# COMMON HALF YEARLY EXAMINATION - 2022

Standard X

Reg No. [illegible]

## MATHEMATICS

Time: 3.30 hours Marks: 90

### Part - I

I. Choose the correct answer 14 x 1 = 14

1. If (a, 3) (6, b) represents an identity function, then the value of a and b are respectively
   a) (6, 6) b) (6, 3) c) (3, 6) d) (6, 6)
2. f(x) = (x + 1)² − (x − 1)² represents a function which is
   a) linear b) cubic c) reciprocal d) quadratic
3. The sum of the exponents of the prime factors in the prime factorization of 1729 is
   a) 1 b) 2 c) 3 d) 4
4. In an A.P. the first term is 1 and the common difference is 4. How many terms of the A.P. must be taken for their sum to be equal to 120?
   a) 6 b) 7 c) 8 d) 9
5. If (x − 5) is the HCF of x² − 2x − 24 and x² − 4x − 5 then the value of k is
   a) 3 b) 5 c) 6 d) 8
6. If number of columns and rows are not equal in a matrix then it is said to be a
   a) diagonal matrix b) rectangular matrix
   c) square matrix d) identity matrix
7. Two poles of height 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) 13 m b) 14 m c) 15 m d) 12.5 m
8. How many tangents can be drawn to the circle from an exterior point?
   a) one b) two c) infinite d) zero
9. The slope of the line which is perpendicular to a line joining the points (0, 0) and (−5, 5) is
   a) −1 b) 1 c) $\frac{5}{5}$ d) −5
10. The inclination of x axis and every line parallel to x axis is
    a) 0° b) 90° c) 45° d) 60°
11. 1 + cot²θ is equal to
    a) sec²θ b) cosec²θ c) sinθ d) cosθ
12. The total surface area of a hemisphere is how much times the square of its radius?
    a) π b) 4π c) 3π d) 2π
13. The ratio of the volumes of a cylinder, a cone and sphere if each has the same diameter and same height is
    a) 1:2:3 b) 2:1:3 c) 1:3:2 d) 3:1:2
14. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is
    a) 3 b) 15 c) 9 d) 225

## Part - II

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

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

16. If x = {5, 1, 3, 4} and y = {a, b, c} then is the relation R = {(1, 5), (1, b), (3, a), (4, c)} a function from x to y?

17. Find the next three terms of the sequence 5, 1, -3

18. Find the number of terms in the A.P. 3, 6, 9, 12, ..., 111

19. Find the L.C.M of $4x^2y$, $8xY^2$


20. In the given figure, AD is the bisector of ∠A. If BD = 4 cm, DC = 3 cm and AB = 6 cm, find AC.

21. Find the slope of the line joining (-6, 1) and (3, 2)

22. Find the equation of the line whose intercepts on the x and y axes are 4, -6

23. Show that the straight lines 2x + 3y - 5 = 0 and 4x + 6y + 18 = 0 are parallel

24. Find the angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of a tower of height $10\sqrt{3}$ m.

25. Find the diameter of a sphere whose surface area is 154 $m^2$.

26. If the ratio of radii of two spheres is 4 : 7, find the ratio of their volumes.

27. The range of a set of data is 13.67 and the largest value is 70.08. Find the smallest value

28. Determine the nature of the roots of the quadratic equation $9y^2 - 6\sqrt{2}y + 2 = 0$

## Part - III

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

29. Let A = {1, 2, 3, 4} and B = {2, 5, 8, 11, 14} be two sets. Let f : A → B be a 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 the function f is defined by $f(x) = \begin{cases} x+2 & x<-1 \\ 2 & -1 \le x \le 1 \\ x-1 & -3 < x < -1 \end{cases}$

Find the values of i) f(3) ii) f(0) iii) f(2) + f(-2)

31. In a Geometric progression, the 4th term is $\frac{8}{9}$ and the 7th term is $\frac{64}{243}$. Find the Geometric progression.

32. Neha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm, ... 24 cm. How much area can be decorated with these coloured papers?

33. A girl is twice as old as her sister. Five years hence, the product of their ages is [illegible] will be 375. Find their present ages.

34. Find the square root of $64x^2 - 16x + 17x^2 - 2x + 1$

35. If $A = \begin{pmatrix} 3 & 1 \\ 1 & 2 \end{pmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

36. State and prove Pythagoras theorem.

37. Find the area of the quadrilateral formed by the points [illegible]

38. The angles of elevation and depression of the top and bottom of a lamp post from the top of a tower in high apartment are [illegible] respectively. Find

i) The height of the lamp post

ii) The difference between height of the lamp post and the apartment

iii) The distance between the lamp post and the apartment

39. A right circular cylindrical container of base radius [illegible] cm and height [illegible] cm is [illegible] cream. The ice cream is to be filled in cones of height [illegible] cm and base radius [illegible] having a hemispherical shape at top. Find the number of cones required to fill the cylinder with ice cream.

40. The volume of a solid right circular cone is [illegible] cm³. If its height is [illegible] cm, find the radius of the cone.

41. Two dice are rolled [illegible] Find the probability of getting [illegible] or a total of [illegible] from [illegible]

42. A line meets [illegible] through [illegible] Find the equation.

## Part - IV

**IV. Answer all the questions**

43. (a) [illegible]

(OR)

b) [illegible]

44. (a) A [illegible]

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

i) [illegible]

ii) [illegible]

(OR)

[illegible]