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STANDARD 10 QUARTERLY EXAMINATION – SEPTEMBER 2022

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Time: 3.00 Hrs MATHEMETICS Max.Marks:100

PART – I [MARKS – 14]

I. Answer all the 14 questions. Choose the most suitable answer from the given four alternatives. 14x1=14

1. If $n(A \times B) = 6$ and $A = \{1, 3\}$ then $n(B)$ is a) 1 b) 2 c) 3 d) 6

2. If A and B are any two non – empty sets and R is a relation from A to B, then the domain of R is a) A b) B c) a subset of A d) a subset of B

3. Let $A = \{1, 2, 3, 4\}$ and $B = \{4, 8, 9, 10\}$. A function $f: A \to B$ 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

4. If the HCF of 65 and 117 is expressible in the term of 65m – 117, then the value of m is
a) 4 b) 2 c) 1 d) 3

5. In how many ways 64 can be written as the product of three numbers such that the numbers are in G.P? a) 0 b) 1 c) 3 d) infinite

6. The value of $(1^3 + 2^3 + 3^3 + \ldots + 15^3) - (1 + 2 + 3 + \ldots + 15)$ is
a) 14400 b) 14200 c) 14280 d) 14520

7. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is a) $\frac{9y}{7}$ b) $\frac{9y^3}{(21y-21)}$ c) $\frac{21y^2-42y+21}{3y^2}$ d) $\frac{7(y^2-2y+1)}{y^2}$

8. Which of the following should be added to make $x^2 - 14x$, a perfect square.
a) 7 b) 49 c) – 49 d) 196

9. Graph of a linear equation is a a) Straight line b) Circle c) Parabola d) hyperbola

10. In ΔLMN, $\angle L = 60°$, $\angle M = 50°$. If $\Delta LMN \sim \Delta PQR$ then the value of $\angle R$ is
a) 40° b) 70° c) 30° d) 110°

11. In a ΔABC, AD is the bisector of $\angle BAC$. If AB = 8cm, BD = 6cm, and DC = 3cm. The length of the side AC is a) 6 cm b) 4 cm c) 3 cm d) 8 cm

12. The slope of the line joining (12, 3), (4, a) is $\frac{1}{8}$. The value of 'a' is a) 1 b) 4 c) – 5 d) 2

13. Two straight lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, where the coefficients are non – zero, are perpendicular iff
a) $a_1b_2 - a_2b_1 = 0$ b) $a_1b_2 + a_2b_1 = 0$ c) $a_1a_2 + b_1b_2 = 0$ d) $a_1a_2 - b_1b_1 = 0$

14. If $\sin\theta = \cos\theta$, then $2\tan^2\theta + \sin^2\theta - 1$ is equal to a) $\frac{-3}{2}$ b) $\frac{3}{2}$ c) $\frac{2}{3}$ d) $\frac{-2}{3}$

PART – II [MARKS 20]

II. Answer any ten questions. Question No. 28 is compulsory. 10x2=20

15. If $A\{2, -2, 3\}$ and $B = \{1, -4\}$ then find $A \times B$, $A \times A$

16. Represent the function $f = \{(1, 2), (2, 2), (3, 2), (4, 3), (5, 4)\}$ through
(i) an arrow diagram (ii) a table form

17. The function g is defined by $g(x) = \frac{x-2}{3}$. Calculate the value of $gg\left(\frac{1}{2}\right)$

18. Compute x, such that $10^4 \equiv x \pmod{19}$

19. Find the sum of $6 + 13 + 20 + \ldots + 97$

20. Find the first term and common ratio of the G.P, whose 2nd term is $\sqrt{6}$ and 6th term is $9\sqrt{6}$.

21. Find the LCM of $5x - 10$ and $5x^2 - 20$

22. Determine the nature of the roots of the quadratic equation $x^2 - x - 1 = 0$.

23. 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.

24. In ΔABC, D and E are points on the sides AB and AC respectively such that DE||BC. If $\frac{AD}{DB} = \frac{3}{4}$ and AC = 15cm find AE.

25. Show that the points (−2,5), (6,−1) and (2, 2) are collinear.

26. Find the equation of a straight line which has slope $\frac{-5}{4}$ and passing through the point (−1,2).

27. Prove the identity $\frac{\cos\theta}{1+\sin\theta} = \sec\theta - \tan\theta$

28. Simplify: $\frac{x\sqrt{x} - y\sqrt{y}}{\sqrt{x} - \sqrt{y}}$

PART – III [MARKS 50]

III. Answer any ten questions. Question No. 42 is compulsory. 10x5=50

29. Let A = {x ∈ W/x < 2}, B = {x ∈ N/1 < x ≤ 4} and C = {3,5}. Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$

30. If the function f: R → R is defined by

$$f(x) = \begin{cases} 2x + 7; & x < -2 \\ x^2 - 2; & -2 \le x < 3 \\ 3x - 2; & x \ge 3 \end{cases}$$

then find the values of

(i) f(4) (ii) f(−2) (iii) f(4) + 2f(1) (iv) $\frac{f(1) - 3f(4)}{f(-3)}$

31. If f(x) = x², g(x) = 3x and h(x) = x − 2, Prove that (fog)oh = fo(goh).

32. Prove that $2^n + 6 \times 9^n$ is always divisible by 7 for any positive integer n.

33. Find the sum of the series $(2^3 - 1^3) + (4^3 - 3^3) + (6^3 - 5^3) + \ldots$ to (i) n terms (ii) 8 terms

34. The sum of the digits of a three – digit number is 11. If the digits are reversed, the new number is 46 more than five times the former number. If the hundreds digit plus twice the tens digit is equal to the units digit, then find the original three digit number?

35. If $A = \frac{2x+1}{2x-1}$, $B = \frac{2x-1}{2x+1}$ find $\frac{1}{A-B} - \frac{2B}{A^2 - B^2}$

36. Find the values of a and b if the polynomial $4x^4 - 12x^3 + 37x^2 + bx + a$ is a perfect square.

37. A bus covers a distance of 90 km at a uniform speed. Had the speed been 15 km / hour more it would have taken 30 minutes less for the journey. Find the original speed of the bus.

38. State and prove Angle Bisector Theorem.

39. Find the value of k, if the area of a quadrilateral is 28 sq. units, whose vertices are (−4,−2), (−3,k), (3,−2) and (2, 3)

40. 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 (i) the equation of the line AB (ii) the equation of the line through C which is perpendicular to the line AB. (iii) the coordinates of the point of contact of tangent line AB with the circle.

41. If $\operatorname{cosec}\theta + \cot\theta = P$, then prove that $\cos\theta = \frac{P^2 - 1}{P^2 + 1}$

42. If $x = 1 + p + p^2 + \ldots \infty$ and $y = 1 + q + q^2 + \ldots \infty$ and |p| < 1, |q| < 1 then show that $1 + pq + p^2q^2 + \ldots \infty = \frac{xy}{x + y - 1}$

PART – IV [MARKS 16]

IV. Answer the following questions.

43. (a) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle PQR (Scale factor $\frac{3}{5} < 1$) (OR)

(b) Construct a ΔPQR in which QR = 5cm, ∠P = 40° and the median PG from P to QR is 4.4 cm. Find the length of the altitude from P to QR.

44. (a) A bus is travelling at a uniform speed of 50km/hr. Draw the distance – time graph and hence find (i) the constant of variation, (ii) how far will it travel in 90 minutes. (iii) the time require to cover a distance of 300 km, from the graph (OR)

(b) Draw the graph of xy = 24, x, y > 0. Using the graph find (i) y when x = 3 and (ii) x when y = 6.