

Time Allowed : 3 Hours

Maximum Marks : 80

**General Instructions:** 

- I. All questions are compulsory.
- II. The question paper consists of 40 questions divided into four sections A, B, C and D.
- III. Section A contains 20 objective questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 8 questions of 3 marks each. Section D contains 6 questions of 4 marks each.
- IV. There is no overall choice. However, an internal choice has been provided in 2 questions of section A, 2 questions of section B, 3 questions of section C and 3 questions of section D. You have to attempt only one of the alternatives in all such questions.
- V. Use of calculators is not permitted.

**SECTION - A**

(Q. 1 – Q. 10) Multiple choice type questions. Select the correct option.

1. Express the number  $0.\overline{3178}$  in the form of rational number.
 

(a)  $\frac{3178}{99}$                       (b)  $\frac{3178}{999}$                       (c)  $\frac{3178}{1000}$                       (d)  $\frac{999}{3178}$
2. Which one of the following statements is correct?
 

(a) If  $x^6 + 1$  is divided by  $x + 1$ , then the remainder is  $-2$   
 (b) If  $x^6 + 1$  is divided by  $x - 1$ , then the remainder is  $2$   
 (c) If  $x^6 + 1$  is divided by  $x + 1$ , then the remainder is  $1$   
 (d) If  $x^6 + 1$  is divided by  $x - 1$ , then the remainder is  $-1$
3. Yash scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test if Yash attempted every question?
 

(a) 20                      (b) 30                      (c) 25                      (d) 35
4. If  $\alpha, \beta$  are roots of the equation  $x^2 + \sqrt{\alpha}x + \beta = 0$ , then find the value of  $\alpha^2 + \beta^2$ .
 

(a) 7                      (b) 6                      (c) 8                      (d) 5
5. The mean of the following frequency table is 50.

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	17	$f_1$	32	$f_2$	19	120

Which of the following is correct?

Consider the following.

- (I)  $f_1 - f_2 = 4$                       (II)  $f_1 + f_2 = 52$                       (III)  $f_1 = 24$                       (IV)  $f_2 = 28$   
 (a) I, II and III                      (b) II and IV                      (c) I and II                      (d) I and III

6. The first and last term of an A.P. are  $a$  and  $l$  respectively. If  $S$  is the sum of all the terms of the A.P. and the

common difference is  $\frac{l^2 - a^2}{k - (l + a)}$ , then  $k$  is equal to

- (a)  $S$                       (b)  $2S$                       (c)  $3S$                       (d) None of these

7. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, Find the number of blue balls in the bag.  
 (a)  $x=10$                       (b)  $x=12$                       (c)  $x=9$                       (d)  $x=8$
8. Consider the following identities:  
 I.  $\sin^2\theta + \cos^2\theta = 1$   
 II.  $\sec^2\theta = 1 + \tan^2\theta$   
 III.  $\operatorname{cosec}^2\theta = 1 + \cot^2\theta$   
 Which of the identities given above is/are correct?  
 (a) Both I and II                      (b) Both I and III  
 (c) Neither I, II nor III                      (d) All the above
9. Five years ago Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. How old are Nuri and Sonu?  
 (a) 50 yrs, 20 yrs                      (b) 40 yrs, 30 yrs                      (c) 60 yrs, 40 yrs                      (d) 45 yrs, 15 yrs
10. In order to divide a line segment of length 10 cm internally in the ratio 3 : 2, we draw a line segment  $AB = 10$  cm. Draw any ray making an acute angle  $\angle BAX$ . Along AX mark off... points  $A_1, A_2$  etc. such that  $AA_1 = A_1A_2$  etc., then join  $BA_5$ . Draw a line parallel to  $A_5B$  through the point.  
 (a)  $A_2$                       (b)  $A_4$                       (c)  $A_3$                       (d)  $A_1$

**(Q. 11 – Q. 15 ) Fill in the blanks.**

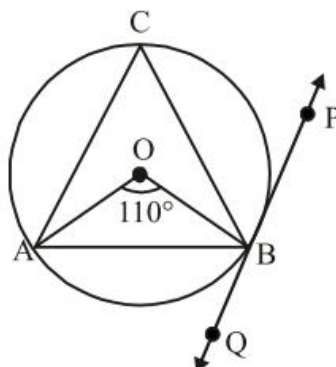
11. If  $\sin A + \operatorname{cosec} A = 3$  then the value of  $\frac{\sin^4 A + 1}{\sin^2 A}$  is \_\_\_\_\_.
12. The angles of elevation of the top of a tower at the top and the foot of a pole of height 10 m are  $30^\circ$  and  $60^\circ$  respectively. Then the height of the tower is \_\_\_\_\_.
13. If  $\triangle ABC \sim \triangle DEF$  such that  $BC = 2.1$  cm and  $EF = 2.8$  cm. If the area of triangle DEF is  $16 \text{ cm}^2$ , then the area of triangle ABC (in sq. cm) is \_\_\_\_\_.

