



Time Allowed: 3 hrs

#### General Instructions:

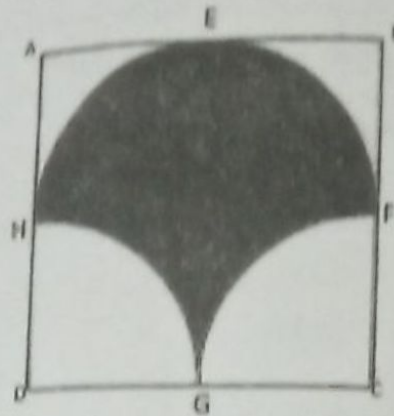
- i. This Question Paper has 5 Sections A, B, C, D and E.
- ii. Section A has 20 MCQs carrying 1 mark each
- iii. Section B has 5 questions carrying 02 marks each.
- iv. Section C has 6 questions carrying 03 marks each.
- v. Section D has 4 questions carrying 05 marks each.
- vi. Section E has 3 case-based integrated units of assessment (04 marks each) .
- vii. All Questions are compulsory.
- viii. Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.

#### SECTION A

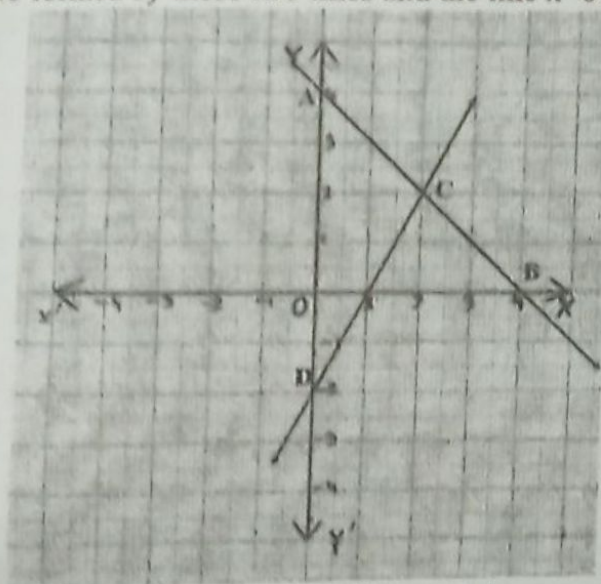
Section A consists of Multiple-choice type questions of 1 mark each.

1. Find the exponent of 5 in the prime factorisation of 5625  
(a) 3 (b) 4 (c) 5 (d) 6
2. There is \_\_\_\_\_ tangent at a point of the circle.  
(a) only one (b) two (c) three (d) four
3.  $(\frac{2}{3} \sin 0^\circ - \frac{4}{5} \cos 0^\circ)$  is equal to \_\_\_\_\_.  
(a)  $\frac{2}{3}$  (b)  $-\frac{4}{5}$  (c) 0 (d)  $-\frac{2}{15}$
4. If the radii of two concentric circles are 4 cm and 5 cm, then the length of each chord of one circle which is tangent to the other circle is \_\_\_\_\_.  
(a) 3 cm (b) 6 cm (c) 9 cm (d) 1 cm
5. Find the value of  $k$  such that the polynomial  $x^2 - (k + 6)x + 2(2k - 1)$  has sum of its zeroes equal to half of their product.  
(a) 7 (b) 8 (c) 3 (d) 5
6. If  $a$  and  $b$  are coprime numbers, then  $a^3$  and  $b^3$  are \_\_\_\_\_.  
(a) Coprime (b) Not coprime (c) Even (d) Odd
7. If a pair of linear equations is consistent, then the lines will be \_\_\_\_\_.  
(a) parallel (b) always coincident  
(c) intersecting or coincident (d) always intersecting
8. A letter of English alphabets is chosen at random. What is the probability that it is a letter of the word 'MATHEMATICS'?  
(a)  $\frac{4}{13}$  (b)  $\frac{9}{26}$  (c)  $\frac{5}{13}$  (d)  $\frac{11}{26}$
9. The angle of elevation of the top of a 30 m high tower at a point  $30\sqrt{3}$  m away from the base of the tower is \_\_\_\_\_.  
(a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$
10. From a well-shuffled deck of 52 cards, a card is drawn at random. What is the probability of getting kings of hearts?  
(a)  $\frac{1}{13}$  (b)  $\frac{1}{26}$  (c)  $\frac{1}{52}$  (d)  $\frac{12}{13}$

