

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 1**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
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**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

Q1. If  $x = 0.\bar{7}$ , then find  $2x$ .

**OR**

1. The L.C.M. of  $x$  and 18 is 36.
  2. The H.C.F. of  $x$  and 18 is 2.
- What is the number  $x$ ?

Q2. Find the value of  $k$  for which the system of linear equations  $x + 2y = 3$ ,  $5x + ky + 7 = 0$  is inconsistent.

Q3. If the sum and product of the zeroes of a quadratic polynomial are 3 and  $-10$  respectively, find the quadratic polynomial.

**OR**

If the sum of the zeroes of the quadratic polynomial  $kx^2 + 2x + 3k$  is equal to their product, then what is the value of  $k$ ?

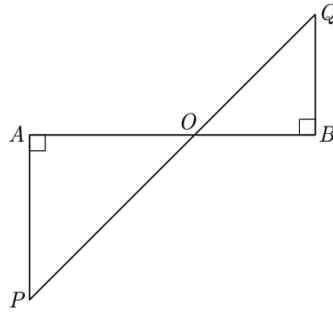
Q4. What is the  $n^{\text{th}}$  term of the AP  $a, 3a, 5a, \dots$  ?

**OR**

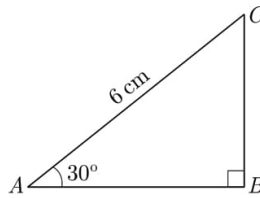
What is the common difference of the AP  $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}, \dots$ ?

Q5.  $\Delta ABC$  is an equilateral triangle of side  $2a$ , then length of one of its altitude is .....

Q6. In the given figure, if  $\angle A = 90^\circ, \angle B = 90^\circ, OB = 4.5\text{cm}$   $OA = 6\text{ cm}$  and  $AP = 4\text{ cm}$  then find  $QB$ .



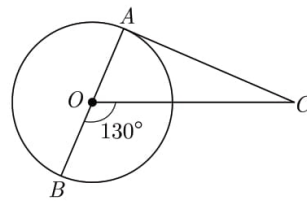
Q7. In the adjoining figure, what is the length of  $BC$ ?



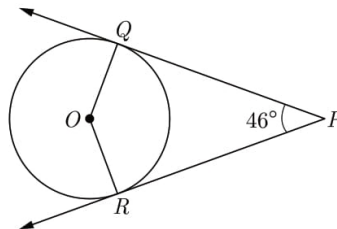
Q8. Prove that  $(1 + \tan A - \sec A) \times (1 + \tan A + \sec A) = 2 \tan A$

Q9. A pole casts a shadow of length  $2\sqrt{3}$  m on the ground, when the Sun's elevation is  $60^\circ$ . Find the height of the pole.

Q10. In the given figure,  $AOB$  is a diameter of the circle with centre  $O$  and  $AC$  is a tangent to the circle at  $A$ . If  $\angle BOC = 130^\circ$ , the find  $\angle ACO$ .



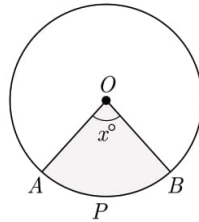
Q11. If  $PQ$  and  $PR$  are two tangents to a circle with centre  $O$ . If  $\angle QPR = 46^\circ$  then find  $\angle QOR$ .



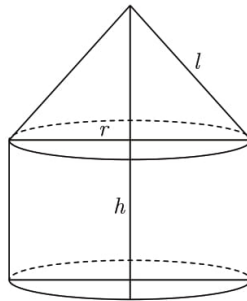
Q12. If the perimeter and the area of the circle are numerically equal, then find the radius of the circle.

**OR**

In given fig.,  $O$  is the centre of a circle. If the area of the sector  $OAPB$  is  $\frac{5}{36}$  times the area of the circle, then find the value of  $x$ .



Q13. The total surface area of the given solid figure is .....



Q14. A cylinder, a cone and a hemisphere have same base and same height. Find the ratio of their volumes.

Q15. Find the class marks of the classes 20-50 and 35-60.

**OR**

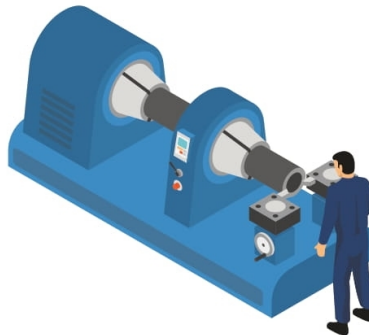
If the median of a series exceeds the mean by 3, find by what number the mode exceeds its mean?

Q16. Median of a data is 52.5 and its mean is 54, use empirical relationship between three measure of central tendency to find its mode.

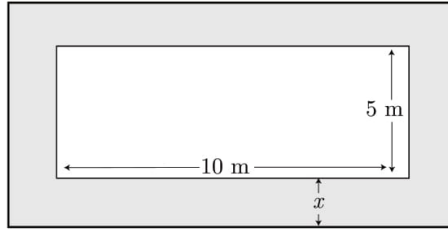
### SECTION II

**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

Q17. RK Fabricators has got a order for making a frame for machine of their client. For which, they are using a AutoCAD software to create a constructible model that includes the relevant information such as dimensions of the frame and materials needed.



The frame will have a solid base and will be cut out of a piece of steel. The final area of the frame should be 54 sq m. The diagram of frame is shown below.



In order to input the right values in the AutoCAD software, the engineer needs to calculate some basic values.

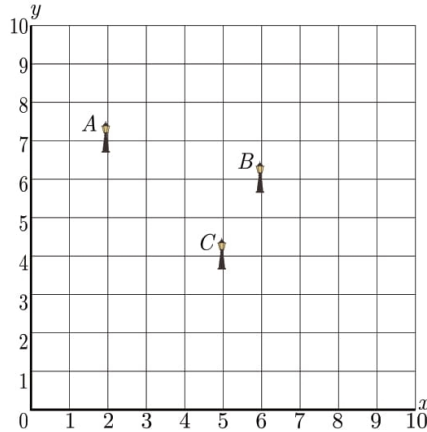
- (i) What are the dimensions of the outer frame ?
- (a)  $(10 + x)$  and  $(5 + x)$                       (b)  $(10 - x)$  and  $(5 - x)$   
(c)  $(10 + 2x)$  and  $(5 + 2x)$                       (d)  $(10 - 2x)$  and  $(5 - 2x)$
- (ii) A metal sheet of minimum area is used to make the frame. What should be the minimum area of metal sheet before cutting ?
- (a)  $4x^2 + 30x + 50$                                       (b)  $x^2 + 27x + 55$   
(c)  $5x^2 + 30$     (d)  $4x^2 + 50$
- (iii) What is the area of required final metal frame ?
- (a)  $4x^2 + 30x + 50 \text{ m}^2$                               (b)  $x^2 + 27x + 55 \text{ m}^2$   
(c)  $4x^2 + 50x \text{ m}^2$                                       (d)  $4x^2 + 30x \text{ m}^2$
- (iv) If the area of the frame is 54 sq m, what is the value of  $x$  ?
- (a) 0.75 m    (b) 3.0 m  
(c) 1.5 m    (d) 1.8 m
- (v) What is the perimeter of the frame?
- (a) 36 m    (b) 42 m  
(c) 45 m    (d) 39 m

Q18. Resident Welfare Association (RWA) of a Gulmohar Society in Delhi have installed three electric poles  $A$ ,  $B$  and  $C$  in a society's common park. Despite these three poles, some parts of the park are still in dark.

So, RWA decides to have one more electric pole  $D$  in the park.



The park can be modelled as a coordinate systems given below.



