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Exam Time : 03:00:00 Hrs

Total Marks 100

14 x 1 = 14

PART - A

CHOOSE THE CORRECT ANSWER

1) Let A = {1, 2, 3, 4} and B = {4, 8, 9, 10}. A function f: A → B given by f = {(1, 4), (2, 8), (3, 9), (4,10)} is a

(a) Many-one function (b) Identity function (c) One-to-one function (d) Into function

2) The sum of the exponents of the prime factors in the prime factorization of 1729 is

(a) 1 (b) 2 (c) 3 (d) 4

3) The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots$ is

(a) $\frac{1}{24}$ (b) $\frac{1}{27}$ (c) $\frac{2}{3}$ (d) $\frac{1}{81}$

4) The solution of the system x + y − 3x = −6, −7y + 7z = 7 , 3z = 9 is

(a) x = 1, y = 2, z = 3 (b) x = −1, y = 2, z = 3 (c) x = −1, y = −2, z = 3 (d) x = 1, y = 2, z = 3

5) If in triangles ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, when

(a) $\angle B = \angle E$ (b) $\angle A = \angle D$ (c) $\angle B = \angle D$ (d) $\angle A = \angle F$

6) A tangent is perpendicular to the radius at the

(a) centre (b) point of contact (c) infinity (d) chord

7) If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then the slope of the perpendicular bisector of PQ is

(a) $\sqrt{3}$ (b) $-\sqrt{3}$ (c) $\frac{1}{\sqrt{3}}$ (d) 0

8) if x = a tanθ and y = b secθ then

(a) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ (b) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (c) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (d) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$

9) A tower is 60 m height. Its shadow is x metres shorter when the sun s altitude is 45 than when it has been 30 then x is equal to

(a) 41.92 m (b) 43.92 m (c) 43 m (d) 45.6 m

10) Th e height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be

(a) 12 cm (b) 10 cm (c) 13 cm (d) 5 cm

11) The total surface area of a hemi sphere is how much times the square of its radius.

(a) π (b) 4π (c) 3π (d) 2π

12) A page is selected at random from a book. The probability that the digit at units place of the page number chosen is less than 7 is

(a) $\frac{3}{10}$ (b) $\frac{7}{10}$ (c) $\frac{3}{9}$ (d) $\frac{7}{9}$

13) The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$ then the value of x is

(a) 2 (b) 1 (c) 3 (d) 1.5

14) if sin θ = cosθ = a and sec θ + cosec θ = b, then the value of b (a^2 - 1) is equal to

(a) 2a (b) 3a (c) 0 (d) 2ab

ANSWER 10 QUESTION .Q.NO 28 COMPLUSARY

15) Let f be a function f : N $\rightarrow$ N be defined by f(x) = 3x + 2, x $\in$ N

(i) Find the images of 1, 2, 3

(ii) Find the pre-images of 29, 53

(iii) Identify the type of function

16) Check whether the following sequences are in A.P. or not?

x + 2 2x + 3, 3x + 4, ...

17) Find the sum of the following

3,7,11....up to 40 terms

18) Solve $3p^2 + 2\sqrt{5}p - 5 = 0$ by formula method.

19) Find the square root of the following expressions

$\frac{144a^8b^{12}c^{16}}{81f^{12}g^4h^{14}}$

20) Vertices of given triangles are aken in order and their areas are provided aside. In each case find the value of 'p'?

S.No	Vertices	Area (sq.units)
(i)	(0, 0), (p, 8), (6, 2)	20
(ii)	(p, p), (5, 6), (5, -2)	32

21) Find the number of point of intersection of two straight lines.

22) prove that secθ - cosθ = tan θ sinθ

23) prove that $\frac{sec\theta}{sin\theta} - \frac{sin\theta}{cos\theta} = cot\theta$

24) Shall we get a hemisphere when a sphere is cut along the small circle?