11. In the figure given below, ABCD is a square of side 14 cm with E, F, G and H as the mid-points sides AB, BC, CD and DA respectively. The area of the shaded portion is



- (a)  $44 \text{ cm}^2$                       (b)  $49 \text{ cm}^2$                       (c)  $98 \text{ cm}^2$                       (d)  $49\pi/2 \text{ cm}^2$
12. The quadratic equation  $2x^2 - \sqrt{5}x + 1 = 0$  has \_\_\_\_\_.
- (a) two distinct real roots                      (b) two equal real roots  
(c) no real roots                      (d) more than two real roots
13. Given that  $\sin \theta = \frac{a}{b}$  then  $\cos \theta$  is \_\_\_\_\_.
- (a)  $\frac{b}{\sqrt{b^2-a^2}}$                       (b)  $\frac{b}{a}$                       (c)  $\frac{a}{\sqrt{a^2-b^2}}$                       (d)  $\frac{\sqrt{b^2-a^2}}{b}$
14. If the radius of a semi-circular protractor is 7 cm, then its perimeter is \_\_\_\_\_.
- (a) 11 cm                      (b) 14 cm                      (c) 22 cm                      (d) 36 cm
15. If the common difference of an Arithmetic Progression is 5 then, what is  $a_{18} - a_{13}$ ?
- (a) 5                      (b) 20                      (c) 25                      (d) 30
16. Given below is the graph representing two linear equations by lines AB and CD respectively. What is the area of the triangle formed by these two lines and the line  $x=0$ ?



- (a) 3 sq. unit                      (b) 4 sq. unit                      (c) 6 sq. unit                      (d) 8 sq. unit
17. If the length of shadow of a tree increases, then the angle of sun's elevation \_\_\_\_\_.
- (a) increases                      (b) decreases                      (c) remains same                      (d) can't say
18. If  $px^2 + 3x + q = 0$  has two roots  $-1$  and  $-2$ , then the value of  $p - q$  is \_\_\_\_\_.
- (a)  $-1$                       (b)  $2$                       (c)  $-2$                       (d)  $1$

(Assertion-Reason type of questions)

In questions numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

- Assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)  
 Assertion (A) is true but reason (R) is false.  
 Assertion (A) is false but reason (R) is true.

19. Assertion (A) : A polynomial whose sum and product of zeroes are  $-8$  and  $6$  respectively is  $x^2 + 8x + 6$ .

Reason (R) : A polynomial with  $S$  as sum of zeroes and  $P$  as product of zeroes is  $x^2 - 5x + p$

20. Assertion (A) :  $-5, -\frac{5}{2}, 0, \frac{5}{2}, \dots$  is in Arithmetic Progression.

Reason (R) : The terms of an Arithmetic Progression cannot have both positive and negative rational numbers.

### SECTION B

Section B consists of 5 questions of 2 marks each.

21. Find the discriminant of the quadratic equation  $3x^2 - 2x + \frac{1}{3} = 0$  and hence find the nature of its roots.

22. For which value of 'k' will the following pair of linear equations have no solution?

$$3x + y = 1$$

$$(2k - 1)x + (k - 1)y = 2k + 1$$

23. If  $\alpha$  and  $\beta$  are zeroes of the quadratic polynomial  $x^2 - 5x + 6$ , form another quadratic polynomial whose zeroes are  $\frac{1}{\alpha}, \frac{1}{\beta}$ .

24. The sum of two numbers is 1215 and their HCF is 81. How many pairs of such numbers can be formed?

25. Find the area of a quadrant of a circle whose circumference is 22 cm

### SECTION C

Section C consists of 6 questions of 3 marks each.

