possible arrangements is:

a. 120 b. 288
c. 32 d. 1440

**PYQ July 21**

(10) If ${}^{n}p_{6}=20\,{}^{n}p_{4}$ then the value of n is given by:

a. $n=5$ b. $n=3$
c. $n=9$ d. $n=8$

**PYQ Dec. 21**

(11) If ${}^{n}p_{2}=12$, then the value of n is

a. 2 b. 3
c. 4 d. 6

**PYQ June 22**

(12) 8 people are seated in a row in a meeting among them the president and vice president are to be ☆ seated always in the center. What is the arrangement?

a. 7!2! b. 6!2!
c. 6! d. 1!

**PYQ Nov. 19**

(13) How many numbers can be formed with the help of 2, 3, 4, 5, 6, 1 which are not divisible by 5, ☆ given that it is a five-digit no. and digits are not repeating?

a. 600 b. 400
c. 1200 d. 1400

**PYQ Jan. 21**

(14) How many four-digit odd numbers can be formed with digits 0, 1, 2, 3, 4, 7 and 8?

☆ a. 150 b. 300
c. 120 d. 210

PYQ July 21

(15) How many numbers of seven-digit numbers which can be formed from the digits 3, 4, 5, 6, 7, 8, 9 no digits being repeated are not divisible by 5?

a. 4320 b. 4690
c. 3900 d. 3890

PYQ Nov. 18

(16) The number of words from the letters of the word BHARAT, in which B and H will never come together, is

a. 360 b. 240
c. 120 d. None of these

PYQ Jan. 21

(17) In how many different ways can the letters of the word 'DETAIL' be arranged so that the vowels occupy only the odd positions?

a. 32 b. 36
c. 48 d. 60

PYQ Dec. 21

(18) The number of four-letter words can be formed using the letters of the word DECTIONARY is

a. 5040 b. 720
c. 90 d. 30240

PYQ Dec. 21

(19) The number of words that can be formed using the letters of the "PETROL" such that the words do not have "P" in the first position, is

a. 720 b. 120
c. 600 d. 540

PYQ Dec. 21

(20) The number of different ways the letters of the word "DETAIL" can be arranged in such a way that the vowels can occupy only the odd position is

a. 32 b. 36
c. 48 d. 60

PYQ June 22

(21) If four words are taken with or without meaning from the word 'LOGARITHAM' without repetition. How many words will be formed?

a. 5040 b. 2520
c. 120 d. 40320

PYQ July 21

(22) ☆ The number of ways 5 boys and 5 girls can be seated at a round table, so no two boys are adjacent is:

a. 2,550 b. 2,880
c. 625 d. 2,476

PYQ June 19

(23) In how many ways can the crew of an eight seated boat be arranged so that 3 of crew can row only on a stroke side and 2 row on the other side?

a. 1,728 b. 256
c. 164 d. 126

PYQ Nov. 19

(24) Three girls and five boys are to be seated in a row so that no two girls sit together. Total no. of ways of this arrangement are:

a. 14,400 b. 120
c. ${}^{5}P_{3}$ d. $3! \times 5!$

PYQ Nov. 19

(25) How many different groups of 3 people can be formed from a group of 5 people?

a. 5 b. 6
c. 10 d. 9

PYQ Jan. 21

(26) ☆ 'n' locks and 'n' corresponding keys are available, but the actual combination is not known. The maximum number of trials that are needed to assigns the keys to the corresponding locks is:

a. ${}^{(n-1)}C_{2}$ b. ${}^{(n+1)}C_{2}$
c. $\sum_{k=2}^{n}(k-1)$ d. $\sum_{k=2}^{n}k$

PYQ Dec. 21

(27) Six boys and five girls are to be seated for a photograph in a row such that no two girls sit together and no two boys sit together. Find the number of ways in which this can be done.

a. 74,200 b. 96,900
c. 45,990 d. 86,400

PYQ Dec. 22

(28) ☆ The number of ways 4 boys and 3 girls can be seated in a row so that they are alternate is:

a. 12 b. 288
c. 144 d. 256

PYQ Dec. 22

(29) ☆ How many 3 digit odd numbers can be formed using the digits 5, 6, 7, 8, 9 if the digits can be repeated?

a. 55 b. 75
c. 65 d. 85

PYQ Jun 23

(30) If ${}^{6}P_{2r} = 12 \times {}^{6}P_{r}$ then r is equal to

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

PYQ Jun 23

(31) In how many different ways can the letters of the word 'SOFTWARE' be arranged so that the vowels always come together?

a. 720 b. 1440
c. 2880 d. 4320

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | a | 3 | a |
| 4 | c | 5 | b | 6 | a |
| 7 | a | 8 | d | 9 | d |
| 10 | c | 11 | c | 12 | b |
| 13 | a | 14 | b | 15 | a |
| 16 | b | 17 | b | 18 | a |
| 19 | c | 20 | b | 21 | a |
| 22 | b | 23 | a | 24 | a |
| 25 | c | 26 | b | 27 | d |
| 28 | c | 29 | b | 30 | b |
| 31 | d | | | | |

## Permutations

### Mock Test Paper Questions

MTP Oct 21

(1) Find the value of n if $(n+1)! = 42\,(n-1)!$

a. 6 b. - 7
c. 7 d. - 6

MTP May 19

(2) If ${}^{n}P_{r} = 336$ and ${}^{n}C_{r} = 56$, then n and r will be

a. (3,2) b. (8, 3)
c. (7, 4) d. none of these

MTP Nov 18

(3) In a lawn different ways can four persons stand in a line for a group photograph

a. 24 b. 16
c. 8 d. 64

MTP May 19

(4) ${}^{n}P_{r} = 720$ and ${}^{n}C_{r} = 120$ then value of r is

a. 4 b. 5
c. 3 d. 6

MTP May 19 Series II

(5) If ${}^{n}P_{4} = 12\,{}^{n}P_{2}$, then n =

a. 2 b. 3
c. 4 d. 6

MTP Oct 21

(6) If ${}^{n}P_{13} : {}^{n+1}P_{12} = 3:4$, then value of n is

a. 15 b. 14
c. 13 d. 12

MTP March 22

(7) If ${}^{n}P_{2} = 20\,{}^{n}P_{2}$ then the value of 'n' is _____

a. -2 b. 7
c. -2 and 7 both d. none of these.

Note: Given expression is incorrect, correct one should be ${}^{n}P_{4} = 20\,{}^{n}P_{2}$

MTP Dec 22 Series II

(8) ${}^{n}P_{3} : {}^{n}P_{2} = 2:1$

a. 4 b. 7/2
c. 5 d. 2/7

MTP June 22

(9) How many Six-digit telephone numbers can be formed by using 10 distinct digits

☆ a. $10^{6}$ b. $6^{10}$
c. ${}^{10}C_{9}$ d. ${}^{10}C_{6}$

MTP Dec 22 Series II

(10) The Sum of all the 4 digits numbers that can be formed with the digits 3,4,5,5 is

☆ a. 18887 b. 33333
c. 38887 d. 56661

MTP June 22

(11) Find the number of even numbers greater than 100 that can be formed with the digits 0,1,2,3?

☆ a. 10 b. 15
c. 20 d. none of these

MTP Dec 22 Series II, PYQ Nov 19

(12) How many numbers can be formed with the help of 2, 3, 4, 5, 6, 1 which is not divisible by 5, given that it is a five-digit number and digits are not repeating?

a. 1200 b. 400
c. 600 d. 1400

MTP May 18

(13) If two letters are taken at random from the word HOME, what is the Probability that none of the letters would be vowels?

a. 1/6 b. 1/2
c. 1/3 d. 1/4

Note: From Probability Chapter

MTP May 18

(14) In how many ways the letters of the word 'ARRANGE' be arranged?

a. 1200 b. 1250
c. 1260 d. 1300

MTP Nov 19

(15) In how many ways can the letters of the word 'STRANGE' be arranged so that the vowels never come together?

a. 3600 b. 3686
c. 5040 d. 4050

MTP May 20

(16) The number of ways the letters of the word 'COMPUTER' can be rearranged is

a. 40,320 b. 40,319
c. 40,318 d. none of these

MTP Nov 20

(17) How many ways can be letters of the word "FAILURE' be arranged so that the consonants may occupy only odd places?

a. 576 b. 476
c. 376 d. 276

MTP March 21

(18) In how many ways can the letters of the word FAILURE be arranged so that the consonants may occupy only odd positions?

a. 576 b. 476
c. 376 d. 276

MTP Nov 21

(19) The number of words that can be formed out of the letters of the word "ARTICLE" so that vowels occupy even places is

a. 36 b. 144
c. 574 d. 754

MTP Nov 21

(20) A box contains 3 pink caps, 2 purple caps and 4 orange caps. In how many ways they can be arranged so that the caps of the same colour come together. (Assume all caps of same colour are not identical)

a. 1724 b. 1728
c. 1732 d. 1764

MTP March 22

(21) How many different words can be formed with the letters of the word "LIBERTY"

a. 4050 b. 5040
c. 5400 d. 4500

MTP March 22

(22) The number of ways of arranging 6 boys and 4 girls in a row so that all 4 girls are together is:

a. 6!.4! b. 2 (7! 4!)
c. 7! 4! d. 2. (6! 4!)