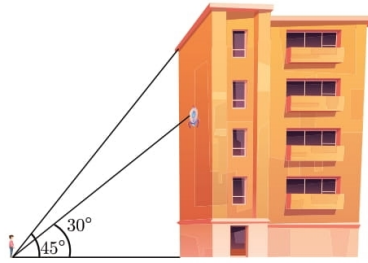
On the basis of the above information, answer any four of the following questions:

- (i) What is the position of the pole  $C$ ?
- (a)  $(4, 5)$  (b)  $(5, 4)$   
(c)  $(6, 5)$  (d)  $(5, 6)$
- (ii) What is the distance of the pole  $B$  from the corner  $O$  of the park ?
- (a)  $6\sqrt{2}$  units (b)  $3\sqrt{2}$  units  
(c)  $6\sqrt{3}$  units (d)  $3\sqrt{3}$  units
- (iii) Find the position of the fourth pole  $D$  so that four points  $A, B, C$  and  $D$  form a parallelogram .
- (a)  $(5, 2)$  (b)  $(1, 5)$   
(c)  $(1, 4)$  (d)  $(2, 5)$
- (iv) What is the distance between poles  $A$  and  $C$  ?
- (a)  $6\sqrt{2}$  units (b)  $3\sqrt{2}$  units  
(c)  $6\sqrt{3}$  units (d)  $3\sqrt{3}$  units
- (v) What is the distance between poles  $B$  and  $D$ ?
- (a)  $2\sqrt{3}$  units (b)  $\sqrt{28}$  units  
(c)  $6\sqrt{3}$  units (d)  $\sqrt{26}$  units

- Q19. A clinometer is a tool that is used to measure the angle of elevation, or angle from the ground, in a right - angled triangle. We can use a clinometer to measure the height of tall things that you can't possibly reach to the top of, flag poles, buildings, trees.



Ravish got a clinometer from school lab and started the measuring elevation angle in surrounding. He saw a building on which society logo is painted on wall of building.



From a point  $P$  on the ground level, the angle of elevation of the roof of the building is  $45^\circ$ . The angle of elevation of the centre of logo is  $30^\circ$  from same point. The point  $P$  is at a distance of 24 m from the base of the building.

- (i) What is the height of the building logo from ground ?  
 (a)  $8\sqrt{2}$  m (b)  $4\sqrt{3}$  m  
 (c)  $8\sqrt{3}$  m (d)  $4\sqrt{2}$  m
- (ii) What is the height of the building from ground ?  
 (a)  $24(3 - \sqrt{3})$  m (b)  $8(3 - \sqrt{3})$  m  
 (c) 24 m (d) 32 m
- (iii) What is the aerial distance of the point  $P$  from the top of the building ?  
 (a)  $24\sqrt{3}$  m (b)  $24\sqrt{2}$  m  
 (c)  $32\sqrt{3}$  m (d)  $32\sqrt{2}$  m
- (iv) If the point of observation  $P$  is moved 9 m towards the base of the building, then the angle of elevation  $\theta$  of the logo on building is given by  
 (a)  $\tan \theta = \sqrt{3}$  (b)  $\tan \theta = \frac{2}{\sqrt{3}}$   
 (c)  $\tan \theta = \frac{1}{2}$  (d)  $\tan \theta = \frac{8\sqrt{3}}{15}$
- (v) In above case the angle of elevation  $\phi$  of the top of building is given by  
 (a)  $\tan \phi = 1.6$  (b)  $\tan \phi = 1.5$   
 (c)  $\tan \phi = 0.75$  (d)  $\tan \phi = 0.8$

Q20. Cards on which numbers 1, 2, 3 ..... 100 are written (one number on one card and no number is repeated), put in a bag and are mixed thoroughly. A card is drawn at random from the bag.



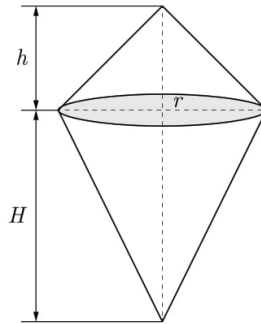
- (i) What is the probability that card taken out has a odd number ?  
 (a) 0.25 (b) 0.49  
 (c) 0.50 (d) 0.51
- (ii) What is the probability that card taken out has a two digit odd number ?  
 (a) 0.23 (b) 0.45  
 (c) 0.56 (d) 0.34

- (iii) What is the probability that card taken out has a odd number which is multiple of 11?  
 (a) 0.05 (b) 0.10  
 (c) 0.12 (d) 0.06
- (iv) What is the probability that card taken out has an odd number which is not less than 70 ?  
 (a) 0.13 (b) 0.14  
 (c) 0.12 (d) 0.15
- (v) What is the probability that card taken out has an odd number which is not multiple of 11 ?  
 (a) 0.25 (b) 0.50  
 (c) 0.40 (d) 0.45

**PART - B**

All questions are compulsory. In case of internal choices, attempt any one.

- Q21. Explain why  $(7 \times 13 \times 11) + 11$  and  $(7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1) + 3$  are composite numbers.
- Q22. In an equilateral triangle of side 24 cm, find the length of the altitude.
- Q23. If  $A(5, 2)$ ,  $B(2, -2)$  and  $C(-2, t)$  are the vertices of a right angled triangle with  $\angle B = 90^\circ$ , then find the value of  $t$ .
- Q24. If  $\sqrt{3} \sin \theta - \cos \theta = 0$  and  $0^\circ < \theta < 90^\circ$ , find the value of  $\theta$ .
- Q25. A solid metallic object is shaped like a double cone as shown in figure. Radius of base of both cones is same but their heights are different. If this cone is immersed in water, find the quantity of water it will displace.



**OR**

Find the number of solid sphere of diameter 6 cm can be made by melting a solid metallic cylinder of height 45 cm and diameter 4 cm.

- Q26. Find the median for the given frequency distribution :

Class	40-45	45-50	50-55	55-60	60-65	65-70	70-75
Frequency	2	3	8	6	6	3	2

**OR**

Find the mean of the following distribution :

Class	10-25	25-40	40-55	55-70	70-85	85-100
Frequency	2	3	7	6	6	6

- Q27. Given that  $\sqrt{2}$  is irrational, prove that  $(5 + 3\sqrt{2})$  is an irrational number.
- Q28. A part of monthly hostel charge is fixed and the remaining depends on the number of days one has taken food in the mess. When Swati takes food for 20 days, she has to pay Rs. 3,000 as hostel charges whereas Mansi who takes food for 25 days Rs. 3,500 as hostel charges. Find the fixed charges and the cost of food per day.
- Q29. Divide 56 in four parts in AP such that the ratio of the product of their extremes ( $1^{st}$  and  $4^{th}$ ) to the product of means ( $2^{nd}$  and  $3^{rd}$ ) is 5:6.

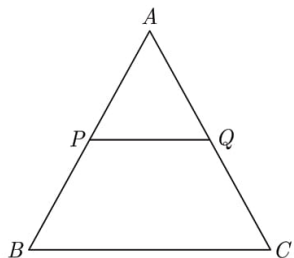
**OR**

The sum of  $n$  terms of an AP is  $3n^2 + 5n$ . Find the AP Hence find its  $15^{th}$  term.

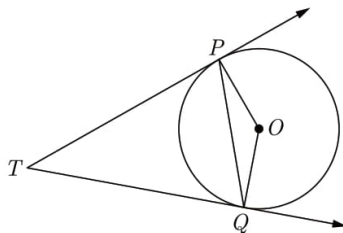
- Q30. If the diagonals of a quadrilateral divide each other proportionally, prove that it is a trapezium.

**OR**

In the given figure,  $P$  and  $Q$  are the points on the sides  $AB$  and  $AC$  respectively of  $\triangle ABC$ , such that  $AP = 3.5$  cm,  $PB = 7$  cm,  $AQ = 3$  cm and  $QC = 6$  cm. If  $PQ = 4.5$  cm, find  $BC$ .



- Q31. Prove that :  $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$ .
- Q32. In the given figure  $PQ$  is chord of length 6 cm of the circle of radius 6 cm.  $TP$  and  $TQ$  are tangents to the circle at points  $P$  and  $Q$  respectively. Find  $\angle PTQ$ .

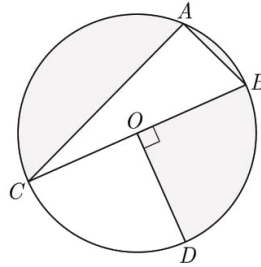


- Q33. Draw a line segment  $AB$  of length 7 cm. Taking  $A$  as centre, draw a circle of radius 3 cm and taking  $B$  as center, draw another circle of radius 2 cm. Construct tangents to each circle from the centre of the other circle.



Q34. Solve for  $x : \left(\frac{2x}{x-5}\right)^2 + \left(\frac{2x}{x-5}\right) - 24 = 0, x \neq 5$

Q35. In the given figure,  $O$  is the centre of the circle with  $AC = 24$  cm,  $AB = 7$  cm and  $\angle BOD = 90^\circ$ . Find the area of the shaded region.



