

## Part - I

14 X 1 = 14

## I Choose the correct answer.

- The range of the relation  $R = \{(x, x^2) / x \text{ is a prime number less than } 13\}$  is
  - $\{2, 3, 5, 7\}$
  - $\{2, 3, 5, 7, 11\}$
  - $\{4, 9, 25, 49, 121\}$
  - $\{1, 4, 9, 25, 49, 121\}$
- If  $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$  is a function given by  $g(x) = \alpha x + \beta$  then the values of  $\alpha$  and  $\beta$  are
  - $(-1, 2)$
  - $(2, -1)$
  - $(-1, -2)$
  - $(1, 2)$
- Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are
  - 0, 1, 2
  - 1, 4, 8
  - 0, 1, 3
  - 1, 3, 5
- $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$  is
  - $\frac{9y}{7}$
  - $\frac{9y^3}{(21y-21)}$
  - $\frac{21y^2-42y+21}{3y^3}$
  - $\frac{7(y^2-2y+1)}{y^2}$
- Find the matrix  $x$  if  $2x + \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 5 \end{bmatrix}$ 
  - $\begin{bmatrix} -2 & -2 \\ 2 & -1 \end{bmatrix}$
  - $\begin{bmatrix} 2 & 2 \\ 2 & -1 \end{bmatrix}$
  - $\begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$
  - $\begin{bmatrix} 2 & 1 \\ 2 & 2 \end{bmatrix}$
- If in  $\Delta ABC$ ,  $DE \parallel BC$ ,  $AB = 3.6\text{cm}$ ,  $AC = 2.4\text{ cm}$  and  $AD = 2.1\text{ cm}$  then the length of  $AE$  is
  - 1.4 cm
  - 1.8 cm
  - 1.2 cm
  - 1.05 cm
- The square root of  $4m^2 - 24m + 36 = 0$  is
  - $4(m-3)$
  - $2(m-3)$
  - $(2m-3)^2$
  - $m-3$
- If  $(5, 7)$ ,  $(3, p)$  and  $(6, 6)$  are collinear, then the value of  $p$  is
  - 3
  - 6
  - 9
  - 12

9. A straight line has equation  $8y = 4x + 21$ . Which of the following is true.
- The slope is 0.5 and y intercept is 2.6
  - The slope is 5 and y intercept is 1.6
  - The slope is 0.5 and y intercept is 1.6
  - The slope is 5 and y intercept is 2.6
10. If the ratio of the height of a tower and the length of its shadow is  $\sqrt{3} : 1$  then the angle of elevation of the sun has measure
- $45^\circ$
  - $30^\circ$
  - $90^\circ$
  - $60^\circ$
11. The total surface area of a cylinder where radius is  $\frac{1}{3}$  of its height is
- $\frac{9\pi h^2}{8}$  sq. units
  - $24\pi h^2$  sq. units
  - $\frac{8\pi h^2}{9}$  sq. units
  - $\frac{56\pi h^2}{9}$  sq. units
12. A spherical ball of radius  $r_1$  units is melted to make 8 new identical balls each of radius  $r_2$  units. Then  $r_1 : r_2$
- 2 : 1
  - 1 : 2
  - 4 : 1
  - 1 : 4
13. The range of the data 8,8,8,8,8 ..... 8 is
- 0
  - 1
  - 8
  - 3
14. If a letter is chosen at random from the English alphabets {a,b,c, ..... z}; then the probability that the letter choose precedes x
- $\frac{12}{13}$
  - $\frac{1}{13}$
  - $\frac{23}{26}$
  - $\frac{3}{26}$

## PART - II

10 X 2 = 20

## II Answer any 10 questions. (Q.No. 28 is compulsory)

15. Let  $A = \{1,2,3\}$  and  $B = \{x/x \text{ is prime number less than } 10\}$ . Find  $A \times B$  and  $B \times A$ .
16. If  $A = \{-2, -1, 0, 1, 2\}$  and  $f : A \rightarrow B$  is an onto function defined by  $f(x) = x^2 + x + 1$  then find B.
17. If  $13824 = 2^a \times 3^b$  then find a, and b.
18. If  $1 + 2 + 3 + \dots + n = 666$  then find n.
19. Find the LCM of the following  $8x^4y^2, 48x^2y^4$ .

