

This Question Paper contains 12 printed pages.
(Section - A, B, C & D)

Sl.No.

12 (E)

(JULY 2022)

Time : 3 Hours]

[Maximum Marks : 80

Instructions :

- 1) Write in a clear legible handwriting.
- 2) This question paper has four Sections A, B, C & D and Question Numbers from 1 to 54.
- 3) All Sections are compulsory. General options are given.
- 4) The numbers to the right represent the marks of the question.
- 5) Draw neat diagrams wherever necessary.
- 6) New sections should be written in a new page. Write the answers in numerical order.
- 7) Calculator is not allowed.

SECTION -A

■ Do as directed: (Questions : 1 to 24, 1 mark each). [24]

■ Answer the following by choosing the correct option given below.

1) If the number $13\underline{A}\underline{L}016$ is exactly divisible by 11, then $A = \underline{\hspace{2cm}}$, $L = \underline{\hspace{2cm}}$.

[1]

(A) $A = 0, L = 0$

(B) $A = 1, L = 2$

(C) $A = 5, L = 8$

(D) $A = 8, L = 5$

- 2) In equations $px+qy=p-q$ [1]

$$qx-py=p+q$$

if $x=1$, then $y =$ _____.

- (A) 0 (B) 1
(C) -1 (D) 2

- 3) $1+2+3+ \dots +50+49+48+ \dots +1 =$ _____ [1]

- (A) 2499 (B) 2500
(C) 2501 (D) 2599

- 4) If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80° , then $\angle POA$ is equal to [1]

- (A) 50° (B) 60°
(C) 70° (D) 80°

- 5) There is an empirical relationship between the three measures of central tendency: [1]

$$3M = Z + 2\bar{x}, \text{ then } \frac{Z-M}{M-\bar{x}} = \text{_____}.$$

- (A) 0 (B) 1
(C) -2 (D) 2

■ Fill in the blanks so as to make each of the following statements true:

- 6) $2520 = 2^3 \times 3^p \times q \times 7$, then $p =$ _____ and $q =$ _____ [1]

- 7) If α and β are the roots of the quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ and $D = 0$ then $\alpha = \beta =$ _____ [1]

8) In an Arithmetic progression, $d = 5$, $a = -\frac{35}{3}$, $a_9 = \frac{85}{3}$, then $S_9 =$ _____ . [1]

9) $\sin 2A = 2\sin A$ is true, when $A =$ _____ . [1]

10) Mean, $\bar{x} = a + h \left[\frac{\sum f_i u_i}{\sum f_i} \right]$, then $u_i =$ _____ . [1]

■ Match the following.

- | A | B |
|--|---------------------------|
| 11) Curved surface area of a frustum of a cone | a) πd [1] |
| 12) Volume of a ₹ 5 coin | b) $3\pi r^2$ [1] |
| 13) Circumference of a circle | c) $\pi l(r_1 + r_2)$ [1] |
| 14) Total surface area of a hemisphere | d) $\pi r^2 h$ [1] |
| | e) $4\pi r^2$ |

■ State True or False.

15) If α, β, γ are the roots of the cubic polynomial $ax^3 + bx^2 + cx + d$, $a \neq 0$ then $\alpha + \beta + \gamma = -\frac{d}{a}$. [1]

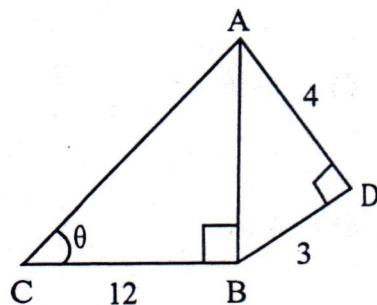
- 16) In the pair of linear equations $x - 2y = 8$ and $5x - 10y = c$ ($c \in \mathbb{R}$), having one and only one solution. [1]
- 17) The distance of a point $P(x, y)$ from the origin $O(0, 0)$ is $OP = \sqrt{x^2 + y^2}$. [1]
- 18) The line containing the radius through the point of contact is called the "normal" to the circle at the point. [1]
- 19) If $P(E) = 0.05$, then the probability of not E is 0.95. [1]

■ Answer the following in one sentence or one word.