Q36. The median of the following data is 525. Find the values of  $x$  and  $y$ , if total frequency is 100 :

Class	Frequency
0-100	2
100-200	5
200-300	$x$
300-400	12
400-500	17
500-600	20
600-700	$y$
700-800	9
800-900	7
900-1000	4

**OR**

Daily wages of 110 workers, obtained in a survey, are tabulated below :

Daily Wages (in ₹)	100-120	120-140	140-160	160-180	180-200	200-220	220-240
Number of Workers	10	15	20	22	18	12	13

Compute the mean daily wages and modal daily wages of these workers.

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 2**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

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2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
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**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1. What is the HCF of smallest primer number and the smallest composite number?

**OR**

Write one rational and one irrational number lying between 0.25 and 0.32.

- Q2. Find the value of  $k$  for which the system of equations  $x + y - 4 = 0$  and  $2x + ky = 3$ , has no solution.

- Q3. If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $x^2 + 2x + 1$ , then what is the value of  $\frac{1}{\alpha} + \frac{1}{\beta}$  ?

**OR**

If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $2x^2 - 13x + 6$ , then what is the value of  $\alpha + \beta$ ?

- Q4. What is the value of  $x$  for which  $2x, (x + 10)$  and  $(3x + 2)$  are the three consecutive terms of an AP ?

**OR**

If the first term of AP is  $p$  and the common difference is  $q$ , then what is its 10th term?

- Q5.  $\triangle ABC$  and  $\triangle BDE$  are two equilateral triangle such that  $D$  is the mid-point of  $BC$ . Ratio of the areas of triangles  $ABC$  and  $BDE$  is .....

- Q6. In  $\triangle ABC$ , if  $X$  and  $Y$  are points on  $AB$  and  $AC$  respectively such that  $\frac{AX}{XB} = \frac{3}{4}$ ,  $AY = 5$  and  $YC = 9$ , then state whether  $XY$  and  $BC$  parallel or not.

- Q7. If  $\sec 5A = \operatorname{cosec}(A + 30^\circ)$ , where  $5A$  is an acute angle, then what is the value of  $A$ ?
- Q8. If  $\tan A = \cot B$ , then find the value of  $(A + B)$ .
- Q9. If the length of the ladder placed against a wall is twice the distance between the foot of the ladder and the wall. Find the angle made by the ladder with the horizontal.
- Q10. If a line intersects a circle in two distinct points, what is it called ?
- Q11. What is the length of the tangent drawn from a point 8 cm away from the centre of a circle of radius 6 cm ?
- Q12. If circumference of a circle is 44 cm, then what will be the area of the circle?

**OR**

A steel wire when bent in the form of a square encloses an area of  $121 \text{ cm}^2$ . If the same wire is bent in the form of a circle, then find the circumference of the circle.

- Q13. A solid metallic cuboid  $24 \text{ cm} \times 11 \text{ cm} \times 7 \text{ cm}$  is melted and recast and recast into solid cones of base radius 3.5 cm and height 6 cm. Find the number of cones so formed.
- Q14. What is the ratio of the total surface area of the solid hemisphere to the square of its radius.
- Q15. From the following frequency distribution, find the median class :

Cost of living index	1400-1500	1550-1700	1700-1850	1850-2000
Number of weeks	8	15	21	8

**OR**

In the following frequency distribution, find the median class.

Height (in cm)	104-145	145-150	150-155	155-160	160-165	165-170
Frequency	5	15	25	30	15	10

- Q16. In a frequency distribution, the mid value of a class is 10 and the width of the class is 6. What is the lower limit of the class?

## SECTION II

**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

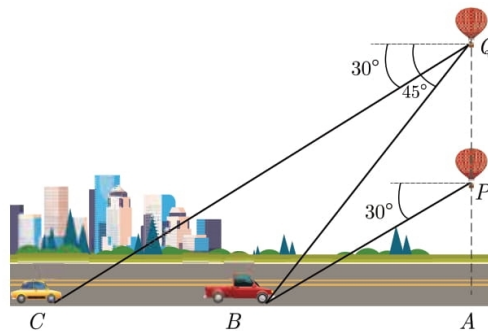
- Q17. The Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund was created on 28 March 2020, following the COVID-19 pandemic in India. The fund will be used for combating, and containment and relief efforts against the coronavirus outbreak and similar pandemic like situations in the future.



The allotment officer is trying to come up with a method to calculate fair division of funds across various affected families so that the fund amount and amount received per family can be easily adjusted based on daily revised numbers. The total fund allotted for a village is  $x^3 + 6x^2 + 20x + 9$ . The officer has divided the fund equally among families of the village and each family receives an amount of  $x^2 + 2x + 2$ . After distribution, some amount is left.

- (i) How many families are there in the village?
- (a)  $x + 4$  (b)  $x - 3$   
(c)  $x - 4$  (d)  $x + 3$
- (ii) If an amount of ₹ 1911 is left after distribution, what is value of  $x$ ?
- (a) 190 (b) 290  
(c) 191 (d) 291
- (iii) How much amount does each family receive?
- (a) 24490 (b) 34860  
(c) 22540 (d) 36865
- (iv) What is the amount of fund allocated?
- (a) Rs 72 72 759 (b) Rs 75 72 681  
(c) Rs 69 72 846 (d) Rs 82 74 888
- (v) How many families are there in the village?
- (a) 191 (b) 98  
(c) 187 (d) 195

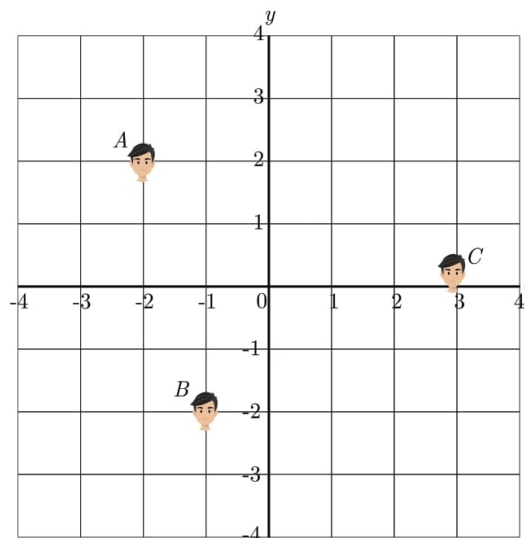
- Q18. A hot air balloon is a type of aircraft. It is lifted by heating the air inside the balloon, usually with fire. Hot air weighs less than the same volume of cold air (it is less dense), which means that hot air will rise up or float when there is cold air around it, just like a bubble of air in a pot of water. The greater the difference between the hot and the cold, the greater the difference in density, and the stronger the balloon will pull up.



Lakshman is riding on a hot air balloon. After reaching at height  $x$  at point  $P$ , he spots a lorry parked at  $B$  on the ground at an angle of depression of  $30^\circ$ . The balloon rises further by 50 metres at point  $Q$  and now he spots the same lorry at an angle of depression of  $45^\circ$  and a car parked at  $C$  at an angle of depression of  $30^\circ$ .

- (i) What is the relation between the height  $x$  of the balloon at point  $P$  and distance  $d$  between point  $A$  and  $B$ ?
- (a)  $x = 3d$  (b)  $d = 3x$   
 (c)  $d^2 = 3x^2$  (d)  $3d^2 = x^2$
- (ii) When balloon rises further 50 metres, then what is the relation between new height  $y$  and  $d$ ?
- (a)  $y = d + 50$  (b)  $d = y$   
 (c)  $y = \sqrt{3}d$  (d)  $\sqrt{3}y = d$
- (iii) What is the new height of the balloon at point  $Q$ ?
- (a)  $50(\sqrt{3} + 3)$  m (b)  $25(\sqrt{3} + 1)$  m  
 (c)  $50(\sqrt{3} + 1)$  m (d)  $25(\sqrt{3} + 3)$  m
- (iv) What is the distance  $AB$  on the ground?
- (a)  $50(\sqrt{3} + 3)$  m (b)  $25(3 + 3\sqrt{3})$  m  
 (c)  $50(\sqrt{3} + 1)$  m (d)  $25(\sqrt{3} + 3)$  m
- (v) What is the distance  $AC$  on the ground?
- (a)  $75(1 + \sqrt{3})$  m (b)  $25(1 + \sqrt{3})$  m  
 (c)  $50(1 + \sqrt{3})$  m (d)  $25(\sqrt{3} + 3)$  m

Q19. Ajay, Bhigu and Colin are fast friend since childhood. They always want to sit in a row in the classroom . But teacher doesn't allow them and rotate the seats row-wise everyday. Bhigu is very good in maths and he does distance calculation everyday. He consider the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Bhigu make the following diagram of their seating position.