MTP June 22

(23) ☆ In how many ways can the letters of the word "ALEGEBRA" be arranged without changing the relative order of the vowels?

a. 82 b. 70
c. 72 d. None of these

Note: Correct word should be ALGEBRA

MTP June 22

(24) ☆ In how many ways can the letters of the word "DIRECTOR" be arranged so that the three vowels are never together?

a. 180 b. 18,000
c. 18,002 d. none of these

MTP Dec 22 – Series I

(25) How many words can be formed with the letters of the word 'ORIENTAL' So that A and E always occupy odd places:

a. 540 b. 8460
c. 8640 d. 8450

MTP Dec 22 – Series I

(26) In how many ways can a party of 4 men and 4 women be seated at a circular table, so that no two women are adjacent?

a. 164 b. 174
c. 144 d. 154

MTP May 19

(27) The number of ways in which 8 examination papers be arranged so that the best and worst papers never come together

a. 8! - 2× 7! b. 8! - 7!
c. 8! d. 7!

MTP May 20

(28) 5 persons are sitting in a round table in such way that Tallest Person is always on the right-side of the shortest person; the number of such arrangements is

a. 6 b. 8
c. 24 d. none of these

**MTP May 20**

(29) An examination paper with 10 questions consists of 6 questions in Algebra and 4questions in Geometry. At least one question from each section is to be attempted. In how many ways can this be done?

a. 945 b. 100
c. 1000 d. none of these

**MTP May 20**

(30) If 12 school teams are participating in a quiz contest, then the number of ways the first, second and third positions may be won is

a. 1,230 b. 1,320
c. 3,210 d. none of these

**MTP Oct 21**

(31) ☆ A question paper contains 6 questions, each having an alternative. The number of ways an examiner can answer one or more questions is

a. 720 b. 728
c. 729 d. none of these

**MTP Jun 23 – Series I**

(32) The number of ways of 4 boys and 3 girls are to be seated for a photograph in a row alternatively.

a. 24 b. 164
c. 144 d. 336

**MTP Jun 23 – Series I**

(33) The number of 3-digit odd numbers can be formed using the digits 5,6,7,8,9. If repetition is allowed?

a. 56 b. 75
c. 95 d. 45

**MTP Jun 23 – Series II**

(34) How many numbers of 3 digits can be made by using digits 3, 5, 6, 7 and 8 no. digit being repeated.

a. 120 b. 60
c. 100 d. None of these

**MTP Jun 23 – Series II**

(35) In how many ways of the word "MATHEMATICS" be arranged so that the vowels always occur together?

a. $11!(2!)^3$ b. $(81\times4!)\div(2!)^3$
c. $12!\div(2!)^3$ d. None of these

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | b | 3 | a |
| 4 | c | 5 | d | 6 | a |
| 7 | b | 8 | a | 9 | a |
| 10 | d | 11 | c | 12 | c |
| 13 | a | 14 | c | 15 | a |
| 16 | b | 17 | a | 18 | a |
| 19 | b | 20 | b | 21 | b |
| 22 | c | 23 | c | 24 | b |
| 25 | c | 26 | c | 27 | a |
| 28 | a | 29 | a | 30 | b |
| 31 | b | 32 | c | 33 | b |
| 34 | b | 35 | b | | |

## Combinations

### Past Year Questions

**PYQ Nov. 18**

(1) A bag contains 4 red, 3 black and 2 white balls. In how many ways 3 balls can be drawn from this bag so that they include at least one black ball?

a. 64 b. 46
c. 85 d. None of these

**PYQ Nov. 18**

(2) If ${}^nP_r = 720$ and ${}^nC_r = 120$, then r is

a. 3 b. 4
c. 5 d. 6

**PYQ June 19**

(3) If these are 40 guests in a party. If each guest takes a shake hand with all the remaining guests. Then the total number of hands shake is _____:

a. 780 b. 840
c. 1,560 d. 1,600

**PYQ Nov. 19**

(4) In how many ways can 4 people be selected at random from 6 boys and 4 girls if there are to be exactly 2 girls?

a. 90 b. 360
c. 92 d. 480

PYQ Nov. 20

(5) A fruity basket contains 7 apples, 6 bananas, and 4 mangoes. How many selections of 3 fruits can be made so that all 3 are apples?

a. 35 ways b. 120 ways
c. 165 ways d. 70 ways

PYQ Nov. 20

(6) Out of 7 boys and 4 girls, a team of a debate club of 5 is to be chosen. The number of teams such that each team includes at least one girl is:

a. 439 b. 429
c. 419 d. 441

PYQ Nov. 20

(7) From a group of 8 men and 4 women, 4 persons are to be selected to form a committee so that at least 2 women are there on the committee. In how many ways can it be done?

a. 168 b. 201
c. 202 d. 220

PYQ Jan. 21

(8) A business houses wishes to simultaneously elevate two of its six branch heads. In how many ways can these elevations take place?

a. 12 b. 3
c. 6 d. 15

PYQ June 22

(9) 7 boys and 4 girls from which a team of 5 is to be selected, each team should have atleast one girl is:

a. 429 b. 439
c. 419 d. 441

PYQ May 18

(10) If ${}^{1000}C_{98} = {}^{999}C_{97} + {}^{X}C_{901}$, find $x$:

a. 999 b. 998
c. 997 d. 1,000

PYQ June 19

(11) If ${}^{11}C_x = {}^{11}C_{2x-4}$ and $x \neq 4$ than the value of ${}^{7}C_x =$

a. 20 b. 21
c. 22 d. 23

PYQ Jan. 21

(12) ${}^{n}C_p + 2{}^{n}C_{p-1} + {}^{n}C_{p-2} = ?$

☆ a. ${}^{n+}C_p$ b. ${}^{n+2}C_p$
c. ${}^{n+1}C_{p+1}$ d. ${}^{n+2}C_{p-1}$

PYQ June

(13) If ${}^{11}C_x = {}^{11}C_{2x-4}$ and $x \neq 4$, then value of ${}^{7}C_x$

a. 20 b. 21
c. 22 d. 23

PYQ June

(14) There are 5 questions each have four options. Then in how many different ways can we answer the questions?

a. 20 b. 120
c. 1024 d. 60

PYQ May

(15) The number of triangle that can be formed by choosing the vertices from a set of 12 points, seven of which lie on the same straight line, is:

a. 185 b. 175
c. 115 d. 105

PYQ June 22

(16) If there are 6 points in a line and 4 points in another line. Find the number of parallelogram formed?

a. 80 b. 70
c. 90 d. 100

PYQ Dec 22

(17) There are 20 points in a plane area. How many triangles can be formed by these points if 5 points are collinear?

a. 550 b. 560
c. 1130 d. 1140

PYQ Dec 22

(18) If ${}^{n}P_r = 3024$ and ${}^{n}C_r = 126$, then find $n$ and $r$?

a. 9, 4 b. 10, 3
c. 12, 4 d. 11, 4

PYQ Jun 23

(19) A committee of 3 women and 4 men is to be formed out of 8 women and 7 men. Mrs. Kajal refuses to serve in a committee in which Mr. Yash is a member. The number of such committees can be:

a. 1530 b. 1500
c. 1520 d. 1540

PYQ Jun 23

(20) In the next world cup of cricket, there will be 12 teams divided equally into two equal groups. Team of each group will play a match against other teams of the group. From each group, 3 top teams will qualify for next round. In this round, each team will play against each other. Four top teams of this round will qualify for semi-finals and play against each other and then two top teams will go to final, where they play the best of three matches. How much minimum number of matches in the next world cup will be?

a. 54 b. 53
c. 38 d. 43

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | a | 3 | a |
| 4 | a | 5 | a | 6 | d |
| 7 | b | 8 | d | 9 | d |
| 10 | a | 11 | b | 12 | b |
| 13 | b | 14 | c | 15 | a |
| 16 | c | 17 | c | 18 | a |
| 19 | d | 20 | b | | |

## Combinations

### Mock Test Paper Questions

MTP May 18

(1) In how many ways 3 prizes out of 5 can be distributed amongst 3 brothers equally

☆ a. 10 b. 45
c. 60 d. 120

MTP Nov 18

(2) A Company wishes top simultaneously promotes three of its 8 department assistant mangers. In how many ways these promotions can take place?

a. 336 b. 56
c. 8 d. 1680

MTP May 19

(3) If ${}^nP_r = 336$ and ${}^nC_r = 56$, then n and r will be

a. (3, 2) b. (8, 3)
c. (7, 4) d. None

MTP May 19

(4) ${}^nP_r = 720$ and ${}^nC_r = 120$ then value of r is

a. 4 b. 5
c. 3 d. 6

MTP Nov 19

(5) In how many ways can a committee of 3 ladies and four gents be chosen from 8 ladies and 7 gents?

a. 1950 b. 1920
c. 1940 d. 1960

MTP Nov 19

(6) A box contains 7 red, 6 white and 4 blue balls. How many selections of three balls on of each colour?

a. 178 b. 158
c. 198 d. 168

MTP Nov 21

(7) ${}^{15}C_3 + {}^{15}C_{13}$ is equal to:

a. ${}^{16}C_3$ b. ${}^{30}C_{16}$
c. ${}^{15}C_8$ d. ${}^{15}C_{15}$

MTP Nov 21

(8) In how many ways 3 Prizes can be distributed among 3 students equally

a. 10 b. 45
c. 60 d. 120

Note: Que is incomplete in MTP – refer MTP May 18 for similar complete question

MTP Oct 21

(9) ${}^5C_1 + {}^5C_2 + {}^5C_3 + {}^5C_4 + {}^5C_5$ is equal to _____

a. 30 b. 31
c. 32 d. 35

MTP March 22

(10) ${}^{15}C_3 + {}^{15}C_{r+3}$ then 'r' is equal to

a. 2 b. 3
c. 4 d. 5

Note: Que mistake in this MTP refer MTP May 18 que for similar complete que. $15C_{3r} = 15C_{r+3}$

MTP June 22

(11) The number ways in which 4 persons can occupy 9 vacant seats is

a. 6048 b. 3024
c. 1512 d. 4536

MTP Dec 22 Series II

(12) How many different groups of 3 people can be formed from a group of 5 people?