20. Determine the nature of the roots for the following quadratic equation.  
 $\sqrt{2}t^2 - 3t + 3\sqrt{2} = 0$ .
21. What length of ladder is needed to reach a height of 7ft along the wall when the base of the ladder is 4ft from the wall? Round off your answer to the next tenth place.
22. A cat is located at the point (-6, -4) in xy plane. A bottle of milk is kept at (5, 11). The cat wish to consume of the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk.
23. Prove that  $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$ .
24. If the total surface area of a cone of radius 7cm is  $704 \text{ cm}^2$  then find its slant height.
25. If the ratio of radii of two spheres is 4 : 7 find ratio of their volumes.
26. Find the range and coefficient of range of the following data 63, 89, 98, 125, 79, 108, 117, 68.
27. What is the probability that a leap year selected at random will contain 53 Saturday?
28. Find the equation of a straight line perpendicular to the line  $y = \frac{4}{3}x - 7$  and passing through the point (7, -1).

## PART - III.

10 X 5 = 50

## III Answer any 10 questions. (Q.No. 42 is compulsory)

29. Let  $A = \{x \in \mathbb{N} / 1 < x < 4\}$ ,  $B = \{x \in \mathbb{W} / 0 \leq x < 2\}$  and  $C = \{x \in \mathbb{N} / x < 3\}$ . Then verify that  $A \times (B \cup C) = (A \times B) \cup (A \times C)$ .
30. If  $f(x) = x - 4$ ,  $g(x) = x^2$  and  $h(x) = 3x - 5$ . Prove that  $(f \circ g) \circ h = f \circ (g \circ h)$ .
31. If nine times ninth term is equal to the fifteen times fifteenth term, show that six times twenty fourth term is zero.
32. Find the sum to n terms of the series  $5 + 55 + 555 + \dots$
33. If  $9x^4 + 12x^3 + 28x^2 + ax + b$  is a perfect square, find the values of a and b.
34. The roots of the equation  $x^2 + 6x - 4 = 0$  are  $\alpha, \beta$  Find the quadratic equation whose roots are i)  $\alpha^2$  and  $\beta^2$  ii)  $\frac{2}{\alpha}$  and  $\frac{2}{\beta}$



35. If  $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{bmatrix}$  show that  $(AB)^T = B^T A^T$ .
36. State and prove basic proportionality theorem.
37. Find the area of the quadrilateral whose vertices are at  $(-9, 0)$ ,  $(-8, 6)$ ,  $(-1, -2)$  and  $(-6, -3)$ .
38. From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be  $30^\circ$  and  $60^\circ$ . If the height of the light house is  $h$  meters and the line joining the ships passes through the foot of the light house, show that the distance between the ships is  $\frac{4h}{\sqrt{3}}$  m.
39. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter is 14cm and the height is 13cm. Find the capacity of the vessel.
40. Find the coefficient of variation of 24, 26, 33, 37, 29, 31.
41. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.
42. A right circular cylindrical container of base radius 6cm and height 15cm is full of ice cream. The ice cream is to be filled in cones of height 9cm and base radius 3cm, having a hemispherical cap. Find the number of cones needed to empty the container.

## PART - IV

2 X 8 = 16

## IV Answer all the questions.

43. a) Draw the two tangents from a point which is 10cm away from the centre of a circle of radius 5cm. Also measure the lengths of the tangents. **(OR)**  
 b) Draw a triangle ABC of base BC = 8cm,  $\angle A = 60^\circ$  and the bisector of  $\angle A$  meets BC and D such that BD = 6cm.
44. a) Graph the following quadratic equations and state their nature of solutions  $x^2 - 9x + 20 = 0$ . **(OR)**  
 b) A school announces that for a certain competitions, the cash price will be distributed for all the participants equals as show

No. of participants (x)	2	4	6	8	10
Amount for each participant in Rs. (y)	180	90	60	45	36

- i) Find the constant of variation.  
 ii) Graph the above data and hence, find how much will each participant get if the number of participants are 12.