PRE-HALFYEARLY EXAMINATION 2019

MATHEMATICS

CLASS: X standard **Marks : 100**

Time : 3 hours

PART-I [Marks 14]

Answer all the 14 questions **14x1=14**

1. Let $n(A)$ =m and $n(B) = n$ then the total number of non-empty relations that can be defined from A to B is

(a) m^n (b) n^m (c) $2^{mn}-1$ (d) 2^{mn}

2. f(x) $(x+1)^3 - (x-1)^3$ represents a function which is

(a) Linear (b) cubic (c) reciprocal (d) quadratic

3. $7^{4k} \equiv$_____(mod 100)

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

4. The HCF of two numbers of the form 2^m and 3^n is _____

(a) 1 (b) 2 (c) 3 (d) 6

5. A system of three linear equations in three variables is inconsistent if their planes

(a) Intersect only at a point (b) intersect in a line

(c) Coincides with each other (d) do not intersect

6. Graph of a linear polynomial is a

(a) Straight line (b) circle (c) parabola (d) hyperbola

7. If A is a 2 x 3 matrix and B is a 3 x 4 matrix, how many columns does AB have

(a) 3 (b) 4 (c) 2 (d) 5

(a) 13 m (b) 14 m (c) 15 m (d) 12.8 m

9. The point of intersection of $3x - y = 4$ and $x + y = 8$ is

(a) (5,3) (b) (2,4) (c) (3,5) (d) (4,4)

10. $\tan\theta\sec^2\theta - \tan\theta$ is equal to

(a) $\sec\theta$ (b) $\cot^2\theta$ (c) $\sin\theta$ (d) $\cos\theta$

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. Variance of first 20 natural numbers is

(a) 32.25 (b) 44.25 (c) 33.25 (d) 30.

13. If a letter is chosen at random from the English alphabets {*a,b,...,z*}, then the probability that the letter chosen precedes *x*

(a) 12/ 13 (b) 1 /13 (c) 23/ 26 (d) 3 /26

14. The probability of sure event is

(a) 1 (b) 2 (c)0 (d) none of these

PARTS-II [MARKS: 20]

Answer all the questions [Question number 28 is compulsory] 10x2=20

15. Let $A=\{1,2,3\}$ and $B=\{x \mid x \text{ is a prime number less than } 10\}$,Find AxB and B xA

16. Find *k*, if f(k)=2k-1 and f o f(k)=5

17. If the Highest Common Factor of 210 and 55 is expressible in the form 55x, - 325, find x.

18. Find the 19th term of an A.P. -11,-15, - 19 ……..

19. Find the sum 3 +1+ 1/ 3 + …….+∞

20. Simplify $\frac{x^3}{x-y} + \frac{y^3}{y-x}$

21. Determine the nature of roots for the quadratic equations $2x^2-2x+9=0$

22. If A= $\begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$ find AB and BA.

23. A*D* is the bisector of $\angle A$. If *BD* = 4 cm, *DC*= 3 cm and *AB*= 6 cm, find *AC.*

24. A man goes 18 m due east and then 24 m due north. Find the distance of his current position from the starting point?

25. Prove that $\sec\theta - \cos\theta = \tan\theta \sin\theta$

26. The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone

27. Find the range and coefficient of range of the data: 25, 67, 48, 53, 18, 39, 44

28. Find the equation of a line passing through the point (3,-4) and having slope -5/7

PARTS-III [MARKS: 50]

Answer all the questions [Question number 42 is compulsory] 10x5=50

29. Let $A = \{1, 2, 3, 4\}$ and $B = \{2, 5, 8, 11, 14\}$ be two sets. Let $f: A \rightarrow B$ be a function function given by $f(x) = 3x-1$. Represent this function

(i) by arrow diagram (ii) in a table form

(iii) as a set of ordered pairs (iv) in a graphical form

30. If $f(x) = 2x+3, g(x) = 1-2x$ and $h(x) = 3x$ prove that $fo(goh) = (fog)oh$

31. If $S_1, S_2, \ldots\ldots\ldots\ldots, Sm$ are the sums of n terms of m A.P.'s whose first terms are 1,2,3...m and whose common differences are 1, 3, ,5,…… (2m-1) respectively, then show that $S_1+S_2+,\ldots\ldots+Sm=1/2mn(mn+1)$

32. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm,…, 24 cm. How much area can be decorated with thesecolour papers?

33. Find the GCD of the polynomials x^3+x^2-x+2 and $2x^3-5x+5x-3$

34. Find the values of *m* and *n* if the following polynomials are perfect squares $x^4-8x^3+mx^2+nx+16$

35. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$ $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$ show that $(AB)^T=B^TA^T$

36. State and prove thales theorem.

37. A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through (-3, 8). Find its equation

38. If $\frac{\cos^2\theta}{\sin\theta} = p$ and $\frac{\sin^2\theta}{\cos\theta} = q$ then prove that $p^2q^2(p^2+q^2+3)=1$

39. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of the frustum

40. The time taken (in minutes) to complete a homework by 8 students in a day are given by 38, 40, 47, 44, 46, 43, 49, 53. Find the coefficient of variation

41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8

42. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tanks will rise by 21 cm.

PARTS-IV [MARKS: 16]

Answer both questions **2x8=16**

43. a) Draw a circle of diameter 6 cm from a point *P*, which is 8 cm away from its centre. Draw the two tangents *PA* and *PB* to the circle and measure their lengths.

(Or)

b) Draw a triangle *ABC* of base *BC* = 5.6 cm, *A*= $\angle 40^{o}$ *and* the bisector of Đ*A* meets *BC* at *D* such that *CD* = 4 cm.

44. a) Draw the graph of $y=x^2-5x-6$ and hence use it to solve $x^2-5x-14=0$

(Or)

b) A passenger train takes 1 hr more than an express train to travel a distance of 240 km from Chennai to Virudhachalam. The speed of passenger train is less than that of an express train by 20 km per hour. Find the average speed of both the trains.

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