- 20) The measures of angles of a triangle are x° , y° and 40° . If $x - y = 30^\circ$, find x° and y° . [1]

- 21) In a quadratic equation $kx^2 + \left[\frac{a}{a-b} + \frac{a-b}{a} \right]x + 1 = 0$ ($k \neq 0$), the roots are reciprocal, then find k . [1]

- 22) From the given figure find $\cot \theta$. [1]

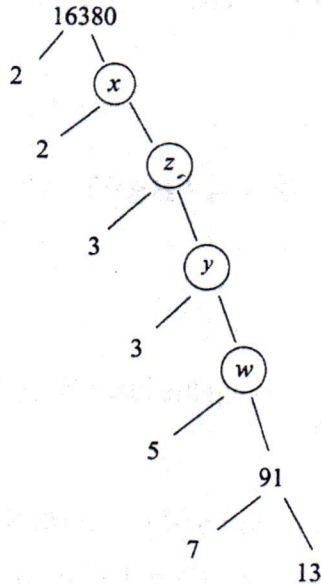


- 23) A tower stands vertically on the ground. From a point on the ground, which is 15m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60° . Find the height of the tower. [1]
- 24) What is the angle made by the hour hand in the clock in one minute? [1]

SECTION - B

- Answer the following questions [Questions : 25 to 37] [Any 9 - each carries 2 marks]. [18]

25) From the given tree find $x + y - z - w$. [2]



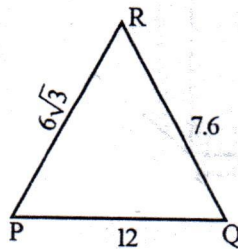
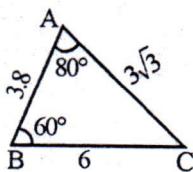
26) Prove that $3 + 2\sqrt{5}$ is irrational. [2]

27) Find a quadratic polynomial whose sum and product of its zeroes are $\frac{1}{4}$ and $-\frac{1}{4}$ respectively. [2]

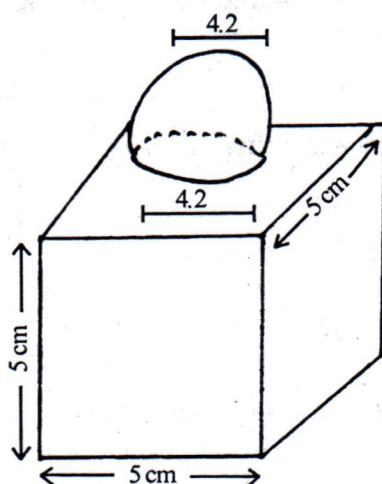
28) Solve $2x + 3y = 11$ and $2x - 4y = -24$ and hence find the value of "m" for which $y = mx + 3$. [2]

29) How many three-digit numbers are divisible by 7? [2]

30) From the given figure, find $\angle P$. [2]



- 31) Find the value of k , if the points $A(2, 3)$, $B(4, k)$ and $C(6, -3)$ are collinear. [2]
- 32) If $3 \cot A = 4$, check whether $\frac{1 - \tan^2 A}{1 + \tan^2 A} = \cos^2 A - \sin^2 A$ or not. [2]
- 33) If $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$, $0^\circ < A + B \leq 90^\circ$, $A > B$, find A and B . [2]
- 34) Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$ using the identity $\sec^2 \theta = 1 + \tan^2 \theta$. [2]
- 35) A 20m deep well with diameter 7m is dug and the earth from digging is evenly spread out to form a platform 22m by 14m. Find the height of the platform. [2]
- 36) The decorative block shown in the figure is made of two solids- a cube and a hemisphere. The base of the block is a cube. Find the total surface area of the block. Measures are given in the figure. (Take $\pi = \frac{22}{7}$). [2]



