V10M

Virudhunagar District Common Examinations
Common Quarterly Examination - September 2022

Standard 10

MATHEMATICS

Time Allowed: 3.00 Hours Maximum Marks: 100

Part - A

Note : i) Answer all the 14 questions. **14 x 1 = 14**
ii) Choose the most suitable answer from the four given alternatives and write the correct option.

1. A = {a,b,p}, B = {2,3}, C = {p,q,r,s}, then n[(A∪C) x B] is
   a) 8 b) 12 c) 16 d) 20
2. If g = {(1,1), (2,3), (3,5), (4,7)} is a function given by g(x) = αx + β, then the values of α and β are
   a) (−1,−2) b) (−1,2) c) (2,−1) d) (1,2)
3. The range of the relation R = {(x,x²) / x is a prime number less than 13} is
   a) {2,3,5,7} b) {2,3,5,7,11}
   c) {4,9,25,49,121} d) {1,4,9,25,49,121}
4. A sequence is a function defined on the set of
   a) real numbers b) natural numbers c) whole numbers d) integers
5. An A.P consists of 31 terms. If its 16th term is m, then the sum of all the terms of this A.P is
   a) $31/2$ b) 31 c) 16 d) 62
6. If $7^{4K} \equiv$ _____ (mod 100)
   a) 1 b) 2 c) 3 d) 4
7. The solution of the system x + y − 3z = −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
8. The solution of $(2x - 1)^2 = 9$ is equal to
   a) −1 b) 2 c) −1,2 d) none of these
9. Product of the roots of the quadratic equation $x^2 + 3x = 0$ is
   a) −3 b) 3 c) 0 d) 1
10. In ΔLMN, ∠L = 60°, ∠m = 50° if ΔLMN ~ ΔPQR then the value of ∠R is
    a) 30° b) 40° c) 70° d) 110°
11. In a ΔABC, AD is the bisector of ∠BAC. If AB = 8 cm, BD = 6 cm and DC = 3 cm. The length of the side AC is
    a) 3 cm b) 4 cm c) 6 cm d) 8 cm
12. The area of triangle formed by the point (−5,0), (0,−5) and (5,0) is
    a) 0 sq.units b) 5 sq.units c) 25 sq.units d) none of these
13. The slope of the line PQ is $1/\sqrt{3}$, then slope of the perpendicular bisector of PQ is
    a) $\sqrt{3}$ b) $-\sqrt{3}$ c) $1/\sqrt{3}$ d) $-1/\sqrt{3}$
14. $\tan\theta \operatorname{cosec}^2\theta - \tan\theta$ is equal to a) $\sin\theta$ b) $\sec\theta$ c) $\cot\theta$ d) $\cot^2\theta$

Part - B

Answer any 10 questions. (Q.No.28 is compulsory) **10 x 2 = 20**

15. Find A x B and B x A if A = {m,n} and B = ϕ.
16. A relation f : x→y is defined by $f(x) = x^2 - 2$ where X = {−2,−1,0,3} and Y = R
    i) List the elements of f ii) Is f a function?
17. If f(x) = 3x + 2, g(x) = 6x − k and if fog = gof, then find the value of k.
18. Find the greatest number that will divide 445 and 572 leaving remainders 4 and 5 respectively.
19. Which term of an A.P 111, 108, 105, 102, ... is 3 ?
20. If a clock strikes once at 1 O'clock, twice at 2 O'clock, thrice at 3 o'clock and so on, how many times will it strike in a day?
21. Find the excluded value of the expansion $\frac{x^3 - 27}{x^3 + x^2 - 6x}$.
22. Determine the quadratic equation whose roots are $-3/2$ and −1.

23. If $\Delta ABC \sim \Delta DEF$ such that BC = 3 cm, EF = 4 cm and area of ΔABC = 54 cm^2. Find area of ΔDEF.
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 = 15 cm, find AE.
25. Find the value of 'a' if the points (2,3), (4,a) and (6,−3) are collinear.
26. Find the equation of a line whose inclination in 30° and making intercept −3 on the y-axis.
27. Prove that $\frac{\sin A}{1+\cos A} + \frac{\sin A}{1-\cos A} = 2\operatorname{cosec} A$
28. If α and β are the roots of $x^2 + 7x + 10 = 0$, find the value of $\alpha - \beta$.

Part - C

Answer any 10 questions. (Q.No.42 is compulsory) **10 x 5 = 50**

29. Let $A = \{x \in N / 1 < x < 4\}$, $B = \{x \in W / 0 \le x \le 3\}$ and $C = \{x \in N / x < 2\}$, then verify $A \times (B \cap C) = (A \times B) \cap (A \times C)$
30. Let $f(x) = \begin{cases} 2x+7 & ; \ x < -2 \\ x^2 - 2 & ; \ -2 \le x < 3 \\ 3x - 2 & ; \ x \ge 3 \end{cases}$ be a function defined on R→R 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. Show that composition of function is associative f(x) = x − 4 ; g(x) = x^2 and h(x) = 3x − 5.
32. Determine the general term of an A.P whose 7^{th} term is −1 and 16^{th} term is 17.
33. If a, b, c are three consecutive terms of an A.P and x, y, z are three consecutive terms of a G.P, then prove that $x^{b-c} \times y^{c-a} \times z^{a-b} = 1$
34. Find the GCD of the polynomials $3x^4 + 6x^3 - 12x^2 - 24x$ and $4x^4 + 14x^3 + 8x^2 - 8x$
35. 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.
36. If α and β, are the roots of the equation $x^2 + 6x - 4 = 0$, find the quadratic equation whose roots are α^2 and β^2.
37. State and prove Angle bisector theorem.
38. Find the area of the quadrilateral formed by the points (8,6), (5,11), (−5,12) and (−4,3).
39. Using slope concept, show that the points (1,−4), (2,−3) and (4,−7), form a right angled triangle.
40. Find the equation of the perpendicular bisector of the line joining the points A(−4,2) and B(6,−4).
41. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.
42. Find the sum to n terms of the series 0.4 + 0.44 + 0.444 + ... to n terms

Part - D

Answer all questions. **2 x 8 = 16**

43. a) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR. ***(OR)***

    b) Construct a ΔPQR in which QR = 8 cm, $\angle P = 60°$ and the bisector of $\angle P$ meets QR at S such that QS = 6 cm.
44. a) A bus is travelling at a uniform speed of 50 km/hr. Draw the distance time graph and hence find

    i) the constant of variation ii) how far will it travel in $1\frac{1}{2}$ hr

    iii) the time required to cover a distance of 300 km from the graph. ***(OR)***

    b) Draw the graph of using xy = 24, x,y>0. Using the graph find

    i) y when x = 3 and ii) x when y = 6