a. 5 b. 6
c. 10 d. 9

MTP Dec 22 Series II

(13) In how many ways can 4 people be selected at random from 6 boys and 4 girls if there are exactly two girls?
a. 90 b. 360
c. 92 d. 480

MTP May 18

(14) $15C_{3r} = 15C_{r+3}$, then r is equal to
a. 2 b. 3
c. 4 d. 5

MTP May 18

(15) In an examination a candidate has to pass in each of the 4 papers. In how many different ☆ ways can be failed?
a. 14 b. 16
c. 15 d. None

MTP March 21

(16) An examination paper consists of 12 questions divided into two parts A and B. Part A contains ☆ 7 questions and Part B contains 5 questions. A candidate is required to attempt 8 questions selecting at least 3 from each part, in how many maximum ways can the candidate select the questions?
a. 35 b. 175
c. 210 d. 420

MTP March 21

(17) Find the number of combinations of the letters of the word COLLEGE taken four together:
☆ a. 18 b. 16
c. 20 d. 26

MTP Apr 21

(18) The Supreme Court Bench consists of 5 judges. In how many ways, the bench can give a majority decision?
a. 10 b. 5
c. 15 d. 16

MTP May 18

(19) There 12 questions to be answered to be Yes or No. How Many ways this can be answered
a. 1021 b. 2048
c. 4096 d. None of these

MTP May 18

(20) ${}^nC_1 + {}^nC_2 + {}^nC_3 + {}^nC_4 + \ldots$
a. $2^n - 1$ b. $2^n$
c. $2^n + 1$ d. None

MTP May 19 II

(21) A man has 5 friends'. In how many ways can be invite one or more of his friends to dinner?
a. 30 b. 31
c. 32 d. 10

MTP Mar 21, MTP Apr 21

(22) An examination paper consists of 12 questions divided into two parts A and B. Part A contains 7 questions and Part B contains 5 questions. A candidate is required to attempt 8 questions selecting at least 3 from each part, in how many maximum ways can the candidate select the questions?
a. 35 b. 175
c. 210 d. 420

MTP May 18, MTP Nov 21

(23) Tere are 12 questions to be answered in Yes or No. How many ways can these be answered?
a. 1024 b. 2048
c. 4096 d. None

MTP Nov 20

(24) A polygon has 14 diagonals then the number of sides are
☆ a. 6 b. 7
c. 8 d. 9

MTP Nov 18

(25) There are 12 points in a plane which are collinear no three points is a straight lie, number of triangular that can be formed with the vertices as there points are:
a. 216 b. 220
c. 110 d. 108

Note: Que is incomplete in MTP – there should be 4 collinear points.

MTP Nov 19

(26) The number of diagonals in a polygon of 6 sides
a. 9 b. 8
c. 6 d. 12

MTP Nov 20

(27) The number of triangles that can be formed by choosing the vertices from set of 12 points, seven of which lie on the same straight line is
a. 185 b. 175
c. 115 d. 105

**MTP March 21**

(28) The number of triangles that can be formed by choosing the vertices from a set of 12 points, seven of which lie on the same straight line, is:

a. 185 b. 175
c. 115 d. 105

**MTP Dec 22 – Series I**

(29) The number of triangles that can be formed by choosing the vertices from a set of 12 points, Seven of which lie on the same lie on the same straight line is:

a. 185 b. 175
c. 115 d. 105

**MTP March 22**

(30) Number ways of painting of a face of a cube by 6 colours is

a. 30 b. 6
c. 24 d. 20

**MTP Apr 21**

(31) A boy has 3 library tickets and 8 books of his interest in the library of these 8, he does not ☆ want to borrow mathematics part II unless mathematics part-1 is also borrowed? In how many ways can he choose the three books to be borrowed?

a. 41 b. 51
c. 61 d. 71

**MTP March 22**

(32) X and Y stand in a line with 6 other people. What is the probability that there are 3 persons ☆ between them?

a. 1/5 b. 1/6
c. 1/7 d. 1/3

Note: Que from Probability

**MTP Dec 22 – Series I**

(33) The number of ways of painting the faces of a cube by 6 different colors is ☆

a. 30 b. 36
c. 24 d. 1

Note: Repeat MTP Mar 22

**MTP June 2023 Series I**

(34) If there are 30 points in a plane of which 5 points are lies on the same line. Then the number of triangles can be formed?

a. 650 b. 580
c. 4050 d. 4060

**MTP June 2023 Series I**

(35) The value $n, r$ if ${}^{n}P_{r} = 3024$ and ${}^{n}C_{r} = 126$

a. 9, 4 b. 10, 7
c. 12, 5 d. 11, 6

**MTP June 2023 Series II**

(36) If ${}^{20}C_{r} = {}^{20}C_{r+6}$. Then the value of $r$ is

a. 10 b. 7
c. 11 d. None of these

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | c | 2 | b | 3 | b |
| 4 | c | 5 | d | 6 | d |
| 7 | a | 8 | c | 9 | b |
| 10 | b | 11 | b | 12 | c |
| 13 | a | 14 | b | 15 | c |
| 16 | d | 17 | a | 18 | d |
| 19 | c | 20 | a | 21 | b |
| 22 | d | 23 | c | 24 | b |
| 25 | a | 26 | a | 27 | a |
| 28 | a | 29 | a | 30 | a |
| 31 | a | 32 | c | 33 | a |
| 34 | c | 35 | a | 36 | b |

# Chapter 6 – Sequence and Series

## Arithmetic Progression AP

### Past Year Questions

**PYQ May 18**

(1) A person pays ₹ 975 in monthly instalments, each instalment is less than formed by ₹ 5. The amount of 1st instalment is ₹ 100. In what time will the entire amount be paid?

a. 26 months b. 15 months
c. Both (a) & (b) d. 18 months

**PYQ May 18**

(2) If the sum of n terms of an AP is $(3n^2 - n)$ and its common difference is 6, then its first term is:

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

**PYQ May 18**

(3) Insert two arithmetic means between 68 and 260.

a. 132, 196 b. 130, 194
c. 70, 258 d. None of these

**PYQ Nov 18**

(4) If the $p^{th}$ term of an A.P. is 'q' and the $q^{th}$ term is 'p', then its $r^{th}$ term is

a. $p + q - r$ b. $p + q + r$
c. $p - q - r$ d. $p - q$

**PYQ Nov 18**

(5) The sum of the series - 8, - 6, - 4,.....n terms is 52. The number of terms n is

a. 11 b. 12
c. 13 d. 10

**PYQ Nov 18**

(6) The value of K, for which the terms $7K + 3$, $4K - 5$, $2K + 10$ are in A.P., is

a. 13 b. - 13
c. 23 d. - 23

**PYQ June 19**

(7) ☆ If the ratio of sum of n terms of two APs is $(n + 1) : (n - 1)$, then the ratio of their $m^{th}$ terms is:

a. $(m + 1) : 2m$
b. $(m + 1) : (m - 1)$
c. $(2m - 1) : (m + 1)$
d. $m : (m - 1)$

Note: Extra Lengthy Solution.

**PYQ June 19**

(8) If $2 + 6 + 10 + 14 + 18 + \ldots\ldots\ldots + x = 882$ then the value of x

☆ a. 78 b. 80
c. 82 d. 86

**PYQ Nov. 19**

(9) If the sum of five terms of AP is 75. Find the third term of the series

a. 35 b. 30
c. 15 d. 20

**PYQ Nov. 20**

(10) The $20^{th}$ term of arithmetic progression whose $6^{th}$ term is 38 and $10^{th}$ term is 66 is:

a. 118 b. 136
c. 178 d. 210

**PYQ Nov. 20**

(11) Divide 69 into 3 parts which are in A.P. and are such that the product of first two parts is 460:

a. 20, 23, 26 b. 21, 23, 25
c. 19, 23, 27 d. 22, 23, 24

**PYQ July 21**

(12) The number of terms of the series: 5 + 7 + 9+..... must be taken so that the sum may be 480.

a. 20 b. 10
c. 15 d. 25

**PYQ July 21**

(13) If the sum of 'n' terms of an AP (Arithmetic Progression) is $2n^2$, the fifth term is ____

☆ a. 20 b. 50
c. 18 d. 25

**PYQ Dec. 21**

(14) The sum of first n terms an AP is $3n^2 + 5n$. The series is:

a. 8, 14, 20, 26, ... b. 8, 22, 42, 68, ..
c. 22, 68, 114, ... d. 8, 14, 28, 44, ..

**PYQ June 22**

(15) The $n^{th}$ term of the series 9,7,5,.... and 15,12,9,.... are same. Find the $n^{th}$ term?