- 37) In a retail market, fruit vendors were selling mangoes kept in packing boxes. These boxes contained varying number of mangoes. The following was the distribution of mangoes according to the number of boxes. [2]

Number of mangoes	50-52	53-55	56-58	59-61	62-64
Number of boxes	15	110	135	115	25

Find the mean number of mangoes kept in a packing box. Which method of finding the mean did you choose?

SECTION - C

- Answer the following questions [Questions : 38 to 46] [Any 6 - each carries 3 marks]. [18]

- 38) If α and β are zeroes of the quadratic polynomial $P(x) = kx^2 + 4x + 4$, $k \neq 0$ and $\alpha^2 + \beta^2 = 24$, find k . [3]
- 39) Sum and difference of reciprocals of present age of mother and daughter is $\frac{3}{40}$ and $\frac{1}{40}$ respectively, then find the present age of mother and daughter. [3]
- 40) Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 60 minutes. What are the speeds of the two cars? [3]
- 41) Find the roots of $ax^2 + bx + c = 0$, $a \neq 0$ by the method of completing the square. [3]

- 42) If A and B are $(-2, -2)$ and $(2, -4)$ respectively, find the coordinates of P such that

$$AP = \frac{3}{7} AB \text{ and P lies on the line segment AB.} \quad [3]$$

- 43) The angles of elevation of the top of a tower from two points at a distance of 3m and 12m from the base of the tower and in the same straight line with it are complementary. Prove that the height of the tower is 6m. [3]

- 44) A chord of a circle of radius 15 cm subtends an angle of 60° at the centre. Find the areas of the corresponding minor and major segments of the circle.

(Use $\pi = 3.14$ and $\sqrt{3} = 1.73$) [3]

- 45) A hemispherical tank full of water is emptied by a pipe at the rate of $3\frac{4}{7}$ litres per

second. How much time (in minutes) will it take to empty $\frac{1}{3}$ of the tank, if it is 3m

in diameter? (Take $\pi = \frac{22}{7}$). [3]

- 46) One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting [3]

i) a king of red colour

ii) a red face card

iii) a spade

SECTION - D

- Answer the following questions [Questions : 47 to 54] [Any 5 - each carries 4 marks] [20]

- 47) Sum of the areas of two squares is 468 m^2 . If the difference of their perimeters is 24m, find the sides of the two squares. [4]
- 48) Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides. [4]
- 49) BL and CM are medians of a triangle ABC right angled at A. Prove that [4]
 $4(BL^2 + CM^2) = 5BC^2$
- 50) The angles of depression of the top and the bottom of an 8m tall building from the top of a multi-storeyed building are 30° and 45° , respectively. Find the height of the multi-storeyed building and the distance between the two buildings. [4]
- 51) In $\odot (P, r)$, Q is an exterior point. QM and QN are tangents of the $\odot (P, r)$. Prove that $QM = QN$. [4]
- 52) Draw a triangle ABC with side $BC = 7 \text{ cm}$, $\angle B = 45^\circ$, $\angle A = 105^\circ$. Then construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of $\triangle ABC$. Write steps of construction. [4]

- 53) Draw a line segment AB of length 8cm. Taking A as centre, draw a circle of radius 4cm and taking B as centre, draw another circle of radius 3cm. Construct tangents to each circle from the centre of the other circle. Write steps of construction. [4]
- 54) The median of the following data is 525. Find the values of x and y , if the total frequency is 100. [4]

Class interval	Frequency
0 - 100	2
100 - 200	5
200 - 300	9
300 - 400	x
400 - 500	17
500 - 600	20
600 - 700	15
700 - 800	9
800 - 900	y
900 - 1000	4