- (i) What are the coordinates of point A?
- (a) (2, 2) (b) (2, -2)  
 (c) (-2, 2) (d) (-2, -2)

- (ii) What is the distance of point  $A$  from origin ?  
 (a) 8 (b)  $2\sqrt{2}$   
 (c) 4 (d)  $4\sqrt{2}$
- (iii) What is the distance between  $A$  and  $B$  ?  
 (a)  $3\sqrt{19}$  (b)  $3\sqrt{5}$   
 (c)  $\sqrt{17}$  (d)  $2\sqrt{5}$
- (iv) What is the distance between  $B$  and  $C$  ?  
 (a)  $3\sqrt{19}$  (b)  $3\sqrt{5}$   
 (c)  $2\sqrt{17}$  (d)  $2\sqrt{5}$
- (v) A point  $D$  lies on the line segment between points  $A$  and  $B$  such that  $AD:DB = 4:3$ . What are the coordinates of point  $D$  ?  
 (a)  $(\frac{10}{7}, \frac{2}{7})$  (b)  $(\frac{2}{7}, \frac{7}{7})$   
 (c)  $(-\frac{10}{7}, -\frac{2}{7})$  (d)  $(-\frac{2}{7}, -\frac{7}{7})$

Q20. In two dice game, the player take turns to roll both dice, they can roll as many times as they want in one turn. A player scores the sum of the two dice thrown and gradually reaches a higher score as they continue to roll. If a single number 1 is thrown on either die, the score for that whole turn is lost. Two dice are thrown simultaneously.

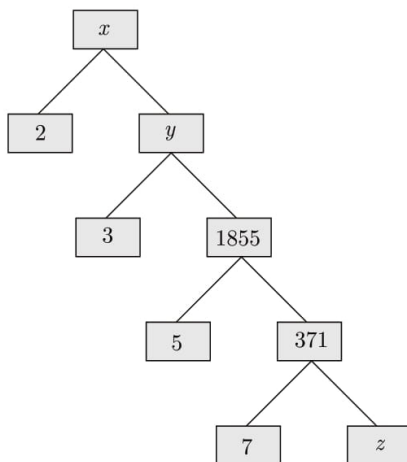


- (i) What is the probability of getting the sum as an even number ?  
 (a)  $\frac{3}{4}$  (b)  $\frac{1}{2}$   
 (c)  $\frac{1}{4}$  (d)  $\frac{5}{8}$
- (ii) What is the probability of getting the sum as a prime number ?  
 (a)  $\frac{5}{12}$  (b)  $\frac{1}{6}$   
 (c)  $\frac{7}{12}$  (d)  $\frac{11}{12}$
- (iii) What is the probability of getting the sum of atleast 10?  
 (a)  $\frac{5}{12}$  (b)  $\frac{5}{6}$   
 (c)  $\frac{1}{6}$  (d)  $\frac{7}{12}$
- (iv) What is the probability of getting a doublet of even number ?  
 (a)  $\frac{1}{12}$  (b)  $\frac{5}{12}$   
 (c)  $\frac{11}{12}$  (d)  $\frac{7}{12}$
- (v) What is the probability of getting a product of numbers greater than 16?  
 (a)  $\frac{7}{36}$  (b)  $\frac{2}{9}$   
 (c)  $\frac{5}{18}$  (d)  $\frac{11}{36}$

## PART - B

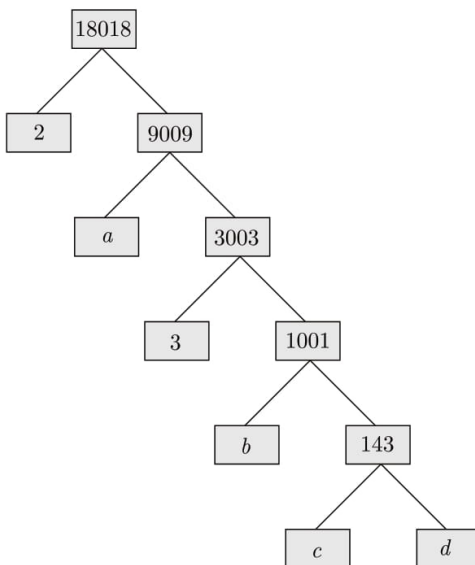
All questions are compulsory. In case of internal choices, attempt any one.

Q21. Complete the following factor tree and find the composite number  $x$



OR

Find the missing numbers  $a, b, c$  and  $d$  in the given factor tree:



Q22. In  $\triangle ABC$ ,  $AD \perp BC$ , such that  $AD^2 = BD \times CD$ . Prove that  $\triangle ABC$  is right angled at  $A$ .

OR

In an equilateral triangle, prove that three times the square of one side is equal to four times the square of one of its altitudes.

OR

Find the altitude of an equilateral triangle when each of its side is  $a$  cm.

Q23. Find the ratio in which the point  $P(\frac{3}{4}, \frac{5}{12})$  divides the line segment joining the point  $A(\frac{1}{2}, \frac{3}{2})$  and  $(2, -5)$ .

Q24. If  $\sin \phi = \frac{1}{2}$ , show that  $3 \cos \phi - 4 \cos^3 \phi = 0$ .

Q25. 12 solid spheres of the same size are made by melting a solid metallic cone of base radius 1 cm and height of 48 cm. Find the radius of each sphere.

Q26. Find the mean of the following data :

Class	0- 20	20-40	40-60	60-80	80-100	100- 120
Frequency	20	35	52	44	38	31

Q27. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together?

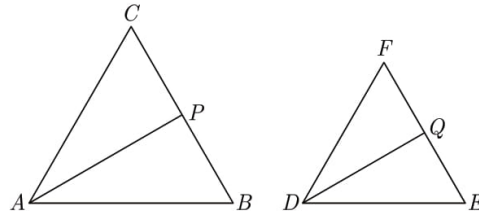
Q28. Solve for  $x$  and  $y$  :

$$\frac{x}{2} + \frac{2y}{3} = -1$$

$$x - \frac{y}{3} = 3$$

Q29. The sum of first  $n$  terms of three arithmetic progressions are  $S_1, S_2$  and  $S_3$  respectively. The first term of each AP is 1 and common differences are 1, 2 and 3 respectively. Prove that  $S_1 + S_3 = 2S_2$ .

Q30. In given figure  $\Delta ABC \sim \Delta DEF$ .  $AP$  bisects  $\angle CAB$  and  $DQ$  bisects  $\angle FDE$ .



Prove that :

(1)  $\frac{AP}{DQ} = \frac{AB}{DE}$

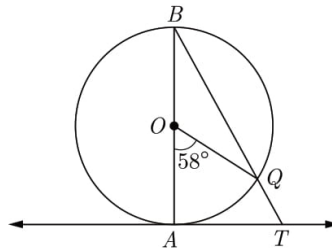
(2)  $\Delta CAP \sim \Delta FDQ$ .

Q31. In  $\Delta ABC$ ,  $\angle B = 90^\circ$ ,  $BC = 5$  cm,  $AC - AB = 1$ , Evaluate :  $\frac{1 + \sin C}{1 + \cos C}$ .

**OR**

If  $b \cos \theta = a$ , then prove that  $\operatorname{cosec} \theta + \cot \theta = \sqrt{\frac{b+a}{b-a}}$ .

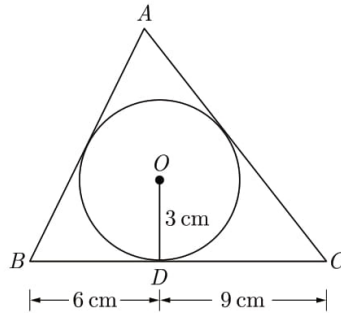
Q32. In given figure,  $AB$  is the diameter of a circle with centre  $O$  and  $AT$  is a tangent. If  $\angle AOQ = 58^\circ$ , find  $\angle ATQ$ .





