

## COMMON THIRD REVISION TEST - 2023

Standard X

Reg.No. 

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## MATHEMATICS

Time: 3.00 hours

Part - I

Marks: 100

I. Choose the correct answer:

14 x 1 = 14

1.  $A = \{a, b, p\}$ ,  $B = \{2, 3\}$ ,  $C = \{p, q, r, s\}$  then  $n[(A \cup C) \times B]$  is
  - a) 8
  - b) 20
  - c) 12
  - d) 16
2. Let  $f$  and  $g$  be two functions given by  $f = \{(0, 1), (2, 0), (3, -4), (4, 2), (5, 7)\}$   
 $g = \{(0, 2), (1, 0), (2, 4), (-4, 2), (7, 0)\}$  then the range of  $f \circ g$  is
  - a)  $\{0, 2, 3, 4, 5\}$
  - b)  $\{-4, 1, 0, 2, 7\}$
  - c)  $\{1, 2, 3, 4, 5\}$
  - d)  $\{0, 1, 2\}$
3. Given  $F_1 = 1$ ,  $F_2 = 3$  and  $F_n = F_{n-1} + F_{n-2}$  then  $F_5$  is
  - a) 3
  - b) 5
  - c) 8
  - d) 11
4. The number of points of intersection of the quadratic polynomial  $x^2 + 4x + 4$  with the  $x$  axis is
  - a) 0
  - b) 1
  - c) 0 or 1
  - d) 2
5. 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
6. In  $\triangle LMN$ ,  $\angle L = 60^\circ$ ,  $\angle M = 50^\circ$ . If  $\triangle LMN \sim \triangle PQR$  then the value of  $\angle R$  is
  - a)  $40^\circ$
  - b)  $70^\circ$
  - c)  $30^\circ$
  - d)  $110^\circ$
7. If slope of the line  $PQ$  is  $\frac{1}{\sqrt{3}}$ , then slope of the perpendicular bisector of  $PQ$  is
  - a)  $\sqrt{3}$
  - b)  $-\sqrt{3}$
  - c)  $\frac{1}{\sqrt{3}}$
  - d) 0
8.  $(2, 1)$  is the point of intersection of two lines
  - a)  $x - y - 3 = 0$ ,  $3x - y - 7 = 0$
  - b)  $x + y = 3$ ,  $3x + y = 7$
  - c)  $3x + y = 3$ ,  $x + y = 7$
  - d)  $x + 3y - 3 = 0$ ,  $x - y - 7 = 0$
9. A tower is 60 m high. Its shadow is  $x$  meters shorter when the sun's altitude is  $45^\circ$  than when it has been  $30^\circ$ , then  $x$  is equal to
  - a) 41.92 m
  - b) 43.92 m
  - c) 43
  - d) 45.6 m
10. The angle of elevation of a cloud from a point  $h$  meter above a lake is  $\beta$ . The angle of depression of its reflection in the lake is  $45^\circ$ . The height of location of the cloud from the lake is
  - a)  $\frac{h(1 + \tan\beta)}{1 - \tan\beta}$
  - b)  $\frac{h(1 - \tan\beta)}{1 + \tan\beta}$
  - c)  $h \tan(45^\circ - \beta)$
  - d) none of these

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X Mathematics

11. If two solid hemispheres of same base radius  $r$  units are joined together along their bases, then curved surface area of this new solid is  
 a)  $4\pi r^2$  sq.units    b)  $6\pi r^2$  sq.units    c)  $3\pi r^2$  sq.units    d)  $8\pi r^2$  sq.units
12. A solid sphere of radius  $x$  cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is  
 a)  $3x$  cm    b)  $x$  cm    c)  $4x$  cm    d)  $2x$  cm
13. Variance of first 20 natural number is  
 a) 32.25    b) 44.25    c) 33.25    d) 30
14. A page is selected at random from a book. The probability that the digit at unit place of the page number closed is less than 7 is  
 a)  $\frac{3}{10}$     b)  $\frac{7}{10}$     c)  $\frac{3}{9}$     d)  $\frac{7}{9}$

## Part - II

II. Answer any 10 questions. (Q.No.28 is compulsory)

10 x 2 = 20

15. Let  $f = \{(x, y) / x, y \in \mathbb{N} \text{ and } y = 2x\}$  be a relation on  $\mathbb{N}$ . Find the domain, codomain and range. Is this relation a function?
16. Find  $k$  if  $f \circ f(k) = 5$  where  $f(k) = 2k - 1$
17. Prove that two consecutive positive integer are always coprime.
18. If  $1 + 2 + 3 + \dots + k = 325$ , then find  $1^3 + 2^3 + \dots + k^3$ .
19. Simplify:  $\frac{x^3}{x-y} + \frac{y^3}{y-x}$
20. If  $A = \begin{bmatrix} 1 & 3 & -2 \\ 5 & -4 & 6 \\ -3 & 2 & 9 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 8 \\ 3 & 4 \\ 9 & 6 \end{bmatrix}$ , find  $A + B$
21. Define Concurrency Theorem.
22. Show that the points  $(-2, 5)$ ,  $(6, -1)$  and  $(2, 2)$  are collinear.
23. Find the equation of a line whose intercepts on the  $x$  and  $y$  axes are  $-5$  and  $\frac{3}{4}$  respectively.
24. A tower stands vertically on the ground. From a point on the ground which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is  $30^\circ$ . Find the height of the tower.
25. The radius of a sphere increases by 25%. Find the percentage increase in its surface area.



39. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container.
40. Find the coefficient of variation of 24, 26, 33, 37, 29, 31,
41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 6.
42. Solve :  $\frac{1}{2x} + \frac{1}{4y} - \frac{1}{3z} = \frac{1}{4}$  ;  $\frac{1}{x} = \frac{1}{3y}$  ,  $\frac{1}{x} - \frac{1}{5y} + \frac{4}{z} = 2\frac{2}{15}$

### Part - IV

#### IV. Answer all the questions.

2 × 8 = 16

43. a) Construct a triangle similar to a given triangle PQR with its sides equal to  $\frac{2}{3}$  of the corresponding sides of the triangle PQR.

(OR)

- b) Draw a circle of radius 4 cm. At a point L on it draw a tangent to the circle using the alternate segment.
44. a) The following table shows the data about the number of pipes and the time taken to fill the same tank.

|                         |    |    |    |    |
|-------------------------|----|----|----|----|
| No of pipes (x)         | 2  | 3  | 6  | 9  |
| Time taken (in min) (y) | 45 | 30 | 15 | 10 |

Draw the graph for the above data and hence

- Find the time taken to fill the tank when 2 pipes are used
- Find the number of pipes when the time is 9 minutes

(OR)

- b) Graph the equation  $(2x - 3)(x + 2) = 0$  and state their nature of solutions.

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