

**CLASS : 10**Register  
Number

10B111

**COMMON HALF YEARLY EXAMINATION-2022-23**

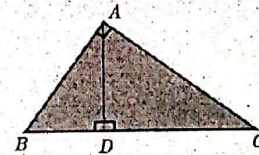
Time Allowed : 3.00 Hours]

**MATHEMATICS**

[Max. Marks : 100

**PART - A****Note : Answer all the 14 questions.**Choose the correct answer from the given four alternatives and write the option code and the corresponding answer. 14x1=14

- $A = \{a, b, P\}$ ,  $B = \{2, 3\}$   $c = \{p, q, r, s\}$  then  $n[A \cup C] \times B$   
a) 8                      b) 20                      c) 12                      d) 16
- Let  $A = \{1, 2, 3, 4\}$   $B = \{4, 8, 9, 10\}$ . A function  $f : A \rightarrow B$  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
- Using Euclid's division lemma, if the cube the possible integer is divided by 9 then the possible remainders are  
a) 0, 1, 8                      b) 1, 4, 8                      c) 0, 1, 3                      d) 1, 3, 5
- If  $A = 2^{65}$  and  $B = 2^{64} + 2^{63} + 2^{62} + \dots + 2^0$  which of the following is true?  
a) B is a  $2^{64}$  more than A                      b) A and B are equal  
c) B is a larger than A by 1                      d) A is larger than B by 1
- 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
- $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$  is  
a)  $\frac{9y}{7}$                       b)  $\frac{9y^3}{21y-21}$                       c)  $\frac{21y^2-42y+21}{3y^3}$                       d)  $\frac{7(y^3-2y+1)}{y^2}$
- The matrix  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$   
a) unit matrix                      b) row matrix                      c) diagonal matrix                      d) scalar matrix
- In the adjacent figure  $\angle BAC = 90^\circ$  and  $AD \perp BC$  then  
a)  $BD \cdot CD = BC^2$                       b)  $AB \cdot AC = BC^2$   
c)  $BD \cdot CD = AD^2$                       d)  $AB \cdot AC = AD^2$
- If a is a point on the y axis whose ordinate is 8 and B is a point on the x axis whose abscissae is 5 then the equation of the line AB is  
a)  $8x + 5y = 40$                       b)  $8x - 5y = 40$                       c)  $x = 8$                       d)  $y = 5$
- The distance of the point  $P(-6, -8)$  from the origin is  
a) 10                      b)  $5\sqrt{2}$                       c)  $\sqrt{10}$                       d) 100
- $a \cot \theta + b \operatorname{cosec} \theta = p$  and  $b \cot \theta + a \operatorname{cosec} \theta = q$  then  $P^2 - q^2$  is equal to  
a)  $a^2 - b^2$                       b)  $b^2 - a^2$                       c)  $a^2 + b^2$                       d)  $b - a$
- A Spherical ball of radius  $r_1$  units is melted to make 8 new identical balls each of radius  $r_2$ . Then  $r_1 : r_2$  is  
a) 2:1                      b) 1:2                      c) 4:1                      d) 1:4
- If the standard deviation of  $x, y, z$  is P then the standard deviation of  $3x + 5, 3y + 5, 3z + 5$  is  
a)  $3p+5$                       b)  $3p$                       c)  $p+5$                       d)  $9p+15$
- If  $P(A \cap B) = 0.3$   $P(\bar{A} \cap B) = 0.45$  then  $P(B)$   
a) 0.14                      b) 0.30                      c) 0.75                      d) 1

**PART - B**

Answer any 10 questions. Question number 28 is compulsory.

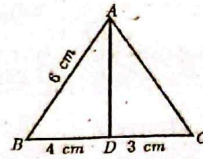
10x2=20

- Let  $A = \{1, 2, 3\}$  and  $B = \{x / x \text{ is a prime number less than } 10\}$ . Find  $A \times B$  and  $B \times A$ .
- Define real valued function.
- Solve :  $3x - 2 \equiv 0 \pmod{11}$ .
- Find the excluded values of the expression  $\frac{7p+2}{8p^2+3p+5}$
- Find the quadratic equations whose sum and product of roots are  $(-2-a)^2, (a+5)^2$

•KK/10/Mat/1

20. Form a  $2 \times 2$  matrix using your class room situation.

21. In the Figure, AD is the bisector of  $\angle A$ , If  $BD=4\text{cm}$   
 $DC=3\text{cm}$  and  $AB = 6\text{cm}$  find AC.