OR

In figure, a triangle  $ABC$  is drawn to circumscribe a circle of radius 3 cm, such that the segments  $BD$  and  $DC$  are respectively of lengths 6 cm and 9 cm. If the area of  $\Delta ABC$  is  $54 \text{ cm}^2$ , then find the lengths of sides  $AB$  and  $AC$ .



Q33. Construct a triangle whose perimeter is 13.5 cm and the ratio of the three sides is 2:3:4.

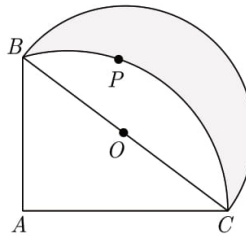
Q34. Solve for  $x$  :  $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$

$x \neq -1, -2, -4$

OR

Find the zeroes of the quadratic polynomial  $7y^2 - \frac{11}{3}y - \frac{2}{3}$  and verify the relationship between the zeroes and the coefficients.

Q35. In given figure  $ABPC$  is a quadrant of a circle of radius 14 cm and a semicircle is drawn with  $BC$  as diameter. Find the are of the shaded region.



Q36. If the median of the following frequency distribution is 32.5. Find the values of  $f_1$  and  $f_2$ .

Class	0- 10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	$f_1$	5	9	12	$f_2$	3	2	40

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 3**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
- 

**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1. If  $\text{HCF}(336, 54) = 6$ , find  $\text{LCM}(336, 54)$ .

**OR**

Explain why 13233343563715 is a composite number?

- Q2. For which value(s) of  $p$ , will the lines represented by the following pair of linear equations be parallel ?

$$3x - y - 5 = 0$$

$$6x - 2y - p = 0$$

- Q3. Find the roots of the quadratic equation  $x^2 - 0.04 = 0$

**OR**

If  $\frac{1}{2}$  is a root of the equation  $x^2 + kx - \frac{5}{4} = 0$ , then what is the value of  $k$ ?

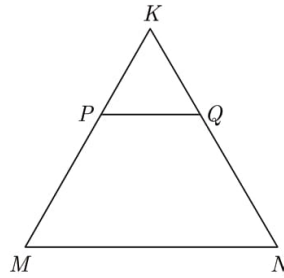
- Q4. Fill the two blanks in the sequence 2 ....., 26, ..... so that the sequence forms an AP.

**OR**

The sum of first 20 terms of the AP 1, 4, 7, 10 .... is

- Q5. A ladder 10 m long reaches a window 8 m above the ground. The distance of the foot of the ladder from the base of the wall is ..... m.

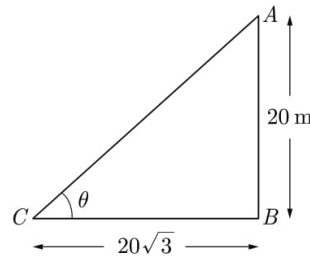
- Q6. In the figure,  $PQ$  is parallel to  $MN$ . If  $\frac{KP}{PM} = \frac{4}{13}$  and  $KN = 20.4$  cm then find  $KQ$ .



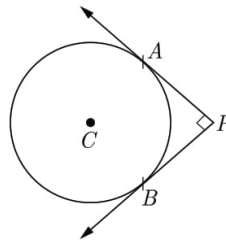
- Q7. If  $\sin \theta = \frac{5}{13}$ , then the value of  $\tan \theta$  is .....
- Q8. If  $x = 3 \sin \theta + 4 \cos \theta$  and  $y = 3 \cos \theta - 4 \sin \theta$  then prove that  $x^2 + y^2 = 25$ .
- Q9. An observer, 1.7 m tall, is  $20\sqrt{3}$  m away from a tower. The angle of elevation from the eye of observer to the top of tower is  $30^\circ$ . Find the height of tower.

**OR**

In figure, a tower  $AB$  is 20 m high and  $BC$ , its shadow on the ground, is  $20\sqrt{3}$  m long. find the Sun's altitude.



- Q10. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of larger circle (in cm) which touches the smaller circle.
- Q11. In figure,  $PA$  and  $PB$  are two tangents drawn from an external point  $P$  to a circle with centre  $C$  and radius 4 cm. If  $PA \perp PB$ , then find the length of each tangent.



- Q12. Find the radius of a circle whose circumference is equal to the sum of the circumference of two circles of diameter 36 cm and 20 cm

**OR**

Find the diameter of a circle whose area is equal to the sum of areas of two circles of diameter 16 cm and 12 cm.

- Q13. The curved surface area of a cylinder is  $264 \text{ m}^2$  and its volume is  $924 \text{ m}^3$ . Find the ratio of its height to its diameter.
- Q14. Two cubes each of volume  $8 \text{ cm}^3$  are joined end to end, then what is the surface area of resulting cuboid.
- Q15. Find median of the data, using an empirical relation when it is given that Mode = 12.4 and Mean = 10.5.
- Q16. Consider the following frequency distribution of the heights of 60 students of a class

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180
Number of students	15	13	10	8	9	5

What is the upper limit of the median class in the given data?

## SECTION II

**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

- Q17. An barrels manufacturer can produce up to 300 barrels per day. The profit made from the sale of these barrels can be modelled by the function  $P(x) = -10x^2 + 3500x - 66000$  where  $P(x)$  is the profit in rupees and  $x$  is the number of barrels made and sold.



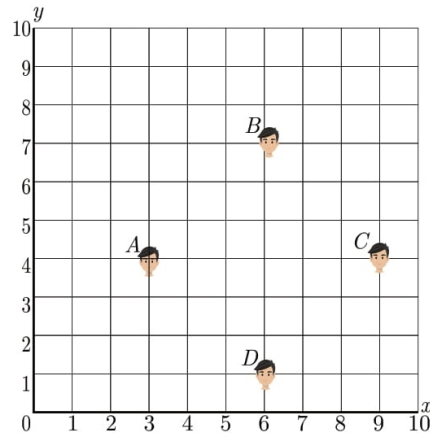
Based on this model answer the following questions:

- (i) When no barrels are produce what is a profit loss?  
 (a) Rs 22000 (b) Rs 66000  
 (c) Rs 11000 (d) Rs 33000
- (ii) What is the break even point ? (Zero profit point is called break even)  
 (a) 10 barrels (b) 30 barrels  
 (c) 20 barrels (d) 100 barrels
- (iii) What is the profit/loss if 175 barrels are produced  
 (a) Profit 266200 (b) Loss 266200  
 (c) Profit 240250 (d) Loss 240250
- (iv) What is the profit/loss if 400 barrels are produced  
 (a) Profit Rs 466200 (b) Loss Rs 266000  
 (c) Profit Rs 342000 (d) Loss Rs 342000
- (v) What is the maximum profit which can manufacturer earn?  
 (a) Rs 240250 (b) Rs 480500  
 (c) Rs 680250 (d) Rs 240250

- Q18. Morning assembly is an integral part of the school's schedule. Almost all the schools conduct morning assemblies which include prayers, information of latest happenings, inspiring thoughts, speech, national anthem, etc. A good school is always particular about their morning assembly schedule. Morning assembly is important for a child's development. It is essential to understand that morning assembly is not just about standing in long queues and singing prayers or national anthem, but it's something beyond just prayers. All the activities carried out in morning assembly by the school staff and students have a great influence in every point of life. The positive effects of attending school assemblies can be felt throughout life.



Have you noticed that in school assembly you always stand in row and column and this make a coordinate system. Suppose a school have 100 students and they all assemble in prayer in 10 rows as given below.

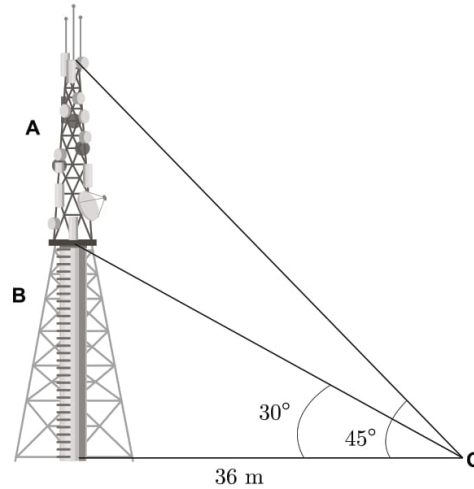


Here  $A, B, C$  and  $D$  are four friend Amar, Bharat, Colin and David.