☆ a. 7 b. 8
c. 9 d. 10

**PYQ May 18, PYQ June 22**

(16) A person pays ₹ 975 in monthly installments, each installment is less than former by ₹ 5. The amount of 1st installment is ₹ 100. In what time will the entire amount be paid?

a. 26 months b. 15 months
c. Both (a) & (b) d. 18 months

PYQ Dec 22

(17) If $p^{th}$ term of an AP is $q$ and its $q^{th}$ term is $p$, then what will be the value of $(p+q)^{th}$ term? ☆

a. 0 b. 1
c. $p+q-1$ d. $2(p+q-1)$

PYQ Jun 23

(18) How many numbers between 74 and 25,556 are divisible by 5?

a. 5090 b. 5097
c. 5095 d. 5075

PYQ Jun 23

(19) If $9^{th}$ and $19^{th}$ term of an Arithmetic Progression are 35 and 75, respectively, then its $20^{th}$ term is:

a. 78 b. 79
c. 80 d. 81

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | b | 2 | b | 3 | a |
| 4 | a | 5 | c | 6 | d |
| 7 | d | 8 | c | 9 | c |
| 10 | b | 11 | a | 12 | a |
| 13 | c | 14 | a | 15 | a |
| 16 | b | 17 | a | 18 | b |
| 19 | b | | | | |

## Arithmetic Progression AP

### Mock Test Paper Questions

MTP May 18

(1) If 8th term of an AP is 15, the Sum of the 15 its term is

a. 15 b. 0
c. 225 d. 225/2

MTP May 18

(2) For what value of $x$; the sequence $x+1, 3x, 4x+2$ are in AP?

a. 3 b. 2
c. 4 d. 5

MTP Nov 18

(3) The nth element of the series 1,3,5,7, ..... is

a. 2 b. 2n-1
c. 2n+1 d. none of these

MTP Nov 18

(4) If $\frac{1+3+5+.....+n\text{terms}}{2+4+6+.....+50\text{terms}}=\frac{2}{51}$, then the value of 'n'

a. 9 b. 10
c. 12 d. 13

MTP Nov 18

(5) If 6th and 13th term of an A.P are 15 and 36 respectively the A.P is

a. 2, 5, 8, 11 b. 1, 4, 6, 8
c. -4, -1, 2, 5 d. 0, 3, 6, 9

MTP May 19

(6) The value of K, for which the terms 7K +3, 4K-5, 2K+10 are in A.P., is

a. 13 b. -23
c. 13 d. 23

MTP May 19 Series II

(7) Which term of the AP 64, 60, 56, 52....is Zero

a. 16 b. 17
c. 15 d. 14

MTP Nov 19

(8) The first term of an A.P. is 100 and the sum of whose first 6 terms is 5 times the sum of the next 6 terms, then the c.d. is – ☆

a. -10 b. 10
c. 5 d. none of these

MTP Nov 19

(9) The sum of n terms of an A.P. is $3n^2+n$; then its $p^{th}$ term is

a. 6P+2 b. 6P–2
c. 6P–1 d. none of these

Note: Given ans in MTP (c) is incorrect. Correct is (b).

MTP Nov 19

(10) If three AM's between 3 and 11, they are

a. 4, 6, 8
b. 3, 5, 7
c. 5, 7, 9
d. 11/2, 15/2, 19/2

MTP May 20

(11) The first and the last term of an AP are –4 and 146. The sum of the terms is 7171. The number of terms is

a. 101 b. 100
c. 99 d. none of these

**MTP March 21**

(12) If the sum of n terms of an A.P. is $3n^2 - n$ and its common difference is 6, then its third term is:

a. 10 b. 12
c. 14 d. 16

**MTP March 21**

(13) Insert 4 A.M.'s between 3 and 18:

a. 12,15,9,6 b. 6,9,12,15
c. 9,6,12,15 d. 15,12,9,6

**MTP Nov 21**

(14) The sum of the first 3 terms in an AP is 18 and that of the last 3 is 28. If the AP has 13 terms, ☆ what is the sum of the middle three terms?

a. 23 b. 18
c. 19 d. none of these

Note: Ans in MTP is wrong (d) Correct ans is a. 23

**PYQ Jul 21, MTP Nov 21**

(15) If the sum of 'terms of an Arithmetic Progression is $2n^2$, the fifth term is.

a. 20 b. 50
c. 18 d. 25

**MTP Nov 21**

(16) The ratio of sum of first n natural numbers to that of sum of cubes of first n natural numbers is

a. 3:16 b. n(n+1) / 2
c. 2 / n(n+1) d. None of these

**MTP Oct 21**

(17) The sum of progression (a+b), a, (a–b).....n term is

☆ a. $\frac{n}{2}[2a+(n-1)b]$ b. $\frac{n}{2}[2a+(3-n)b]$

c. $\frac{n}{2}[2a+(3-n)]$ d. $\frac{n}{2}[2a+(n-1)]$

**MTP Oct 21**

(18) Find the sum of first twenty-five terms of A.P. series whose nth term is $\left(\frac{n}{5}+2\right)$

a. 105 b. 115
c. 125 d. 135

**MTP June 22**

(19) The first and fifth term of an A.P. of 40 terms are -29 and -15 respectively. Find the sum of all positive terms of this A.P

a. 1605 b. 1705
c. 1805 d. none of these

**MTP June 22**

(20) If the common difference of an AP equals to the first term, then the ratio of its $m^{th}$ term and $n^{th}$ term is:

a. n:m b. m: n
c. $m^2 : n^2$ d. none of these

**MTP June 22**

(21) Find the value of 1 + 2 + 3 + ---------- + 105

a. 5000 b. 5560
c. 5565 d. None of these

**MTP Dec 22 – Series I**

(22) The first and last terms of an arithmetic progression are 5 and 905. Sum of the terms is 45,955. The number of terms is

a. 99 b. 100
c. 101 d. 102

**MTP Dec 22 – Series I**

(23) If the sum of n terms of an AP is $3n^2 - n$ and its common difference is 6, then its term is

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

Note: Requirement should be to find first term but que in MTP is incomplete.

**MTP Dec 22 Series II**

(24) Sum lying from 100 to 300 which is divisible by 4 and 5 is

a. 2000 b. 2100
c. 2200 d. 2300

**MTP Dec 22 Series II**

(25) Sum of x terms of two AP's are in the ratio $(3x+5):(5x+3)$ then ratio of their $10^{th}$ term ☆ is

a. 31 : 49 b. 30 : 49
c. 28 : 49 d. None of these

**MTP June 2023 Series I**

(26) In AP $T_p = q$ and $T_q = p$ then $T_{p+q}$ = ____

a. 0 b. - (p + q)
c. $\frac{p+q}{2}$ d. 1

**MTP June 2023 Series II**

(27) If 20 AMs. are inserted between 3 and 51 then sum of these 20 A.M.s is

a. 540 b. 1080
c. 270 d. None of these

**MTP June 2023 Series II**

(28) The 4th term of an A.P. is three times the first and the 7th term exceeds the third term by 1. Find the first term 'a' and common difference 'd'.

a. $a = 3, d = 2$ b. $a = 4, d = 3$
c. $a = 5, d = 4$ d. $a = 6, d = 5$

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | c | 2 | a | 3 | b |
| 4 | b | 5 | d | 6 | b |
| 7 | b | 8 | a | 9 | b |
| 10 | c | 11 | a | 12 | c |
| 13 | b | 14 | a | 15 | c |
| 16 | c | 17 | b | 18 | b |
| 19 | b | 20 | b | 21 | c |
| 22 | c | 23 | b | 24 | c |
| 25 | a | 26 | a | 27 | a |
| 28 | a | | | | |

## Geometric Progression

### Past Year Questions

**PYQ Nov. 18**

(1) The 3rd term of a G.P. is $\frac{2}{3}$ and the 6th term is $\frac{2}{81}$, then the 1st term is

a. 6 b. $\frac{1}{3}$
c. 9 d. 2

**PYQ June 19**

(2) In a G.P. if the fourth term is '3' then the product of first seven terms is

a. $3^5$ b. $3^7$
c. $3^6$ d. $3^8$

**PYQ June 19**

(3) If $y = 1 + x + x^2 + \ldots\ldots\ldots\ldots \infty$ then $x =$

a. $\frac{y-1}{y}$ b. $\frac{y+1}{y}$
c. $\frac{y}{y+1}$ d. $\frac{y}{y-1}$

**PYQ Nov. 19**

(4) Sum up to infinity of series.

A ☆ $\frac{1}{2}+\frac{1}{3^2}+\frac{1}{2^3}+\frac{1}{3^4}+\frac{1}{2^5}+\ldots\ldots\ldots$

a. 19/24 b. 24/19
c. 5/24 d. None of these

**PYQ Nov. 19**

(5) Sum the series $\frac{1}{5}, \frac{1}{5^2}, \frac{1}{5^3} \ldots\ldots\ldots\ldots \frac{1}{5^n}$.

a. $\frac{1}{4}\left[1-\left(\frac{1}{5}\right)^n\right]$ b. $\frac{1}{5}\left[1-\left(\frac{1}{4}\right)^n\right]$
c. Both (a) & (b) d. None of these

**PYQ Nov. 19**

(6) Find the no. of terms of the series 25, 5, 1 ……. $\frac{1}{3125}$

a. 6 b. 7
c. 8 d. 9

**PYQ Nov. 20**

(7) Three numbers in G.P. with their sum 130 and their product 27,000 are:

a. 10, 30, 90 b. 90, 30, 10
c. Both (a) & (b) d. 10, 20, 30

**PYQ Jan. 21**

(8) In a geometric progression that 3rd and 6th terms are respectively 1 and -1/8. The term (a) and common ratio are respectively.

a. 4 and $\frac{1}{2}$ b. 4 and $\frac{-1}{4}$
c. 4 and $\frac{-1}{2}$ d. 4 and $\frac{1}{4}$

**PYQ Dec. 21**

(9) If the sum and product of three numbers in G.P. are 7 and 8 respectively, then 4th term of the ☆ series is

a. 6 b. 4
c. 8 d. 16

**PYQ Dec. 21**

(10) The sum of series 7 + 14 + 21 + …… to 17th term is:

a. 1071 b. 971
c. 1171 d. 1271

**PYQ Dec. 21**

(11) The largest value of n for which

☆ $\frac{1}{2}+\frac{1}{2^2}+\ldots\ldots\frac{1}{2^n} < 0.998$ is

a. 9 b. 6
c. 7 d. 8

**PYQ June 22**

(12) The sum of first 8 terms of a G.P is five times the sum of the first 4 terms. Find the common ratio?

a. $\pm\sqrt{2}$ b. 16

c. $\pm\sqrt{20}$ d. 4

**PYQ Dec. 22**

(13) In a GP $5^{th}$ term is 27 and $8^{th}$ term is 729. Find its $11^{th}$ term?