**OR**

- If  $\triangle ABC \sim \triangle DEF$ ,  $AB = 4$  cm,  $DE = 6$  cm.  $EF = 9$  cm and  $FD = 12$  cm, the perimeter of  $\triangle ABC$  is \_\_\_\_\_.
14. If the arithmetic mean of 9 observation is 100 and that of 6 observations is 80, then the combined mean of all the 15 observations will be = \_\_\_\_\_.
15. If  $\sin \theta + \cos \theta = a$  and  $\sec \theta + \operatorname{cosec} \theta = b$ , then the value of  $b(a^2 - 1)$  is \_\_\_\_\_.

**(Q. 16 – Q. 20 ) Answer the following questions.**

16. In figure, AB is a chord of circle, and PQ is a tangent at point B of the circle. If  $\angle AOB = 110^\circ$ , then find  $\angle ABQ$ .

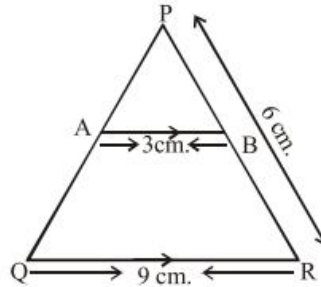


17. 90% of the mangoes in a bag are good. If a mango is chosen randomly from the box, find the probability of getting a bad mango.
18. Find the value of  $x$  such that  $PQ = QR$  where co-ordinates of  $P, Q, R$ , are  $(6, -1), (1, 3)$  and  $(x, 8)$  respectively.

**OR**

If the mid- point of the segment joining  $A(x, y + 1)$  and  $B(x + 1, y + 2)$  is  $C\left(\frac{3}{2}, \frac{5}{2}\right)$ . Find  $x$  and  $y$ .

19. In the given fig.  $AB \parallel QR$ , find the length of  $PB$ .



20. If  $\tan 2\theta = \cot(\theta + 18^\circ)$ , find the value of  $\theta$ .

**SECTION - B**

21. Two bills of ₹ 6075 and ₹ 8505 respectively are to be paid separately by cheques of same amount. Find the largest possible amount of each cheque.
22. Find the value of  $70 + 68 + 66 + \dots + 40$ .
23. Find the chance that a non-leap year contains 53 Saturdays.
24. A jar contains 54 marbles each of which is blue, green or white. The probability of selecting a blue marble and a green marble at random from the jar is  $\frac{1}{3}$  and  $\frac{4}{9}$  respectively. How many white marbles does the jar contain?
25. If the lines given by  $3x + 2ky = 2$  and  $2x + 5y = 1$  are parallel, then find the value of  $k$

**OR**

Aruna has only ₹ 1 and ₹ 2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is ₹ 75, then find the numbers of ₹ 1 and ₹ 2 coins.

26. Find 'k' so that the points  $(7, -2), (5, 1)$  and  $(3, k)$  are collinear.

**OR**

Find the value of  $a$ , if the distance between the points  $A(-3, -14)$  and  $B(a, -5)$  is 9 units.

**SECTION - C**

27. If  $a^2 - b^2$  is a prime number, show that  $a^2 - b^2 = a + b$ , where  $a, b$  are natural number.
28. If the polynomial  $6x^4 + 8x^3 + 17x^2 + 21x + 7$  is divided by another polynomial  $3x^2 + 4x + 1$ , the remainder comes out to be  $(ax + b)$ , find the values of  $a$  and  $b$ .

29. If  $\tan \theta + \sin \theta = m$  and  $\tan \theta - \sin \theta = n$ , then prove that  $m^2 - n^2 = 4\sqrt{mn}$

**OR**

Solve:  $\frac{\cos^2 \theta}{\cot^2 \theta - \cos^2 \theta} = 3; (\theta < 90^\circ)$

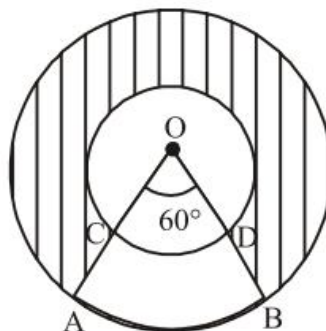
30. The following table gives the number of pages written by Sarika for completing her own book for 30 days:

Numbers of pages written per day	16-18	19-21	22-24	25-27	28-30
Number of days	1	3	4	9	13

Find the mean number of pages written per day.