- (i) What is the distance between  $A$  and  $B$  ?  
 (a) 8 (b) 6  
 (c)  $3\sqrt{3}$  (d)  $2\sqrt{3}$
- (ii) What is the distance between  $C$  and  $D$  ?  
 (a) 8 (b) 6  
 (c)  $3\sqrt{3}$  (d)  $2\sqrt{3}$
- (iii) What is the distance between  $A$  and  $C$  ?  
 (a) 8 (b) 6  
 (c)  $3\sqrt{3}$  (d)  $2\sqrt{3}$
- (iv) What is the distance between  $D$  and  $B$  ?  
 (a) 8 (b) 6  
 (c)  $3\sqrt{3}$  (d)  $2\sqrt{3}$
- (v) These 4 friends seating arrangement make a  
 (a) square (b) rhombus  
 (c) parallelogram (d) rectangle

Q19. 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  $45^\circ$ .



- (i) What is the height of the section  $B$  ?
 

(a) $12\sqrt{3}$ m	(b) $12\sqrt{2}$ m
(c) $8\sqrt{3}$ m	(d) $4\sqrt{2}$ m
- (ii) What is the height of the section  $A$  ?
 

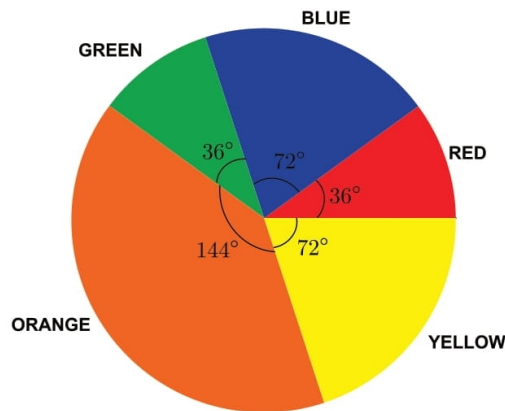
(a) $12(2 - \sqrt{2})$	(b) $24(2 - \sqrt{2})$
(c) $12(3 - \sqrt{3})$	(d) $24(3 - \sqrt{3})$
- (iii) What is the length of the wire structure from the point  $O$  to the top of section  $A$  ?
 

(a) $32\sqrt{2}$ m	(b) $24\sqrt{3}$ m
(c) $28\sqrt{3}$ m	(d) $36\sqrt{2}$ m
- (iv) What is the length of the wire structure from the point  $O$  to the top of section  $B$  ?
 

(a) $12\sqrt{3}$ m	(b) $24\sqrt{3}$ m
(c) $28\sqrt{3}$ m	(d) $16\sqrt{3}$ m
- (v) What is the angle of depression from top of tower to point  $O$  ?
 

(a) $30^\circ$	(b) $45^\circ$
(c) $15^\circ$	(d) $75^\circ$

- Q20. A survey was taken at a high school, and the results were put in a circle graph. The students were asked to list their favourite colours. The measurement of each central angle is shown. If a person is chosen at random from the school, find the probability of each response.

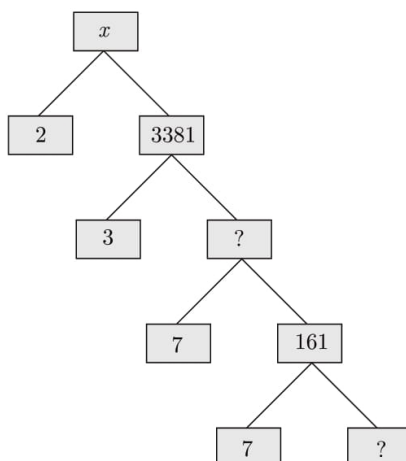


- (i) What is the probability of favourite colour being red ?  
(a) 0.1 (b) 0.2  
(c) 0.3 (d) 0.4
- (ii) What is the probability of favourite colour being blue or green ?  
(a) 0.1 (b) 0.2  
(c) 0.3 (d) 0.4
- (iii) What is the probability of favourite colour not being red or blue?  
(a) 0.35 (b) 0.70  
(c) 0.15 (d) 0.50
- (iv) What is the probability of favourite colour not being orange or green ?  
(a) 0.65 (b) 0.75  
(c) 0.25 (d) 0.50
- (v) What is the probability of favourite colour being red or blue?  
(a) 0.2 (b) 0.3  
(c) 0.1 (d) 0.4

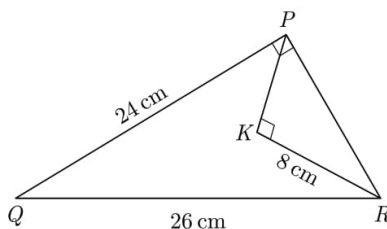
### PART - B

All questions are compulsory. In case of internal choices, attempt anyone.

Q21. Complete the following factor tree and find the composite number  $x$ .



Q22. In the given triangle  $PQR$ ,  $\angle QPR = 90^\circ$ ,  $PQ = 24$  cm and  $QR = 26$  cm and in  $\triangle PKR$ ,  $\angle PKR = 90^\circ$  and  $KR = 8$  cm, find  $PK$ .



Q23. The points  $A(4, 7)$ ,  $B(p, 3)$  and  $C(7, 3)$  are the vertices of a right triangle, right-angled at  $B$ . Find the value of  $p$ .

**OR**

Show that the points  $(a, a)$ ,  $(-a, -a)$  and  $(-\sqrt{3}a, \sqrt{3}a)$  are the vertices of an equilateral triangle.

Q24. Find the value of  $\theta$ , if,  $\frac{\cos \theta}{1 - \sin \theta} + \frac{\cos \theta}{1 + \sin \theta} = 4$ ;  $\theta \leq 90^\circ$

**OR**

Prove that :  $-1 + \frac{\sin A \sin(90^\circ - A)}{\cot(90^\circ - A)} = -\sin^2 A$

Q25. A cylinder and a cone have base radii 5 cm and 3 cm respectively and their respective heights are 4 cm and 8 cm. Find the ratio of their volumes.

Q26. Find the mode of the following frequency distribution.

Class	0- 10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	8	10	10	16	12	6	7

Q27. Find HCF and LCM of 16 and 36 by prime factorization and check your answer.

**OR**

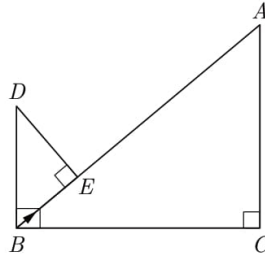
Find the HCF and LCM of 510 and 92 and verify that  $\text{HCF} \times \text{LCM} = \text{Product of two given numbers}$ .



Q28. In an election contested between  $A$  and  $B$ ,  $A$  obtained votes equal to twice the no. of persons on the electoral roll who did not cast their votes and this later number was equal to twice his majority over  $B$ . If there were 1,8000 persons on the electoral roll. How many votes for  $B$ .

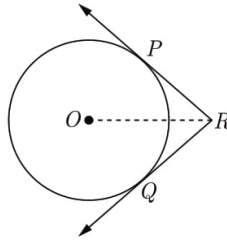
Q29. The 14<sup>th</sup> term of an AP is twice its 8<sup>th</sup> term. If the 6<sup>th</sup> term is  $-8$ , then find the sum of its first 20 terms.

Q30. In the given figure,  $DB \perp BC$ ,  $DE \perp AB$  and  $AC \perp BC$ . Prove that  $\frac{BE}{DE} = \frac{AC}{BC}$ .



Q31. Prove that :  $(\cot \theta - \operatorname{cosec} \theta)^2 = \frac{1 - \cos \theta}{1 + \cos \theta}$

Q32. In figure, two tangents  $RQ$  and  $RP$  are drawn from an external point  $R$  to the circle with centre  $O$ . If  $\angle PRQ = 120^\circ$ , then prove that  $OR = PR + RQ$ .



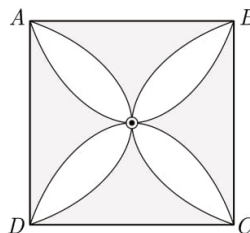
Q33. Draw a circle of radius of 3 cm. Take two points  $P$  and  $Q$  one of its diameter extended on both sides, each at a distance of 7 cm on opposite sides of its centre. Draw tangents to the circle from these two points.