a. 729 b. 6561

c. 2187 d. 19683

**PYQ Jun 23**

(14) If $4^{th}$, $7^{th}$ and $10^{th}$ terms of a Geometric Progression are p, q and r, respectively, then:

a. $p^2 = q^2 + r^2$ b. $p^2 = qr$

c. $q^2 = pr$ d. $pqr + pq + 1 = 0$

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | b | 3 | a |
| 4 | a | 5 | a | 6 | c |
| 7 | c | 8 | c | 9 | c |
| 10 | a | 11 | d | 12 | a |
| 13 | d | 14 | c | | |

## Geometric Progression

### Mock Test Paper Questions

**MTP May 18**

(1) For what values of x, the number $\frac{-2}{7}$, x, $\frac{-7}{2}$ are in G.P.?

a. $\pm 1$ b. $\pm 3$

c. $\pm 2$ d. None

**MTP May 19**

(2) Find the three numbers in G.P, whose sum is 19 and product is 216.

a. 9,6,4 or 4,6,9 b. 9,6,3 or 3,6,9

c. 9,3,1 or 1,3,9 d. 9,3, -1 or -1,3,9

**MTP May 19**

(3) The nth term of the sequence -1,2, - 4, 8,.is

a. $(-1)^n 2^{n-1}$ b. $2^{n-1}$

c. $2^n$ d. None of these

**MTP May 19 Series I**

(4) The sum of the first two terms of a GP is 5/3 and the sum of infinity of the series is 3. The common ratio is

a. 1/3 b. 2/3

c. -1/3 d. None of these

Note: Correct Ans is $\pm\frac{2}{3}$

**MTP May 19 Series II**

(5) The sum of the infinite series 1 + 2/3 + 4/9 +.....is

a. 1/3 b. 3

c. 2/3 d. None of these

**MTP March 2021**

(6) Find the sum to n terms of the series : 7+77+777+..... to n terms:

a. $\frac{7}{9}(10^{n+1} - 10) - \frac{7n}{9}$

b. $\frac{7}{9}(10^{n+1} - 10) + \frac{7n}{9}$

c. $\frac{7}{81}(10^{n+1} - 10) - \frac{7n}{9}$

d. $\frac{7}{81}(10^{n+1} - 10) + \frac{7n}{9}$

**MTP Apr 21**

(7) Given: P ( 7 , k) = 60 P (7, k-3). Then:

a. K = 9 b. K = 8

c. K = 5 d. K = 0

Note: From Chp5 PNC

**MTP Apr 21**

(8) If the pth term of a G.P. is x and the qth term is y, then find the nth term:

a. $\left[\frac{x^{(n-q)}}{y^{(n-p)}}\right]$ b. $\left[\frac{x^{(n-q)}}{y^{(n-p)}}\right]^{(p-q)}$

c. 1 d. $\left[\frac{x^{(n-q)}}{y^{(n-p)}}\right]^{\frac{1}{p-q}}$

Note: Extra Lengthy Solution.

**MTP Apr 21**

(9) The sum of the series: 0.5+0.55+0.555+..... to n term is:

a. $\frac{5n}{9} + \frac{5}{9}\left[1 - (0.1)^n\right]$

b. $\frac{5n}{9} - \frac{5}{81}\left[1 - (0.1)^n\right]$

c. $\frac{5n}{9} + \frac{5}{81}\left[1 - (0.1)^n\right]$

d. None

**MTP Oct 21**

(10) The second term of a G P is 24 and the fifth term is 81. The series is

a. 16, 36, 24, 54…..
b. 24, 36, 53… …
c. 16, 24, 36, 54,……
d. none of these

**MTP Oct 21**

(11) The series $1+10^{-1}+10^{-2}+10^{-3}$....to $\infty$ is

a. 9/10 b. 1/10
c. 10/9 d. none of these

**MTP March 22**

(12) In a GP .if fourth term is 3 then the product of first seven terms is

a. $3^5$ b. $3^7$
c. $3^6$ d. $3^8$

**PYQ Nov 18, MTP March 22**

(13) In a G.P. If the third term of a GP is 2/ 3 and 6th term is 2/ 81, then the first term is

a. 6 b. 1/3
c. 9 d. 2

**PYQ Nov 19, MTP March 22**

(14) Sum upto infinity series

☆ $\frac{1}{2}+\frac{1}{3^2}+\frac{1}{2^3}+\frac{1}{3^4}+\frac{1}{2^5}+\ldots$

a. 19/24 b. 24/19
c. 5/24 d. none of these

**MTP June 22**

(15) In a G. P sixth term is 729 and the common ratio is 3, then the first term of G.P is

a. 2 b. 3
c. 4 d. 7

**MTP Dec 22 – Series I**

(16) In a geometric progression, the second term is 12 and sixth term is 192. Find 11th term.

a. 3072 b. 1536
c. 12288 d. 6144

**PYQ Jun 22, MTP Dec 22 – Series I**

(17) The sum of first eight terms of geometric progression is five times the sum of the first four

☆ terms. The common ratio is

a. $\sqrt{3}$ b. $\sqrt{2}$
c. 4 d. 2

**MTP Dec 22 Series II**

(18) If 5th term of G.P. is 32 and 3rd term of G.P. is 8 then 6th term of G.P. is

a. 4 b. 16
c. 32 d. 6

Note: Correct option d should be 64 not 6

**MTP Dec 22 Series II**

(19) Which term of the sequence 2, 4, 8, 16 ……. is 2048?

a. 9 b. 10
c. 11 d. None of these

**MTP June 2023 Series I**

(20) The 5th and 8th terms of a GP series is 27 and 729. Then find the 10th term.

a. 729 b. 243
c. 81683 d. 6561

**MTP June 2023 Series I**

(21) Four Geometric Means between 4 and 972 are

a. 12, 30, 100, 324
b. 12, 24, 108, 320
c. 10, 36, 108, 320
d. 12, 36, 108, 324

**MTP June 2023 Series II**

(22) The sum upto infinity of the series

$S=\frac{1}{2}+\frac{1}{6}+\frac{1}{18}+\ldots\ldots\ldots\ldots$ is

a. $\frac{5}{4}$
b. $\frac{3}{4}$
c. $\frac{7}{3}$
d. None of these

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | a | 3 | a |
| 4 | d | 5 | b | 6 | c |
| 7 | c | 8 | d | 9 | b |
| 10 | c | 11 | c | 12 | b |
| 13 | a | 14 | a | 15 | b |
| 16 | d | 17 | b | 18 | d |
| 19 | c | 20 | d | 21 | d |
| 22 | b | | | | |

## Other Problems

### Past Year Questions

**PYQ May 18**

**(1)** The sum of m terms of the series $1+11+111+\ldots\ldots$ up to m terms, is equal to:

a. $\frac{1}{81}(10^{m+1}-9m-10)$

b. $\frac{1}{27}(10^{m+1}-9m-10)$

c. $10^{m+1}-9m-10$

d. None of these

**PYQ Nov. 19**

**(2)** If $\frac{(b+c-a)}{a}, \frac{(c+a-b)}{b}, \frac{(a+b-c)}{c}$ are in AP then a, b, c are in:

a. AP b. GP

c. HP d. None of these

Note: HP is out of syllabus.

**PYQ Nov. 19**

**(3)** If the AM and GM of two numbers is 6.5 and 6 the no.'s are:

a. 3 and 2 b. 9 and 4

c. 81 and 16 d. None of these

**PYQ Nov. 19**

**(4)** If AM and HM for two numbers are 5 and 3.2, respectively. GM will be:

a. 20 b. 16

c. 4 d. 5

**PYQ July 21**

**(5)** ☆ The sum of three numbers in a geometric progression is 28. When 7, 2 and 1 are subtracted from the first, second and the third numbers respectively, then the resulting numbers are in arithmetic progression. What is the sum of squares of the original three numbers?

a. 510 b. 456

c. 400 d. 336

Note: Extra lengthy solution.

**PYQ Jan. 21**

**(6)** The $n^{th}$ term of the series $3+7+13+21+31+\ldots\ldots\ldots$ is

a. $4n-1$ b. $n^2+2n$

c. $n^2+n+1$ d. $n^3+2$

### Answer Key

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | 2 | c | 3 | b |
| 4 | c | 5 | d | 6 | c |

## Other Problems

### Mock Test Paper Questions

**MTP May 20**

**(1)** Three numbers are in AP and their sum is 21. If 1, 5, 15 are added to them respectively, they form a G. P. The numbers are

a. 5, 7, 9 b. 9, 5, 7

c. 7, 5, 9 d. none of these

**MTP May 20**

**(2)** The sum of three numbers in G.P. is 70. If the two extremes by multiplied each by 4 and the mean by 5, the products are in AP. The numbers are

a. 12, 18, 40 b. 10, 20, 40

c. 40, 20, 15 d. none of these

**MTP Nov 20**

**(3)** If a, b, c are in AP and x, y, z are in GP , then the value of $x^{(b-c)}.y^{(c-a)}.z^{(a-b)}$ is

a. 1 b. 0

c. $b(c-a)$ d. none of these

**MTP Apr 21**

**(4)** If $a^{1/x}=b^{1/y}=c^{1/z}$ and a,b,c are in G.P; the x,y,z are in:

a. A.P b. G.P

c. Both (a) and (b) d. None of these

**MTP March 22**

**(5)** If x, y and z are the terms in G.P , then the term $x^2+y^2, xy+yz, y^2+z^2$ are in

a. AP b. GP

c. HP d. None of these

**MTP May 18**

**(6)** If $a^{1/x}=b^{1/y}=c^{1/z}$ then a, b, c are in GP then x, y, z are in

a. AP b. GP

c. HP d. AGP

MTP Nov 20

(7) ☆ The sum of the first two terms of an infinite geometric series is 15 and each term is equal to the sum of all the terms following it; then the sum of the series is

a. 20 b. 15

c. 25 d. None

Note: Extra lengthy solution

MTP March 21

(8) $\sum n^2$ defines:

a. $\frac{n(n+1)(2n+1)}{6}$ b. $\frac{n(n+1)}{2}$

c. $\left[\frac{n(n+1)}{2}\right]$ d. none of these

MTP June 2023 Series II

(9) 1 Find the sum to n terms of the series: $7+77+777+$ to n terms:

a. $\frac{7}{9}(10^{n+1}-10)-\frac{7n}{9}$

b. $\frac{7}{9}(10^{n+1}-10)+\frac{7n}{9}$

c. $\frac{7}{9}\left[\frac{10(10^n-1)}{9}-n\right]$

d. $\frac{7}{81}(10^{n+1}-10)+\frac{7n}{9}$

Answer Key

| | | |
|---|---|---|
| 1 a | 2 b | 3 a |
| 4 a | 5 b | 6 a |
| 7 a | 8 a | 9 c |

