

TIME ALLOWED 3 Hr

INSTRUCTIONS

1. This question paper contains 38 questions. All questions are compulsory.
2. In section A, questions no. 1 to 18 are MCQs and question no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
3. In section B, questions no. 21 to 25 are very short answer (VSA) type questions, carrying 2 marks each.
4. In section C, questions no. 26 to 31 are short answer (SA) type questions, carrying 3 marks each.
5. In section D, questions no. 32 to 35 are long answer type questions (LA) carrying 5 marks each.
6. In section E, questions no. 36 to 38 are case based questions carrying 4 marks each.
7. Draw neat diagrams wherever required. Take  $\pi = 22/7$  wherever required, if not stated.
8. Use of calculators is not allowed.

SECTION A

1. The HCF of two numbers 54 and 81 is 27. The LCM of these two numbers is :  
a) 45    b) 9    c) 36    d) 162
2. For what value of k, the equation  $9x^2 + 6kx + 4 = 0$  has equal roots ?  
a)  $k = 2$     b)  $k = -2$     c)  $k = 0$     d) Both a and b
3. A quadratic polynomial, the sum and product of whose zeroes are  $\frac{1}{4}$  and  $-1$  respectively, is  
a)  $k/4(4x^2 - x - 4)$     b)  $k/4(x^2 - 4x - 4)$     c)  $k(4x^2 - 4x - 4)$     d)  $k(4x^2 - 4)$
4. Graphically, the pair of equations  $6x - 3y + 10 = 0$ ,  $2x - y + 9 = 0$  represents two lines which are  
a) Intersecting at exactly one point    b) intersecting at exactly two point  
c) Coincident    d) parallel
5. The coordinates of two points are  $(6,0)$  and  $(0,-8)$ . The coordinates of the mid point of the line segment joining them are  
a)  $(3,4)$     b)  $(3,-4)$     c)  $(0,0)$     d)  $(-4,3)$

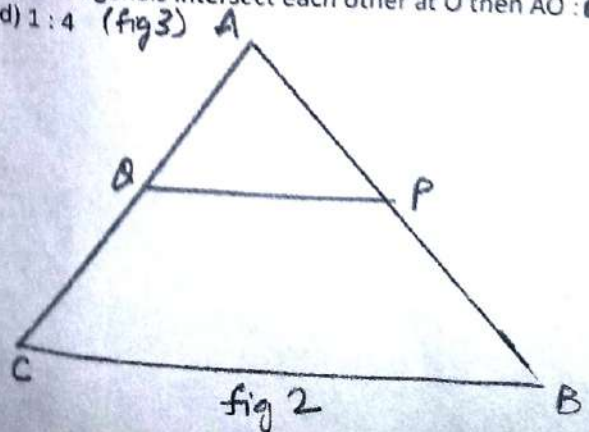
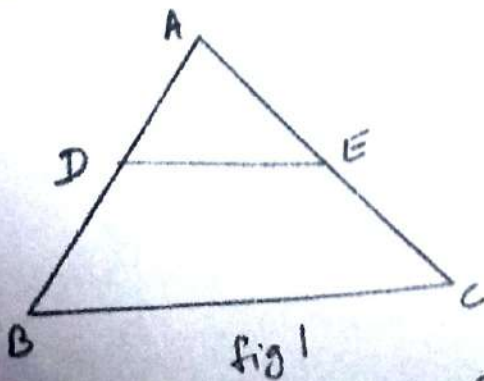
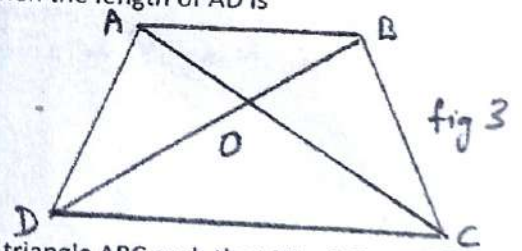
6. In figure 1,  $DE \parallel BC$  if  $AE = 1.8$  cm,  $BD = 7.2$  cm and  $CE = 5.4$  cm then the length of AD is  
a) 1.2 cm    b) 2.4 cm    c) 3.6 cm    d) 4.8 cm

7. If  $\sin A = \frac{3}{4}$ , then the value of  $\sec A$  is  
a)  $\frac{3}{7}$     b)  $\frac{4}{7}$     c)  $\frac{3}{4}$     d)  $\frac{4}{\sqrt{7}}$

8. If  $\cos(A + B) = 0$  and  $B = 30^\circ$  then  $\sin(A - B)$  is equal to  
a)  $\cos A$     b)  $\cos 2B$     c)  $\sin B$     d)  $\sin A$

9. In figure 2, P and Q are points on sides AB and AC respectively of triangle ABC such that  $AP = 3.5$  cm,  $PB = 7$  cm and  $QC = 6$  cm. If  $PQ = 4.5$  cm, then the length of BC is  
a) 7 cm    b) 13.5 cm    c) 9 cm    d) 10.5 cm