25) A cone, a hemisphere and a cylinder have equal bases. The heights of he cone and cylinder are equal and are same as the common radius. Are they equal in volume?

26) If the mean and coefficient of variation of a data are 15 and 48 respectively, then find the value of standard deviation.

27) If A and B are two mutually exclusive events of a random experiment and P(not A) = 0.45, P(A U B) = 0.65, then find P(B).

28) Check whether AD is bisector $\angle$A of $\triangle$ABC in each of the following AB = 4cm, AC = 6cm, BD = 1.6cm and CD = 2.4cm.

29) ...

ANSWER 10 QUESTION .Q.NO 43 COMPLUSARY

30) If f(x) = $\frac{x-1}{x+1}$, x $\neq$ 1 show that f(f(x)) = $-\frac{1}{x}$, provided x $\neq$ 0.

31) If $p_1^{x_1} \times p_2^{x_2} \times p_3^{x_3} \times p_4^{x_4}$ = 113400 where p_1, p_2, p_3, p_4 are primes in ascending order and x_1, x_2, x_3, x_4 are integers, find the value of p_1, p_2, p_3, p_4 and x_1, x_2, x_3, x_4

32) Find the sum $\left[\frac{a-b}{a+b} + \frac{3a-2b}{a+b} + \frac{5a-3b}{a+b}+ \ldots to\ 12\ terms\right]$

33) A boat takes 1.6 hours longer to go 36 kms up a river than down the river. If the speed of the water current is 4 km per hr, what is the speed of the boat in still water?

34)
If $A = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix}, B = \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$ verify that $(AB)^T = B^T A^T$

35) Solve the following quadratic equations by completing the square method

$\frac{5x+7}{x-1}$ = 3x + 2

36) State the Alternate Segment theorem

37) A circular garden is bounded by East Avenue and Cross Road. Cross Road intersects North Street at D and East Avenue at E. AD is tangential to the circular garden at A(3, 10). Using the figure.

Where does the Cross Road intersect the

(i) East Avenue ?

(ii) North Street ?

38) The line joining the points A(0,5) and B(4,1) is a tangent to a circle whose centre C is at the point (4,4)
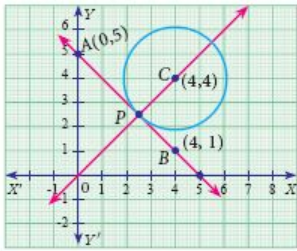
Find the equation of the line through C which is perpendicular to the line AB.

39) if $\frac{cos\theta}{1+sin\theta} = \frac{1}{a}$,then prove that $\frac{a^2-1}{a^2+1} = sin\theta$

40) The internal and external radii of a hollow hemispherical shell are 3 m and 5 m respectively. Find the T.S.A. and C.S.A. of the shell.
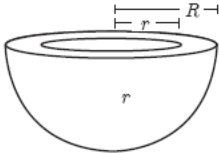
41) A solid sphere and a solid hemisphere have equal total surface area Prove that the ratio of their volume is $3\sqrt{3} : 4$.

42) A bag contains 6 green balls, some black and red balls. Number of black balls is as twice as the number of red balls. Probability of getting a green ball is thrice the probability of getting a red ball. Find (i) number of black balls (ii) total number of balls.

43) Three unbiased coins are tossed once. Find the probability of getting atmost 2 tails or atleast 2 heads.

<div align="center">PART -D</div>

2x 8 = 16

ANSWER ALL THE QUESTION

44) a) Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x   2 = 0$

<div align="center">**(OR)**</div>

b) Discuss the nature of solutions of the following quadratic equations.

$x^2 - 8x + 16 = 0$

45) a) Draw the two tangents from a point which is 5 cm away from the cen re of a circle of diameter 6 cm Also, measure the lengths of the tangents

<div align="center">**(OR)**</div>

b) Draw a triangle ABC of base BC = 8 cm, ∠A = 60º and the bisector of ∠A meets BC at D such that BD = 6 cm.

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