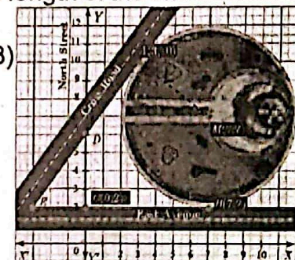
22. Find the equation of a straight line which has slope  $-\frac{5}{4}$  and passing through the point  $(-1, 2)$
23. Find the equation of a straight line which is parallel to the line  $3x-7y=12$  and passing through the point  $(6, 4)$
24. Prove  $\frac{\cos \theta}{1 + \sin \theta} = \sec \theta - \tan \theta$
25. The ratio of the volumes of two cones is 2:3 Find the ratio of their radii if the height of second cone is double the height of the first.
26. Find the standard deviation of first 21 natural numbers
27. A die is rolled and a coin is tossed simultaneously Find the probability that the die shows an odd number and the coin shows a head.
28. Find the G.P in which the 2nd term is  $\sqrt{6}$  and the 6th term is  $9\sqrt{6}$ .

### PART - C

Answer any 10 questions. Question number 42 is compulsory.

10x5=50

29. Let  $A = \{x \in \mathbb{W} / x < 2\}$   $B = \{x \in \mathbb{N} / 1 < x \leq 4\}$  and  $C = \{3, 5\}$  verify that  $A \times (B \cap C) = (A \times B) \cap (A \times C)$ .
30. Let  $A = \{1, 2, 3, 4\}$  and  $B = \{2, 5, 8, 11, 14\}$  be two set. Let  $f: A \rightarrow B$  be a function given by  $f(x) = 3x - 1$ . Present this function. i) by arrow diagram ii) in a table form iii) as a set of ordered pairs iv) in a graphical form.
31. Find the HCF of 252525 and 363636
32. The sum of first  $n$ ,  $2n$  and  $3n$  terms of an A.P are  $S_1$ ,  $S_2$  and  $S_3$  respectively. Prove that  $S_3 = 3(S_2 - S_1)$ .
33. If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$  show that  $A^2 - 5A + 7I_2 = 0$ .
34. The hypotenuse of right angled triangle is 25 cm and its perimeter 56 cm Find the length of the smallest side.
35. State and prove basic proportionality theorem.
36. Find the area of the quadrilateral formed by the points  $(8, 6)$   $(5, 11)$   $(-5, 12)$  and  $(-4, 3)$
37. A circular garden is bounded by East Avenue and cross road. Cross road intersects North street at D and East Avenue at E AD is tangential to the circular garden at A  $(3, 10)$ . Using the figure. Find the equation of (i) East Avenue (ii) North street (iii) Cross road.
38. If the angle of elevation of a cloud from a point 'h' metres above a lake is  $\theta_1$ , and the angle of depression of its reflection in the lake is  $\theta_2$ . Prove that the height that the cloud is located from the ground is  $\frac{h(\tan \theta_1 + \tan \theta_2)}{\tan \theta_2 - \tan \theta_1}$
39. A funnel consists of a frustum of a cone attached to a cylindrical portion 12 cm long attached at the bottom. If the total height be 20 cm. diameter of the cylindrical portion be 12 cm and the diameter of the top of the funnel be 24 cm. Find the outer surface area of the funnel.
40. The mean and variance of seven observations are 8 and 16 respectively. If five of these are 2, 4, 10, 12 and 14 then find the remaining two observations.
41. A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card.
42. A metallic sheet in the form of a sector of a circle of radius 21 cm has central angle of  $216^\circ$ . The sector is made into a cone by bring the bounding radii together. Find the volume of the cone formed.



### PART - D

Answer the following.

2x8=16

43. a) Draw a circle of radius 4 cm. At a point L on it draw a tangent to the circle using the alternate segment.  
(OR)
- b) Construct a  $\Delta PQR$  which the base  $PQ=4.5\text{ cm}$   $\angle R = 35^\circ$  and median  $RG$  from  $R$  to  $PQ$  is 6 cm.
44. a) Varshika drew 6 circles with different sizes. Draw a graph for the relationship between the diameter and circumference (approximately related) to each circle as shown in the table and use it to find the circumference of a circle when its diameter is 6 cm.

Diameter (x) cm	1	2	3	4	5
Circumference (y) cm	3.1	6.2	9.3	12.4	15.5

- b) Draw the graph of  $y = x^2 + 3x - 4$  and hence use it to solve  $x^2 + 3x - 4 = 0$ .

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