10. ABCD is a trapezium in which  $AB \parallel DC$  and  $DC = 3AB$ . If the diagonals intersect each other at O then  $AO : OC =$   
a) 3 : 1    b) 3 : 4    c) 1 : 3    d) 1 : 4 (fig 3)



11. Two parallel lines touch the circle at points A and B respectively. If area of the circle is  $25\pi\text{cm}^2$ , then AB is equal to  
 a) 5 cm    b) 8 cm    c) 10 cm    d) 25 cm
12. Length of arc of sector angle  $90^\circ$  and radius 14 cm is  
 a) 22 cm    b) 44 cm    c) 88 cm    d) 11cm
13. The total surface area of hemisphere of radius 14 cm is  
 a)  $1848\text{cm}^2$     b) 1848 cm    c)  $1232\text{cm}^2$     d)  $18.48\text{m}^2$
14. If  $\sum f_i = 11$ ,  $\sum f_i x_i = 2p + 52$  and the mean of any distribution is 6, find the value of p.  
 a) 5    b) 6    c) 7    d) 8
15. If circumference and area of circle are numerically equal, then the diameter of the circle is  
 a) 1 unit    b) 2 units    c) 4 units    d) 6 units
16. What is the lower limit of the class just preceding the median class of the following data if median is 34?

Marks obtained	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Number of students	12	15	18	55	10

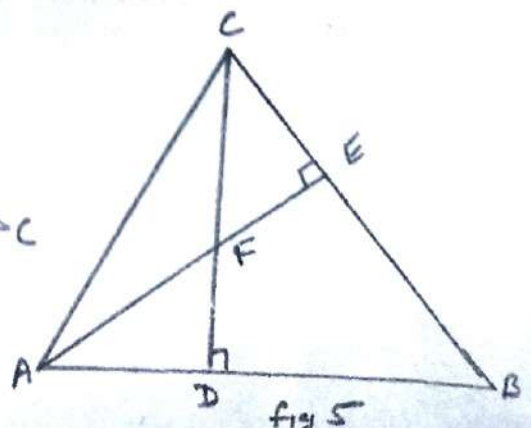
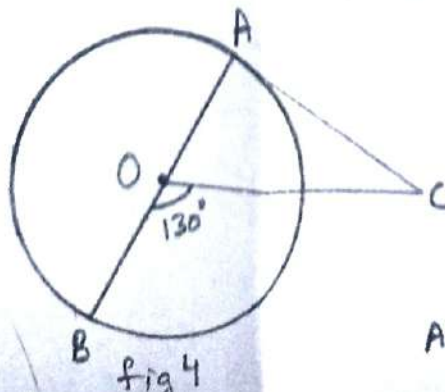
17. Cards each marked with one of the numbers 4,5,6,.....,20 are placed in a box and mixed thoroughly. One card is drawn at random from the box. The probability of getting an even prime ~~number~~ <sup>number is</sup> ~~number~~  
 a) 0    b)  $\frac{1}{2}$     c)  $\frac{3}{4}$     d)  $\frac{2}{5}$
18. If  $\tan A + \cot A = 5$ , then the value of  $\tan^2 A + \cot^2 A$  is  
 a) 23    b) 25    c) 27    d) 15

Question number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from codes (a), (b), (c) and (d) as given below.

- a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).  
 b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).  
 c) Assertion (A) is true, but Reason (R) is false.  
 d) Assertion (A) is false, but Reason (R) is true.
19. Assertion : If  $\text{LCM} = 182$ , the product of integers is  $26 \times 91$ , then  $\text{HCF} = 13$ .  
 Reason :  $\text{LCM} \times \text{product of integers} = \text{HCF}$
20. Assertion : The distance between the points (a,b) and (-a,-b) is  $2\sqrt{a^2 + b^2}$  units.  
 Reason : Distance between two given points  $A(x_1, y_1)$  and  $B(x_2, y_2)$  is  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

SECTION B

21. For what value of p will the following pair of linear equations have infinitely many solutions  
 $(p-3)x + 3y = p$ ;  $px + py = 12$
22. In given figure 5, altitudes AE and CD intersect at F. Prove that (i) Triangle ADF is similar to triangle CEF.  
 (ii)  $AD \cdot EF = DF \cdot CE$
23. In figure 4, AOB is diameter of a circle with centre O and AC is a tangent to the circle at A. If  $\angle BOC = 130^\circ$ , then find  $\angle LACO$ .



24. Find the area of the sector of circle of radius 21 cm and central angle  $90^\circ$   
 25. Prove the following identity  $\tan^2 A + \cot^2 A + 2 = \sec^2 A \cdot \operatorname{cosec}^2 A$

#### SECTION C

26. Prove that  $(3 + 2\sqrt{5})$  is an irrational number, given that  $\sqrt{5}$  is an irrational number.  
 27. Find the zeroes of the following polynomial:  $5\sqrt{5}x^2 + 30x + 8\sqrt{5}$   
 28. Places A and B are 80 km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in the same direction they meet in 8 hours and if they move towards each other they meet in 1 hour 20 minutes. Find the speed of the cars.  
 29. If  $\sec A + \tan A = p$ , prove that  $\sin A = \frac{(p^2 - 1)}{(p^2 + 1)}$   
 30. ABC is an isosceles triangle, in which  $AB = AC$ , circumscribed about a circle. Show that BC is bisected at the point of contact.  
 31. A card is drawn at random from a well shuffled deck of playing cards. Find <sup>the</sup> ~~te~~ probability <sup>that</sup> ~~at~~ the card drawn is (i) a spade or an ace (ii) a black king (iii) neither a jack nor a king.