# Chapter 7 – Set, Relations and Functions

## Sets

### Past Year Questions

**PYQ May 18**

**(1)** The numbers of proper subset of the set (3, 4, 5, 6, 7) is

a. 32 b. 31
c. 30 d. 25

**PYQ Nov. 18**

**(2)** If $A = (1, 2, 3, 4, 5, 6, 7)$ and $B = (2, 4, 6, 8)$. Cardinal number of $A - B$ is:

a. 4 b. 3
c. 9 d. 7

**PYQ June 19**

**(3)** If $A = (1, 2, 3, 4, 5, 6, 7, 8, 9)$
$B = (1, 3, 4, 5, 7, 8)$
$C = (2, 6, 8)$ then find $(A - B) \cup C$

a. (2, 6) b. (2, 6, 8)
c. (2, 6, 8, 9) d. None of these

**PYQ June 19**

**(4)** The no. of subsets of the set (3, 4, 5) is:

a. 4 b. 8
c. 16 d. 32

**PYQ Nov. 19**

**(5)** $(A^T)^T = ?$

a. $A$ b. $A^T$
c. $A^T.A^T$ d. $A^{2T}$

Note: This que is from matrix (deleted topic).

**PYQ Nov. 20**

**(6)** Two finite sets respectively have x and y number of elements. The total number of subsects of the first is 56 more than the total number of subsets of the second. The value of x and y respectively.

a. 6 and 3 b. 4 and 2
c. 2 and 4 d. 3 and 6

**PYQ Nov. 20**

**(7)** The set of cubes of the natural number is:

a. A null set
b. A finite set
c. An infinite set
d. A finite set of three numbers

**PYQ Nov 20, PYQ Jan 21**

**(8)** The set of cubes of natural number is

a. Null set
b. A finite set
c. An infinite set
d. Singleton set

**PYQ Jan. 21**

**(9)** The number of integers from 1 to 100 which are neither divisible by 3 nor by 5 nor by 7 is

☆ a. 67 b. 55
c. 45 d. 33

**PYQ July 21**

**(10)** Let U be the universal set, A and B are the subsets of U. If $n(U) = 650$, $n(A) = 310$ $n(A \cap B) = 95$ and $n(B) = 190$, then $n(\overline{A} \cap \overline{B})$ is equal to ($\overline{A}$ and $\overline{B}$ are the complement of A and B respectively):

a. 400 b. 200
c. 300 d. 245

**PYQ Nov 20, PYQ June 22**

**(11)** Two finite sets have x and y number of elements. The total number of subsets of first is 56 more than the total number of subsets of second. The value of x and y is:

a. 6 and 3 b. 4 and 2
c. 2 and 4 d. 3 and 4

**PYQ June 22**

**(12)** Given $A = (2, 3)$, $B = (4, 5)$, $C = (5, 6)$ then $A \times (B \cap C)$ is

a. $\{(2,5),(3,5)\}$ b. $\{(5,2),(5,3)\}$
c. $\{(2,3),(5,5)\}$ d. None of these

**PYQ June 22**

**(13)** If the universal set $E = (x : x$ is a positive integer $< 25)$, $A = (2, 6, 8, 14, 22)$, $B = (4, 8, 10, 14)$

a. $(A \cap B)' = A' \cup B'$
b. $(A \cap B)' = A' \cap B'$
c. $(A' \cap B') = \varphi$
d. None of these

PYQ May 18

(14) ☆ In a town of ₹ 20,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C, if 2% families buy all the three newspaper, then the number of families which buy A only is:

a. 6600 b. 6300
c. 5600 d. 600

PYQ Nov. 20

(15) The number of items in the set A is 40; in the set B is 32; in the set C is 50; in both A and B is 4, in both A and C is 5; in both B and C 7 in all the sets 2. How many are in at least one if the set?

a. 110 b. 65
c. 108 d. 84

PYQ Dec. 21

(16) ☆ Out of a group of 20 teachers in a school, 10 teach Mathematics, 9 teach Physics and 7 teach Chemistry. 4 teach Mathematics and Physics but none teach both Mathematics and Chemistry. How many teach Chemistry and Physics; how many teach only Physics?

a. 2, 3 b. 3, 2
c. 4, 6 d. 6, 4

PYQ Dec. 22

(17) If $A = (1,2,3,4,5,7,8,9)$ and $B = (2,4,6,7,9)$ then how many proper subset of

$A \cap B$

$(A-B) \cup (B-A)$

$A \times B$

$A' \cup B'$

$xy \in A, y \in A$ can be created?

$[fog(3) - gof(-3)]$

$$f(x) = \begin{cases} 2x \text{ for } x > 3 \\ x^2 \text{ for } 1 < x \leq 3 \\ 3x \text{ for } x \leq 1 \end{cases}$$

a. 16 b. 15
c. 32 d. 31

PYQ Dec. 22

(18) The number of subsets of the set (0, 1, 2, 3) is:

a. 2 b. 4
c. 8 d. 16

PYQ Jun 23

(19) A survey shows that 74% of the Canadian like grapes, whereas 68% like bananas. What percentage of the Canadians like both grapes and bananas, if everybody likes either of two?

a. 32% b. 26%
c. 6% d. 42%

PYQ Jun 23

(20) If $A = (a, b, c)$, $B = (b, c, d)$ and $C = (a, d, c)$ then $(A-B)\times(B\cap C)$ is equal to:

a. $\{(a,d),(c,d)\}$ b. $\{(a,c),(a,d)\}$
c. $\{(c,a),(d,a)\}$ d. $\{(a,c),(a,d),(b,d)\}$

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | b | 2 | a | 3 | c |
| 4 | b | 5 | a | 6 | a |
| 7 | c | 8 | c | 9 | c |
| 10 | d | 11 | a | 12 | a |
| 13 | a | 14 | a | 15 | c |
| 16 | a | 17 | b | 18 | d |
| 19 | d | 20 | b | | |

## Sets

### Mock Test Paper Questions

MTP Nov 18

(1) The number of proper subsets of the set {3, 4, 5, 6, 7} is

a. 32 b. 31
c. 30 d. 25

MTP Nov 18

(2) If A and B are two sets $A = \{1, 2,3,4\}$ and $B = \{2,3 ,4\}$ then $(A-B)\cup(B-A)$

a. {1}
b. {1, 2, 3}
c. {1, 3}
d. {1, 2, 3, 4}

MTP Nov 18

(3) The number of subsets {1,2, 5} is

a. 3 b. 8
c. 6 d. 9

MTP May 19

(4) If $A = \{1,2,3,4,5,6,7\}$ and $B = \{2,4,6\}$ Cardinal number of $A \cup B$

a. 3 b. 16
c. 5 d. 7

**MTP May 19 Series II**

**(5)** If $A = \{1, 2, 3, 4\}$ and $B = \{5, 6, 7, 6\}$, then cardinal number of the set $A \times B$ is _____

a. 7 b. 1
c. 16 d. none of these

**MTP Nov 19**

**(6)** If $A = \{1, 2, 3, 4, 5\}$ and $B = \{6, 7, 8\}$, then cardinal number of $A \times B$ is:

a. 15 b. 5
c. 3 d. 8

**MTP Nov 19**

**(7)** The number of subsets of the set $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ is

a. 36 b. 128
c. 256 d. None of these

**MTP May 20**

**(8)** $(A \cup B)'$ is equal to

a. $(A' \cup B)'$ b. $A' \cap B'$
c. $A' \cup B'$ d. none of these

**MTP Nov 20**

**(9)** If $A = \{p, q, r, s\}$, $B = \{q, s, t\}$ and $C = \{m, q, n\}$ find $C-(A \cap B)$

a. $\{m, n\}$ b. $\{p, q\}$
c. $\{r, s\}$ d. $\{p, r\}$

**MTP Nov 20**

**(10)** The set having no element is called

a. Singleton set
b. Null set
c. Finite set
d. Infinite set

**MTP March 21**

**(11)** If $A = \{1, 2, 3, 4, 5\}$ and $B = \{6, 7, 8, 9\}$, then cardinal number of $A \times B$ is:

a. 20 b. 5
c. 3 d. 8

**MTP March 21**

**(12)** The number of subsets of the set $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ is

a. 36 b. 128
c. 256 d. None of these

**MTP March 21**

**(13)** If $A = (1,2,3,4,5)$ $B = (2,4)$ and $C = (1,3,5)$ then $(A-C) \times B$ is

a. $\{(2,2,), (2,4), (4,2), (4,4), (5,2), (5,4)\}$
b. $\{(2,2,), (2,4), (4,2), (4,4), (5,2), (5,4)\}$
c. $\{(2,2), (4,2), (4,4), (4,5)\}$
d. $\{(2,2), (2,4), (4,2), (4,4)\}$

