Padasalai's Half Yearly Exam 2019 – Model Question Paper

CLASS   : X   **MARKS : 100**

SUBJECT : MATHEMATICS   **TIME : 3:00hrs**

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PART – A   14X1=14

Answer All The Questions :

1. If $B \times A = \{(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)\}$, then A is
   a) $\{-2,0,3\}$ b) $\{3,4\}$ c) $\{-2,0,3,4\}$ d) None of these

2. If $f: A \rightarrow B$ is many-one function , then f is
   a) One-one   b) Not one-one   c) Onto   d) Into

3. If t_n is the nth term of an A.P, then $t_{2n} - t_n$ is
   a) 2nd   b) nd   c) 3nd   d) 0

4. If $1^3 + 2^3 + 3^3 + \cdots k^3 = 44100$,then $1 + 2 + 3 + \cdots k$ is
   a) 210   b) 2100   c) 441   d) 21

5. LCM of $-9a^3b^2$, $12a^2b^2c$ is
   a) $36a^3b^2c$ b) $-36a^3b^2c$ c) $-36a^2b^3c$ d) $36a^3b^2$

6. If $3\sqrt{x} = 9$, then the value of x is
   a) 27   b) 3   c) 9   d) $\frac{9}{3}$

7. If A is a 2x3 matrix and B is a 3x4 matrix, how many rows does AB have
   a) 3   b) 4   c) 2   d) 5

8. Two poles of heights 6m and 11m stand vertically on a plane ground. If the distance between their feet is 12m, what is the distance between their tops?
   a) 13m   b) 14m   c) 15m   d) 12.8m

9. If (2,3) , (4,a) and (6,-3) are collinear, then the value of 'a' is
   a) 0   b) 4   c) 3   d) 2

10. If the ratio of the height of the tower and the length of its shadow is $1: \sqrt{3}$, then the angle of elevation of the sun has measure
    a) 45° b) 30° c) 90° d) 60°

11. If the curved surface area of a right circular of height 14cm is 88cm^2,then the diameter of the cylinder is
    a) 1cm   b) 2cm   c) 4cm   d) 1.5 cm

12. If the standard deviation of a data is 4.5 and if each value of the data is decreased by 3, then the new standard deviation is
    a) 1.5   b) 4.5   c) 13.5   d) 7.5

13. A letter is chosen at random from the letter of the word "PROBABILITY". Find the probability that it is not a vowel.
    a) $\frac{1}{5}$ b) $\frac{3}{5}$ c) $\frac{1}{3}$ d) $\frac{2}{3}$

14. In a two children family,then find the probability that there is at least one girl in a family
    a) $\frac{1}{4}$ b) $\frac{1}{2}$ c) $\frac{3}{4}$ d) $\frac{4}{3}$

PART – B   **10x2=20**

Answer Any TEN Questions : (Q.No 28 is compulsory)

15. Define One-one and Onto function.

16. Find k if $f \circ f(k) = 5$ where $f(k) = 2k - 1$.

17. If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then find the value of 'm'.

18. Find the remainder when 2^{81} is divided by 17.

19. In a G.P. 729, 243, 81, … find t_7.

20. Solve $x + 2y - z = 5; x - y + z = -2; -5x - 4y + z = -11$.

21. Simplify : $\frac{x+2}{4y} \div \frac{x^2-x-6}{12y^2}$.

22. A vertical stick of length 6m casts a shadow 400cm long on the ground and at the same time a tower casts a shadow 28m long. Using similarity , find the height of the tower.

23. 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?

24. The line through the points $(-2, a)$ and $(9,3)$ has slope $-\frac{1}{2}$. Find the value of 'a'.

25. Prove that $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + \tan\theta$.

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

27. If the range and coefficients of range of the data are 20 and 0.2 respectively, then find the largest and smallest values of the data.

28. If $\cos\theta \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} + \sin\theta \begin{bmatrix} x & -\cos\theta \\ \cos\theta & x \end{bmatrix} = I_2$, find x.

PART – C   **10x5=50**

Answer Any TEN Questions : (Q.No 42 is compulsory)

29. If the function $f: [-5,9] \to R$ is defined by $f(x) = \begin{cases} 6x + 1, & -5 \le x < 2 \\ 5x^2 - 1, & 2 \le x < 6 \\ 3x - 4, & 6 \le x \le 9 \end{cases}$,

    i) $f(-3) + f(2)$ ii) $f(7) - f(1)$ iii) $2f(4) + f(8)$ iv) $\frac{2f(-2)-f(6)}{f(4)+f(-2)}$.

30. If $f(x) = x^2, g(x) = 3x$ and $h(x) = x - 2$, prove that $(f \circ g) \circ h = f \circ (g \circ h)$.

31. The 13th term of an A.P. is 3 and the sum of first 13 terms is 234. Find the common difference and the sum of first 21terms.

32. Find the G.P. in which the 2nd term is $\sqrt{6}$ and the 6th term is $9\sqrt{6}$.

33. Find the square root of $289x^4 - 612x^3 + 970x^2 - 684x + 361$.

34. The roots of the equation $x^2 + 6x - 4 = 0$ are α and β. Find the quadratic equation whose roots are $\alpha^2\beta$ and $\beta^2\alpha$.

35. State and prove Basic Proportionality Theorem.

36. If vertices of a quadrilateral are at $A(-5,7), B(-4, k), C(-1, -6)$ and $D(4,5)$ and its area is 72 sq.units. Find the value of 'k'.

37. From the top of the tower 60m high the angles of depression of the top and bottom of a vertical lamp post are observed to be 38° and 60° respectively. Find the height of the lamp post.
    ($\tan 38° = 0.7813$, $\sqrt{3} = 1.732$) .

38. An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom diameters are 10m and 4m and whose height is 4m. Find the curved and total surface area of the bucket.

39. 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.

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 coefficients of variation.

41. The king , Queen and Jack of the suit spade are removed from a deck of 52 cards. One card is selected from the remaining cards. Find the probability of getting (i) a diamond (ii) a queen (iii) a spade (iv) a heart card bearing the number 5.

42. Is it possible to design a rectangular park of perimeter 320m and area 4800m^2?If so find its length and breadth.

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PART – D   **2x8=16**

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Answer All the Questions :

43. Construct a triangle ΔPQR such that $QR = 5cm$, $\angle P = 30°$ and the altitude from P to QR is length 4.2cm.   **(OR)**

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

44. Draw the graph of $y = (x - 1)(x + 3)$ and hence solve $x^2 - x - 6 = 0$.   **(OR)**

    Solve $\frac{1}{3}(x + y - 5) = y - z = 2x - 11 = 9 - (x + 2z)$.

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ALL THE BEST

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