31. A circle touches all the four sides of a quadrilateral ABCD. Prove that  $AB + CD = BC + DA$ .

32. In figure, two concentric circles with centre O, have radii 21 cm and 42 cm. If  $\angle AOB = 60^\circ$ , find the area of the shaded region. [ Use  $\pi = \frac{22}{7}$  ].



33. If volumes of two spheres are in the ratio of 64 : 27, then what is the ratio of their surface areas?

**OR**

A medicine-capsule is in the shape of a cylinder of diameter 0.5 cm with two hemispheres stuck to each of its ends. The length of entire capsule is 2 cm. What is the capacity of the capsule?

34. If the points A (k + 1, 2k), B (3k, 2k + 3) and C (5k – 1, 5k) are collinear, then find the value of k.

**OR**

Show that the points A (1, 0), B (5, 3), C (2, 7) and D (–2, 4) are the vertices of a parallelogram.

**SECTION - D**

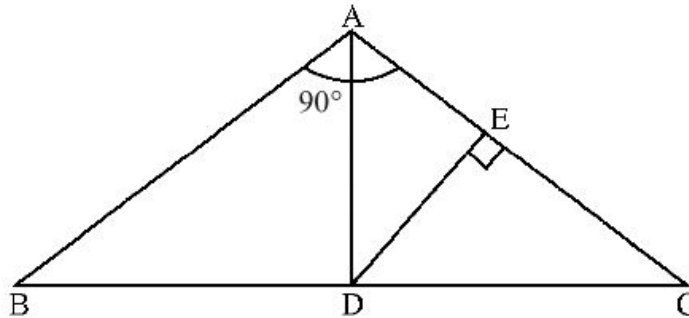
35. An aeroplane left 30 minutes later than its scheduled time. The pilot decided to increase its speed. In order to reach its destination 1500 km away in time, pilot has to increase its speed by 250 km/hr from its usual speed. Determine the usual speed.

36. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.
37. If  $h, c, v$  are respectively the height, the curved surface area and the volume of a cone, prove that  $3\pi v h^3 - c^2 h^2 + 9v^2 = 0$ .

**OR**

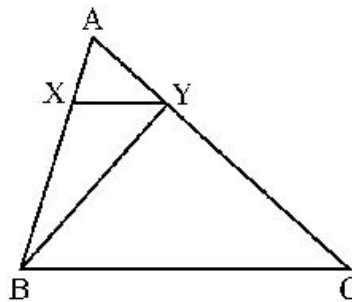
A metallic right circular cone 20 cm high and whose vertical angle is  $60^\circ$  is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter  $\frac{1}{16}$  cm, find the length of the wire.

38. If  $a\left(\frac{1}{b} + \frac{1}{c}\right), b\left(\frac{1}{a} + \frac{1}{c}\right), c\left(\frac{1}{a} + \frac{1}{b}\right)$ , are in A.P., prove that  $a, b, c$  are in A.P.
39. In fig.  $\angle BAC = 90^\circ$ , AD is its bisector. If  $DE \perp AC$ , prove that  $DE \times (AB + AC) = AB \times AC$ .



**OR**

ar  $(\Delta ABC) = 16 \text{ cm}^2$ . Segment XY is drawn parallel to side BC, dividing AB in the ratio 3 : 5. Find ar  $(\Delta BXY)$ .



40. From the top of a tower, the angles of depression of two objects on the same side of the tower are found to be  $\alpha$  and  $\beta$  ( $\alpha > \beta$ ). If the distance between the objects is  $P$ ; show that the height ‘ $h$ ’ of the tower is given by  $h = \frac{P \tan \alpha \tan \beta}{\tan \alpha - \tan \beta}$ .

**OR**

A vertical tower stands on a horizontal plane and is surmounted by vertical flag staff of height ‘ $h$ ’ At a point on the plane, the angles of elevation of the bottom and the top of the flag- staff are  $\alpha$  and  $\beta$  respectively. Prove that the height of the tower is  $\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$ .