**MTP Nov 21**

**(14)** Let Z be the universal set for two sets – A and B. If $n(A) = 300$, $n(B) = 400$ and $n(A \cap B) = 200$, then $n(A' \cap B')$ is equal to 400 provided $n(Z)$ is equal to

a. 900 b. 800
c. 700 d. 600

**MTP Nov 21**

**(15)** If $A = \{4,5\}$, $B = \{2,3\}$, $C = \{5,6\}$ then $A \times (B \cap C)$ is

a. $\{(2,5), (3,5)\}$ b. $\{(4,2), (4,6)\}$
c. $\{(4,3), (4,2)\}$ d. none of these

**MTP March 21**

**(16)** If $A = \{1, 2,3\}$, $B = \{3,4\}$ and $C = \{4, 5,6\}$, then $A \times (B \cap C) =$

a. $\{(1,4), (2,4), (3,4)\}$
b. $\{(1,4), (2,4), (3,4)\}$
c. $\{(3, 4), (2, 4)\}$
d. $\{(1, 2), (1, 4), (1, 6), (3, 4)\}$

**MTP Dec 22 – Series I**

**(17)** Two finite sets have m and n elements. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The value of m and n are

a. 6,3 b. 7,6
c. 5,1 d. 8,7

**MTP Dec 22 Series II**

**(18)** The number of proper subset of the set $\{3, 4, 5, 6, 7\}$ is

a. 32 b. 31
c. 30 d. 25

**MTP Dec 22 Series II**

**(19)** Let A be the set of squares of natural numbers and let $x \in A, y \in A$, then

☆ a. $x + y \in A$ b. $x - y \in A$
c. $\frac{x}{y} \in A$ d. $xy \in A$

**MTP May 20**

**(20)** A town has a total population of 50,000. Out of it 28,000 read the newspaper X and 23,000 read Y while 4,000 read both the papers. The number of persons not reading X and Y both is

a. 2,000 b. 3,000
c. 2,500 d. none of these

**MTP Apr 21**

(21) ☆ In a survey of 300 companies, the number of companies using different Media-Newspapers (N), Radio (R) and Television (T) are as follows: $n(N) = 200$, $n(R) = 100$, $n(T) = 40$, $n(N \cap R) = 50$, $n(R \cap T) = 20$, $n(N \cap R) = 25$, and $n(N \cap R \cap T) = 5$,
Find the numbers of companies using none of these media:
a. 20 companies b. 250 companies
c. 30 companies d. 50 companies

**MTP Nov 21**

(22) In a group of students 80 can speak Hindi, 60 can speak English and 40 can speak Hindi and English both, then number of students is:
a. 100 b. 140
c. 180 d. 60

**MTP Dec 22 Series II**

(23) ☆ Out of total 150 students, 45 passed in Accounts, 30 in Economics and 50 in Maths, 30 in both Accounts and Maths, 32 in both Maths and Economics, 35 in both Accounts and Economics, 25 students passed in all the three subjects. Find the numbers who passed at least in any one of the subjects:
a. 63 b. 53
c. 73 d. none of these

**MTP June 2023 Series I**

(24) If $A = (0,1,2,3,4,5)$ then the number of subsets of A is
a. 64 b. 63
c. 61 d. 60

**MTP June 2023 Series I**

(25) The number of proper subsets of $A \cap B$, $A = (1,2,3,4,5,7,8,9,10)$ and $B = (2,4,6,7,9)$
a. 8 b. 15
c. 16 d. 64

**MTP June 2023 Series II**

(26) Out of 20 members in a family, 11 like to take tea and 14 like coffee. Assume that each one likes at least one of the two drinks. Find how many like both coffee and tea:
a. 2 b. 3
c. 4 d. 5

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | b | 2 | a | 3 | b |
| 4 | d | 5 | c | 6 | a |
| 7 | c | 8 | b | 9 | a |
| 10 | b | 11 | a | 12 | c |
| 13 | d | 14 | a | 15 | d |
| 16 | a | 17 | a | 18 | b |
| 19 | d | 20 | b | 21 | d |
| 22 | a | 23 | b | 24 | a |
| 25 | a | 26 | d | | |

## Relations

### Past Year Questions

**PYQ Nov. 18**

(1) If $A = (1, 2)$ and $B = (3, 4)$. Determine the number of relations from A and B:
a. 3 b. 16
c. 5 d. 6

**PYQ June 19**

(2) ☆ $A = (1, 2, 3, 4, \ldots\ldots, 10)$ a relation on A, $R = \{(x, y) / x + y = 10, x \in A, y \in A, x \geq y\}$ then domain of $R^{-1}$ is
a. (1, 2, 3, 4, 5)
b. (0, 3, 5, 7, 9)
c. (1, 2, 4, 5, 6, 7)
d. None of these

**PYQ Jan. 21**

(3) In the set of all straight lines on a plane which of the following is not 'TRUE'?
a. Parallel to an equivalence relation
b. Perpendicular to is a symmetric relation
c. Perpendicular to is an equivalence relation
d. Parallel to a reflexive relation

**PYQ Dec. 21**

(4) ☆ If a is related to b if and only if the difference in a and b is an even integer. This relation is
a. Symmetric, reflexive but not transitive
b. Symmetric, transitive but not reflexive
c. Transitive, reflexive but not symmetric
d. Equivalence relation

PYQ Dec. 22

(5) Let $A = (1,2,3)$ and consider the relation $R = \{(1,1),(2,2),(3,3),(1,2),(2,3),(1,3)\}$

☆ Then R is:

a. Symmetric and transitive
b. Reflexive but not transitive
c. Reflexive but not symmetric
d. Neither symmetric, nor transitive

PYQ Jun 23

(6) Given the relation $R = \{(1,2),(2,3)\}$ on the set $A = \{1,2,3\}$, the minimum number of ordered pairs which when added to R make it equivalence relation is

a. 5 b. 7
c. 6 d. 8

PYQ Jun 23

(7) If R be a relation defined on the set of Natural numbers as" $xRy \Leftrightarrow (x-y)$ is divisible by 5" $\forall x, y \in N$ then the relation R is

a. Equivalence
b. Anti-symmetric
c. Symmetric but not transitive
d. Symmetric but not reflexive

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | b | 2 | a | 3 | c |
| 4 | d | 5 | c | 6 | b |
| 7 | a | | | | |

## Relations

### Mock Test Paper Questions

MTP May 18

(1) On the sets of lines in a plane the Relation "is perpendicular to" is

a. Reflexive b. Symmetric
c. Transitive d. None of these

MTP Nov 18

(2) On the set of lines, being Perpendicular is a _____ relation.

a. Reflexive
b. Symmetric
c. Transitive
d. None of these

MTP Dec 22 Series II

(3) Let $A = \{1,2,3\}$, then the relation $R = \{(1,1),(2,3),(2,2),(3,3),(1,2)\}$ is:

a. Symmetric b. Transitive
c. Reflexive d. Equivalence

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | b | 2 | b | 3 | c |

## Functions

### Past Year Questions

PYQ May 18

(1) Let N be the set of all natural numbers; E be the set of all even natural numbers then the function;
$f: N \to E$ defined as $f(x) = 2x, x \in N$

a. One-One Into
b. Many-One Into
c. One-One Onto
d. Many-One Onto

PYQ Nov. 18

(2) A is (1, 2, 3, 4) and B is (1, 4, 9, 16, 25) is a function f is defined from set A to B where $f(x) = x^2$ then the range of f is:

a. (1, 2, 3, 4) b. (1, 4, 9, 16)
c. (1, 4, 9, 16, 25) d. None of these

PYQ Nov. 18

(3) Identify the function from the following:

a. $\{(1,1),(1,2),(1,3)\}$
b. $\{(1,1),(2,1),(2,3)\}$
c. $\{(1,2),(2,2)(3,2),(4,2)\}$
d. None of these

PYQ June 19

(4) If $f(x) = x^2$ and $g(x) = \sqrt{x}$ then

a. go $f(3) = 3$ b. go $f(-3) = 9$
c. go $f(9) = 3$ d. go $f(-9) = 3$

PYQ June 19

(5) If $A = (a, b, c, d)$; $B = (p, q, r, s)$ which of the following relation is a function from A to B

☆

a. $R_1 = \{(a,p),(b,q),(c,s)\}$
b. $R_2 = \{(p,a),(b,r),(d,s)\}$
c. $R_3 = \{(b,p),(c,s),(b,r)\}$
d. $R_4 = \{(a,p),(b,r),(c,q),(d,s)\}$

PYQ Nov. 19

(6) $f(n) = f(n-1) + f(n-2)$ when $n = 2, 3, 4 \ldots\ldots$ $f(0) = 0, f(1) = 1$ then $f(7) = ?$

☆ a. 3 b. 5
c. 8 d. 13

PYQ Nov. 19

(7) $f(x) = \frac{x+1}{x}$ find $f^{-1}(x)$

a. $1/(x-1)$ b. $1/(y-1)$
c. $\frac{1}{y} - 1$ d. X

PYQ Nov. 20

(8) The inverse function $f^{-1}$ of $f(y) = 3y$ is:

a. $1/3y$ b. $y/3$
c. $-3y$ d. $1/y$

PYQ Jan. 21

(9) Let $f: R \Rightarrow R$ be defined by

☆ $f(x) = \begin{cases} 2x \text{ for } x > 3 \\ x^2 \text{ for } 1 < x \le 3 \\ 3x \text{ for } x \le 1 \end{cases}$