**OR**

Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at an angle of  $60^\circ$  to each other.

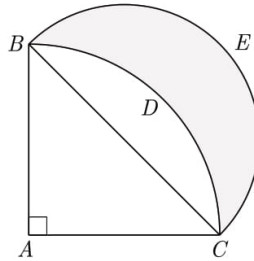
Q34. Write all the values of  $p$  for which the quadratic equation  $x^2 + px + 16 = 0$  has equal roots. Find the roots of the equation so obtained.

Q35. In fig.  $ABCD$  is a square of side 14 cm. Semi-circle are drawn with each side of square as diameter. Find the area of the shaded region. Use  $\pi = \frac{22}{7}$ .



OR

As  $ABDC$  is a quadrant of a circle of radius 28 cm and a semi-circle  $BEC$  is drawn with  $BC$  as diameter. Find the area of the shaded region. Use  $\pi = \frac{22}{7}$ .



Q36. Monthly expenditures on milk in 100 families of a housing society are given in the following frequency distribution :

Monthly expenditure (in Rs.)	0- 175	175-350	350-525	525-700	700-875	875-1050	1050-1125
Number of families	10	14	15	21	28	7	5

Find the mode and median for the distribution.

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 4**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
- 

**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1.  $a$  and  $b$  are two positive integers such that the least prime factor of  $a$  is 3 and the least prime factor of  $b$  is 5. Then calculate the least prime factor of  $(a + b)$ .

**OR**

What is the HCF of the smallest composite number and the smallest prime number?

- Q2. The 2 digit number which becomes  $\frac{5}{6}$ th of itself when its digits are reversed. If the difference in the digits of the number being 1, what is the two digits number?

- Q3. What are the values of  $k$  for which the quadratic equation  $2x^2 - kx + k = 0$  has equal roots?

**OR**

If one root of the quadratic equation  $ax^2 + bx + c = 0$  is the reciprocal of the other, then show that  $a = c$ .

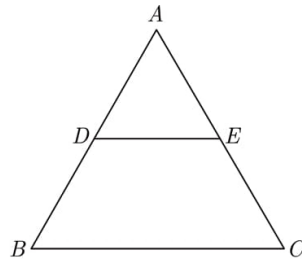
- Q4. Show that  $(a - b)^2$ ,  $(a^2 + b^2)$  and  $(a + b)^2$  are in AP.

**OR**

Find the sum of all 11 terms of an AP whose middle term is 30.

Q5. In  $\triangle ABC$ ,  $AB = 6\sqrt{3}$  cm,  $AC = 12$  cm and  $BC = 6$  cm, then  $\angle B = \dots\dots\dots$  .

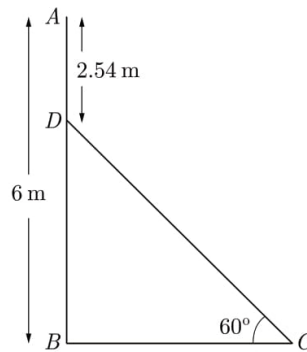
Q6. In given figure  $DE \parallel BC$ . If  $AD = 3c$ ,  $DB = 4c$  cm and  $AE = 6$  cm then find  $EC$ .



Q7. The value of the  $(\tan^2 60^\circ + \sin^2 45^\circ)$  is  $\dots\dots\dots$  .

Q8. Evaluate  $\sin^2 60^\circ - 2 \tan 45^\circ - \cos^2 30^\circ$

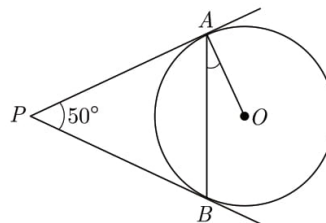
Q9. In the given figure,  $AB$  is a 6 m high pole and  $DC$  is a ladder inclined at an angle of  $60^\circ$  to the horizontal and reaches up to point  $D$  of pole. If  $AD = 2.54$  m, find the length of ladder. ( use  $\sqrt{3} = 1.73$ )



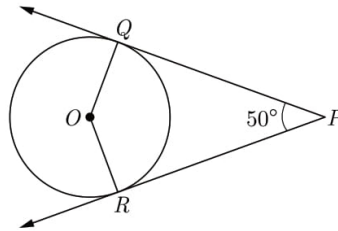
**OR**

A ladder, leaning against a wall, makes an angle of  $60^\circ$  with the horizontal. If the foot of the ladder is 2.5 m away from the wall, find the length of the ladder.

Q10. In figure,  $PA$  and  $PB$  are tangents to the circle with centre  $O$  such that  $\angle APB = 50^\circ$ . Write the measure of  $\angle OAB$ .



- Q11. In the given figure,  $PQ$  and  $PR$  are tangents to the circle with centre  $O$  such that  $\angle QPR = 50^\circ$ , Then find  $\angle OQR$ .



- Q12. If the circumference of a circle increases from  $4\pi$  to  $8\pi$ , then what about its area ?

**OR**

If the radius of the circle is 6 cm and the length of an arc 12 cm. Find the area of the sector.

- Q13. A rectangular sheet paper  $40 \text{ cm} \times 22 \text{ cm}$  is rolled to form a hollow cylinder of height 40 cm. Find the radius of the cylinder.
- Q14. The radius of sphere is  $r$  cm. It is divided into two equal parts. Find the whole surface of two parts.
- Q15. Consider the following distribution :

Marks Obtained	0 or more	10 or more	20 or more	30 or more	40 or more	50 or more
Number of students	63	58	55	51	48	42

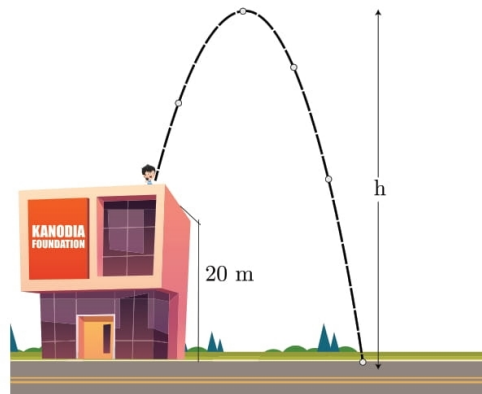
- (i) Calculate the frequency of the class 30 - 40.  
 (ii) Calculate the class mark of the class 10 - 25.

- Q16. For finding the popular size of readymade garments, which central tendency is used?

## SECTION II

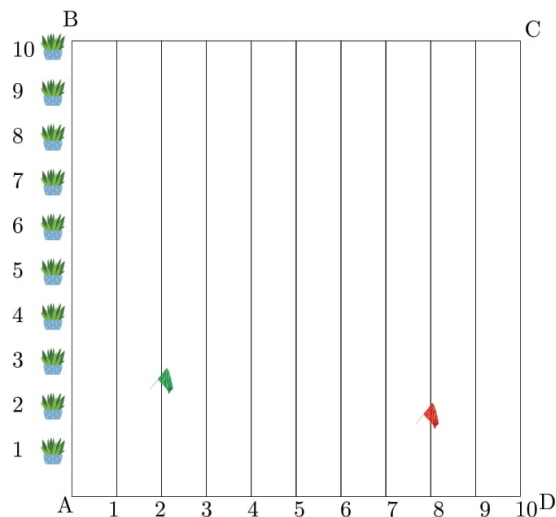
**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

- Q17. Lavanya throws a ball upwards, from a rooftop, which is 20 m above from ground. It will reach a maximum height and then fall back to the ground. The height of the ball from the ground at time  $t$  is  $h$ , which is given by  $h = -4t^2 + 16t + 20$ .