#### SECTION D

32. A motorboat whose speed is 24 km/h in still water takes 1 hour more to go 32 km upstream than to return downstream to the same spot. Find the speed of the stream. OR  
 Solve the following quadratic equation for x:  $4x^2 - 4a^2x + (a^4 - b^4) = 0$   
 33. State and prove Basic Proportionality Theorem.  
 34. From a solid cylinder whose height is 15 cm and diameter 16 cm, a conical cavity of same height and same diameter is hollowed out. Find the total surface area of the remaining solid. (take  $\pi = 3.14$ )  
 35. The following distribution gives the weights of 60 students of a class. Find the mean and the mode weights of the students.

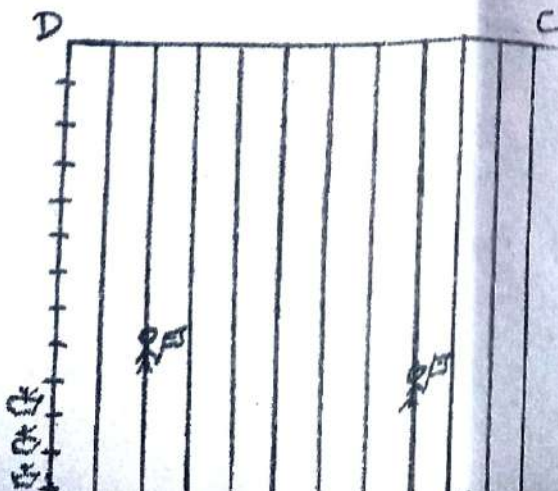
Weight (in kg)	40 - 44	44 - 48	48 - 52	52 - 56	56 - 60	60 - 64	64 - 68	68 - 72
Number of students	4	6	10	14	10	8	6	2

#### SECTION E

36. To conduct sports day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1m each. 100 flower pots have been placed at a distance of 1m from each other along AD, as shown in figure. Niharika runs  $\frac{1}{4}$ th the distance AD on the 2<sup>nd</sup> line and posts a green flag. Preet runs  $\frac{1}{5}$ th the distance AD on the eighth line and posts a red flag.

Use the above information to answer the questions that follows:

- (i) What is the distance between green flag and red flag? (1)  
 (ii) If Rashme has to put blue flag exactly halfway between the line segment joining the two flags, where should she post her flag? (1)  
 (iii) Find a relation between x and y such that point P(x,y) is equidistant from red flag and green flag. (2)



37. Subsistence farming – the earliest form of agriculture that is meant to provide for the needs of family or small group. Manohar, a farmer in a remote area has a small piece of land. He grows 1000 saplings in his field in rows such that each succeeding row has 5 saplings less than the previous one.

Use above information to answer the questions that follows :

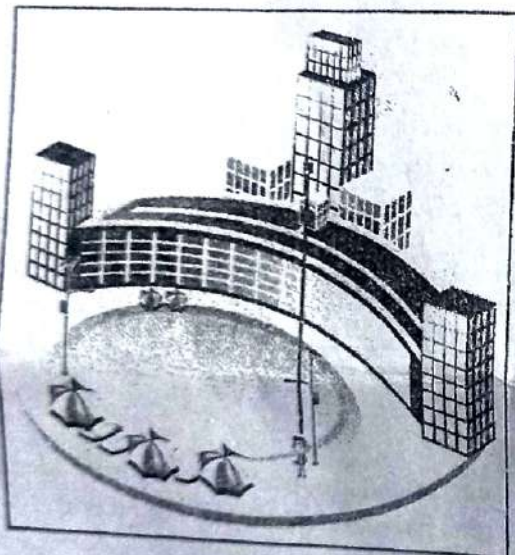
- (i) If the first row has 100 saplings, how many saplings will be there in 10<sup>th</sup> row? (1)
- (ii) For 1000 saplings, how many rows need to be there? (2)
- (iii) If there are 25 rows in the field, how many saplings are there in the middle row? (1)

38. Mr Ram, a vendor in a resort installed solar moon light lamp-posts in the resort premises. He observes the electrician working on a lamp-post from the window of the resort at a height of 60m. He also found the measure of depression of the top and bottom of lamp-post as 30° and 60° respectively.

Use the above information to answer the questions that follows :

- (i) Draw a neat labelled figure to show the above situation. (1)
- (ii) Find the distance between the lamp-post and building at ground level. (1)
- (iii) What is the height of lamp-post for which the angle of depression of the top of lamp-post is 30° (2)

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Rachin  
20/11/23