26. As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are  $30^\circ$  and  $45^\circ$ . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.

27. A restaurant has 4 choices of sandwiches, 3 choices of parathas and 3 choices of south Indian food. A person chooses one type of food for breakfast. What is the probability that he chooses:  
 (a) south Indian food? (b) sandwich? (c) no sandwich?

28. If  $\alpha, \beta$  are zeroes of quadratic polynomial  $5x^2 + 5x + 1$ , find the value of  
 (a)  $\alpha^2 + \beta^2$  (b)  $\alpha^{-1} + \beta^{-1}$

29. Find two consecutive positive integers, the sum of whose squares is 365.

30. Find the sum of the first fifteen multiples of 7.

31. Prove that:  $\frac{\sec A - \tan A}{\sec A + \tan A} = \frac{\cos^2 A}{1 + \sin^2 A}$

### SECTION D

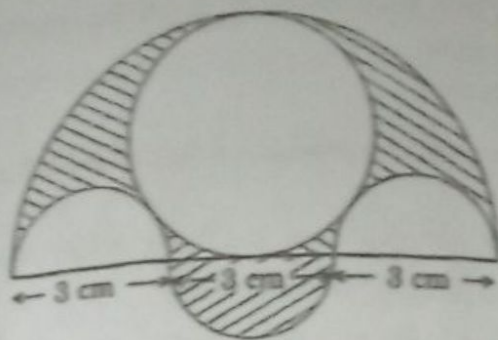
Section D consists of 4 questions of 5 marks each.

32. The first term of an AP is 5, the last term is 45 and sum is 400. Find the number of terms and the common difference.

33. In figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that  $\angle AOB = 90^\circ$ .

34. A two-digit number is such that the product of its digits is 24. If 18 is subtracted from the number, the digits interchange their places. Find the number.

35. Three semicircles each of diameter 3 cm, a circle of diameter 4.5 cm and a semicircle of radius 4.5 cm are drawn in the given figure. Find the area of the shaded region.



### SECTION- E

Section D consists of 3 questions of 4 marks each.

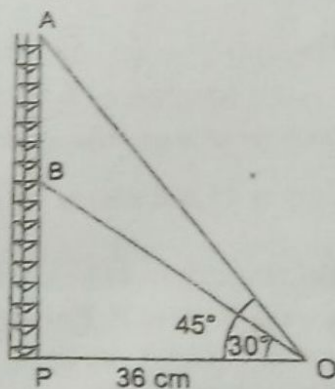
36. A seminar is being conducted by an Educational Organisation, where the participants will be educators of different subjects. The number of Participants in Hindi, English, and Mathematics are 60, 84 and 108 respectively.

- In each room the same number of participants are to be seated and all of them being of the same subject, hence find the maximum number of participants that can be accommodated in each room. 1
- What is the minimum number of rooms required during the event? 1
- Which is the greatest four-digit number that is exactly divisible by 2,3 and 5? 2

37. Ram is the owner of a famous amusement park in Noida. The ticket for the park is ₹ 100 for children and ₹150 for adults. One day he went to the cash counter and checked 310 tickets were sold and ₹40000 was collected.

- Assuming that  $x$  number of children and  $y$  number of adults visited the park. Represent the given situations algebraically. 1
- How many children visited the park? How many adults visited the park? 2
- How much amount will be collected if 200 adults and 150 children visited the park? 1

38. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure, including microwave dishes. They are among the tallest human-made structures. There are 2 main types: guyed and self-supporting structures. On a similar concept, a radio station tower was built in two sections A and B. Tower is supported by wires from a point O. Distance between the base of the tower and point O is 36 m. From point O, the angle of elevation of the top of section B is  $30^\circ$  and the angle of elevation of the top of section A is  $45^\circ$



Based on the above information, answer the following questions:

- Find the length of the wire from the point O to the top of the Section B. 1
- Find the distance AB. 1
- Find the height of the section A from the base of the tower. 2

*Handwritten signature and date: 15/5/2020*