The value of $f(-1) + f(2) + f(4)$ is

a. 9 b. 14
c. 5 d. 6

PYQ July 21

(10) The range of the function $f$ defined by $f(x) = \sqrt{16 - x^2}$ is

a. (-4, 0) b. (-4, 4)
c. [0, 4] d. (+4, 4)

PYQ July 21

(11) Let $A = R-(3)$ and $B = R-(1)$. Let $f(x) \to B$

☆ defined by $f(x) = \frac{x-2}{x-3}$. What is the value of $f^{-1}\left(\frac{1}{2}\right)$?

a. 2/3 b. 3/4
c. 1 d. - 1

PYQ July 21

(12) If $F(x) = x^2 - 1$ and $g(x) = |2x + 3|$, then

☆ $[fog(3) - gof(-3)]$ is ?

a. 71 b. 61
c. 41 d. 51

PYQ Dec. 21

(13) If $u(x) = \frac{1}{1-x}$, then $u^{-1}(x)$ is:

a. $\frac{1}{x-1}$ b. $1 - x$
c. $1 - \frac{1}{x}$ d. $\frac{1}{x} - 1$

PYQ June 22

(14) $f(x) = \{(2,2);(3,3);(4,4);(5,5);(6,6)\}$ be a relation of set $A = (2, 3, 4, 5, 6)$

a. Reflexive and Transitive
b. Reflexive and Symmetric
c. Reflexive only
d. An equivalence relation

PYQ June 22

(15) If $f(y) = \frac{y-1}{y}$, find $f^{-1}(x)$

☆ a. $\frac{1}{1-y}$ b. $y$
c. $\frac{y}{y-1}$ d. $\frac{y}{1-y}$

PYQ Jun 23

(16) If $f(x): N \to R$ is a function defined as $f(x) = 4x + 3$, $\forall x \in N$, then $f^{-1}(x)$ is:

a. $4 + \frac{x+3}{4}$ b. $\frac{x+3}{4}$
c. $\frac{x-3}{4}$ d. $\frac{3x+4}{4}$

**Answer Key**

| | | |
|---|---|---|
| 1 c | 2 b | 3 c |
| 4 a | 5 d | 6 d |
| 7 a | 8 b | 9 a |
| 10 c | 11 c | 12 b |
| 13 c | 14 c | 15 a |
| 16 c | | |

## Functions

### Mock Test Paper Questions

**MTP May 18**

(1) Find $f \circ g$ for the functions $f(x) = x^8, g(x) = 2x^2 + 1$

a. $x^8(2x^2+1)$ b. $x^8$
c. $2x^2+1$ d. $(2x^2+1)^8$

**PYQ Nov 18, MTP May 19**

(2) If $A = \{1,2,3,4\}$ and $B = \{1,4,9,16,25\}$ is a function of f is defined set A to B where $f(x) = x$ 2 then the range of f is

a. {1,2,3,4} b. {1,4,9,16}
c. {1,4,9,16, 25} d. none of these

**MTP May 19**

(3) If $f(x) = x+3$ and $g(x) = x^2$, then $fog(x)$

a. $x^2+3$ b. $x^2+x+3$
c. $(x+3)^2$ d. None of these

**MTP May 19 Series II**

(4) A function $f(x)$ is an even function, if

a. $-f(x) = f(x))$ b. $f(-x) = f(x)$
c. $f(-x) = -f(x)$ d. None of these

**MTP May 19 Series II**

(5) Find the $f \circ g$ for the functions $f(x) = x^3$, $g(x) = x + 1$

a. $x^2(x+1)$ b. $x^2$
c. $x+1$ d. $(x+1)^3$

**MTP Nov 19**

(6) If $f(x) = \left(\frac{x^2-4}{x-2}\right)$, then $f(2)$ is:

a. 0 b. 2
c. 4 d. 1

Note: From Chp8 – Calculus

**MTP Nov 19**

(7) If $f'(x) = 3x^2 + 2$ & $f(0)=0$ then find $f(2)$.

a. 8 b. 10
c. 12 d. none of these

**ICAI SM, MTP May 20**

(8) If $f(x) = \frac{x}{1-x}$ and $g(x) = \frac{x-1}{x}$, then $g$ of $(x)$ is

a. $x-1$ b. $x$
c. $1/x$ d. none of these

**MTP Nov 2**

(9) Let $f: R \to R$ be such that $f(x) = 2^x$, then $f(x+y)$ equals

a. $f(x) + f(y)$
b. $f(x).f(y)$
c. $f(x) \div f(y)$
d. None of these

**MTP Nov 19, MTP March 2**

(10) If $f(x) = \left(\frac{x^2-4}{x-2}\right)$, then $f(2)$ is

a. 0 b. 2
c. 4 d. 1

**MTP March 2**

(11) If $f(x) = x^k$ and $f'(1) = 10$ then the value of K is

a. 10a b. -10
c. 1/10 d. None

Note: From Chapter 8

**MTP Apr 21**

(12) Let R is the set of real numbers such that the function $f: R \to R$ and $g: R \to R$ are defined by by $f(x) = x^2 + 3x + 1$ and $g(x) = 2x-3$. Find (fog):

a. $4x^2+6x+1$ b. $x^2+6x+1$
c. $4x^2-6x+1$ d. $x^2-6x+1$

**MTP Apr 21**

(13) If $A = \{1,2,3,4\}$, $B = \{2,4,6,8\}$, $f(1) = 2$, $f(2) = 4$, $f(3) = 6$ and $f(4) = 8$, and $f: A \to B$ then $f^{-1}$ is:

a. {(2,1), (4,2), (6,3) (8,4)}
b. {(1,2), (2,4), (3,6), (4,8)}
c. {(1,4), (2,2), (3,6), (4,8)}
d. none of these

**MTP Nov 21**

(14) If $f(x) = x^2 - 1$ and $g(x) = 2x+3$ then g of (3)

a. 71 b. 61
c. 41 d. 19

**MTP Oct 21**

(15) Find $g \circ f$ for the functions $f(x) = \sqrt{x}$, $g(x) = 2x^2 + 1$.

a. $2x^2+1$ b. $2x+1$
c. $(2x^2+1)(\sqrt{x})$ d. $\sqrt{x}$

**MTP Oct 21**

(16) If $f(x)= x^2-1$ and $g(x)= \frac{x+1}{2}$, then $\frac{f(3)}{f(3)+g(3)}$ is

a. 5/4 b. 4/5
c. 3/5 d. 5/3

**MTP March 22**

(17) If $f(x)=\frac{2+x}{2-x}$, then $f^{-1}(x)$

a. $\frac{2(x-1)}{x+1}$ b. $\frac{2(x+1)}{x-1}$
c. $\frac{(x+1)}{x-1}$ d. $\frac{(x-1)}{x+1}$

**MTP March 22**

(18) If $f: R \to R$ is a function, defined by $f(x) = 2^x$ ; then $f(x+y)$ is

a. $f(x)+f(y)$ b. $f(x).f(y)$
c. $f(x) \div f(y)$ d. none

**MTP March 22**

(19) If $f(x) = x+2$, $g(x) = 7^x$, than g of $(x) =$ ____

a. $7^x.x+2.7^x$ b. $7^x+2$
c. $49(7^x)$ d. none of these

**MTP June 22**

(20) Let R be a relation on N defined by $x+2y = 8$. The domain of R is:

a. {2, 4, 8} b. {2, 4, 6, 8}
c. {2, 4, 6} d. {1, 2, 3, 4}

**MTP June 22**

(21) The domain of the function $f(x)=\frac{x^2+3x+5}{x^2-5x+4}$ is:

a. R b. $R-\{1,4\}$
c. $R-\{1\}$ d. (1, 4)

**MTP Dec 22 – Series I**

(22) $f(p)=\frac{1}{1-p}$, then $f^{-1}$ is

a. 1-p b. $\frac{p-1}{p}$
c. $\frac{p}{p-1}$ d. $\frac{1}{p}$

**MTP Dec 22 – Series I**

(23) ☆ Determine $f(x)$, given that $f'(x) = 12x^2-4x$ and $f(-3) = 17$

a. $f(x)=4x^3-2x^2+143$
b. $f(x)=6x^3-x^4+137$
c. $f(x)=3x^4-x^3-137$
d. $f(x)=4x^3-2x^2-143$

**MTP June 2023 Series I**

(24) If $f(x)=x^2-5$, evaluate $f(3)$, $f(-4)$, $f(5)$, and $f(1)$.

a. 0, 11, 20, 4 b. -4, 11, -2, 4
c. 4, 11, 20, -4 d. -2, 0, 20, 5

**MTP June 2023 Series II**

(25) If $f(x)=\frac{x}{\sqrt{1+x^2}}$ and $g(x)=\frac{x}{\sqrt{1-x^2}}$ Find fog?

a. x b. $\frac{1}{x}$
c. $\frac{x}{\sqrt{1-x^2}}$ d. $x\sqrt{1-x^2}$

**MTP June 2023 Series II**

(26) The range of the relation $\{(1,0)(2,0)(3,0)(4,0)(0,0)\}$ is

a. $\{1,2,3,4,0\}$ b. $\{0\}$
c. $\{1,2,3,4\}$ d. None of these

**Answer Key**

| | | | | | |
|---|---|---|---|---|---|
| 1 | d | 2 | b | 3 | a |
| 4 | b | 5 | d | 6 | c |
| 7 | c | 8 | b | 9 | b |
| 10 | c | 11 | a | 12 | c |
| 13 | a | 14 | d | 15 | b |
| 16 | b | 17 | a | 18 | b |
| 19 | c | 20 | c | 21 | b |
| 22 | b | 23 | a | 24 | c |
| 25 | a | 26 | b | | |