- (i) What is the height reached by the ball after 1 second?  
 (a) 64 m (b) 128 m  
 (c) 32 m (d) 20 m
- (ii) What is the maximum height reached by the ball?  
 (a) 54 m (b) 44 m  
 (c) 36 m (d) 18 m
- (iii) How long will the ball take to hit the ground?  
 (a) 4 seconds (b) 3 seconds  
 (c) 5 seconds (d) 6 seconds
- (iv) What are the two possible times to reach the ball at the same height of 32 m?  
 (a) 1 and 3 seconds (b) 1 and 4 seconds  
 (c) 1 and 2 seconds (d) 1 and 5 seconds
- (v) Where is the ball after 5 seconds ?  
 (a) at the ground (b) rebounds  
 (c) at highest point (d) fall back

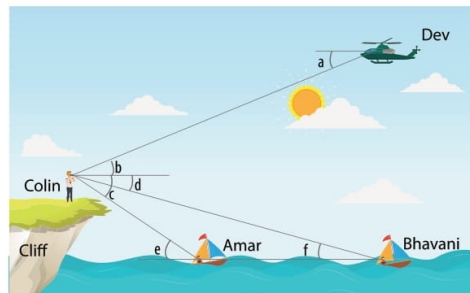
Q18. To conduct sports day activities, in a rectangular shaped school ground  $ABCD$ , lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along  $AB$ , as shown in figure. Nishtha runs  $\frac{1}{4}$ th the distance  $AB$  on the 2nd line and posts a green flag. Suman runs  $\frac{1}{5}$ th the distance  $AB$  on the 8th line and posts a red flag.



- (i) What is the position of green flag ?  
 (a) (2, 25) (b) (25, 4)  
 (c) (25, 2) (d) (4, 25)
- (ii) What is the position of red flag ?  
 (a) (20, 4) (b) (8, 20)  
 (c) (20, 8) (d) (4, 20)
- (iii) What is the distance between both the flags?  
 (a)  $\sqrt{51}$  (b)  $3\sqrt{3}$   
 (c)  $\sqrt{61}$  (d)  $2\sqrt{3}$

- (iv) What is the distance of red flag from point  $A$  ?
- (a)  $4\sqrt{29}$  (b)  $2\sqrt{29}$   
(c)  $8\sqrt{15}$  (d)  $16\sqrt{3}$
- (v) If Rakhi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?
- (a) (20, 4) (b) (22.5, 5)  
(c) (4, 20) (d) (5, 22.5)

Q19. Navy officer Mr. Colin is tasked with planning a coup on the enemy at a certain date. Currently he is inspecting the area standing on top of the cliff. Agent Dev is on a chopper in the sky. When Mr. Colin looks down below the cliff towards the sea, he has Bhawani and Amar in boats positioned to get a good vantage point. Bhawani boat is behind the Amar boat.



Following angle have been measured :

From Colin to Bhawani :  $30^\circ$

From Dev to Colin :  $60^\circ$

From Amar to Colin :  $60^\circ$

- (i) Which of the following is a pair of angle of elevation?
- (a)  $(\angle a, \angle e)$  (b)  $(\angle b, \angle e)$   
(c)  $(\angle c, \angle d)$  (d)  $(\angle a, \angle f)$
- (ii) Which of the following is a pair of angle of depression?
- (a)  $(\angle a, \angle e)$  (b)  $(\angle b, \angle e)$   
(c)  $(\angle c, \angle d)$  (d)  $(\angle a, \angle f)$
- (iii) If angle of elevation of Amar to Colin is  $60^\circ$ , what is the distance of Amar boat from the base of hill ?
- (a)  $\frac{\sqrt{3}h}{2}$  (b)  $\frac{h}{\sqrt{3}}$   
(c)  $\frac{2h}{\sqrt{3}}$  (d)  $\sqrt{3}h$
- (iv) If angle of depression of Colin to Bhawani is  $30^\circ$ , what is the distance of Amar boat from the Bhawani boat?
- (a)  $\frac{\sqrt{3}h}{2}$  (b)  $\frac{h}{\sqrt{3}}$   
(c)  $\frac{2h}{\sqrt{3}}$  (d)  $\sqrt{3}h$
- (v) If angle of depression of Dev to Colin is  $60^\circ$ , what is the height of Dev from base of hill ?
- (a)  $h$  (b)  $2h$   
(c)  $3h$  (d)  $4h$

- Q20. A game at a stall in new year carnival involves spinning a wheel first as a first step to complete the game with certain rules. If the wheel stops at a particular number, then the player is allowed to roll a 6 faced unbiased dice.

**Rules of Game:**

1. If the wheel stops at a particular number, then the player is allowed to roll a unbiased dice.
2. If the wheel stops at any other number, player get to try again and only one extra try allowed. If player reach the next stage and roll a dice, he may get a prize depending on the number on dice.



- (i) What is the probability of getting an even number on the wheel?
- (a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$   
(c)  $\frac{1}{8}$  (d)  $\frac{1}{16}$
- (ii) If getting an odd number on the wheel allows a player to roll the die, then what is the probability of his rolling the die ?
- (a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$   
(c)  $\frac{1}{8}$  (d)  $\frac{1}{16}$
- (iii) If the player is allowed to roll the dice and getting a number greater than 4 entitles him to get prize, what is the probability of his winning the prize?
- (a)  $\frac{3}{4}$  (b)  $\frac{1}{6}$   
(c)  $\frac{1}{3}$  (d)  $\frac{2}{3}$
- (iv) If getting a square number on the wheel allows a player to roll the dice, then what is the probability of his rolling the dice ?
- (a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$   
(c)  $\frac{1}{3}$  (d)  $\frac{2}{3}$
- (v) If the player is allowed to roll the die and getting a prime number on die entitles him to get prize, then what is the probability of his winning the prize?
- (a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$   
(c)  $\frac{1}{3}$  (d)  $\frac{1}{6}$

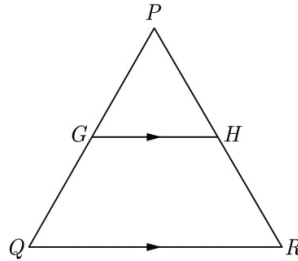
**PART - B**

**All questions are compulsory. In case of internal choices, attempt anyone.**

- Q21. Explain whether  $3 \times 12 \times 101 + 4$  is a prime number or a composite number.



- Q22. In the given figure,  $G$  is the mid-point of the side  $PQ$  of  $\triangle PQR$  and  $GH \parallel QR$ . Prove that  $H$  is the mid-point of the side  $PR$  or the triangle  $PQR$ .



- Q23. If  $A(4,3)$ ,  $B(-1,y)$ , and  $C(3,4)$  are the vertices of a right triangle  $ABC$ , right angled at  $A$ , then find the value of  $y$ .
- Q24. If  $\sin \theta - \cos \theta = \frac{1}{2}$ , then find the value of  $\sin \theta + \cos \theta$ .
- Q25. A sphere of maximum volume is cut out from a solid hemisphere of radius 6 cm. Find the volume of the cut out sphere.

**OR**

If the total surface area of a solid hemisphere is  $462 \text{ cm}^2$ , find its volume. Use  $\pi = \frac{22}{7}$

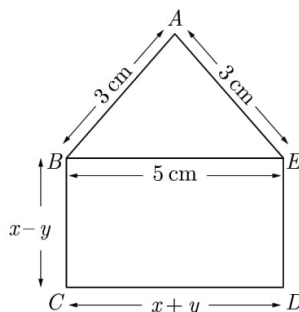
- Q26. The data regarding marks obtained by 48 students of a class in a class test is given below. Calculate the modal marks of students.

Marks obtained	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Number of students	1	0	2	0	0	10	25	7	2	1

**OR**

Find the value of  $\lambda$ , if the mode of the following data is 20 :  
15, 20, 25, 18, 13, 15, 25, 15, 18, 17, 20, 25, 20,  $\lambda$ , 18.

- Q27. The HCF of 65 and 117 is expressible in the form  $65m-117$ . Find the value of  $m$ . Also find the LCM of 65 and 117 using prime factorization method.
- Q28. In the figure below  $ABCDE$  is a pentagon with  $BE \parallel CD$  and  $BC \parallel DE$ .  $BC$  is perpendicular to  $DC$ . If the perimeter of  $ABCDE$  is 21 cm, find the values of  $x$  and  $y$ .



OR

Solve for  $x$  and  $y$  :

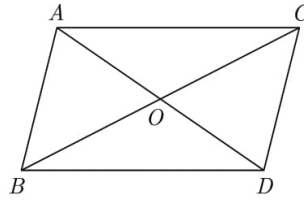
$$\frac{x+1}{2} + \frac{y-1}{3} = 9 ; \quad \frac{x-1}{3} + \frac{y+1}{2} = 8.$$

- Q29. If the sum of the first  $n$  terms of an AP is  $\frac{1}{2}[3n^2 + 7n]$ , then find its  $n^{\text{th}}$  term. Hence write its  $20^{\text{th}}$  term.

OR

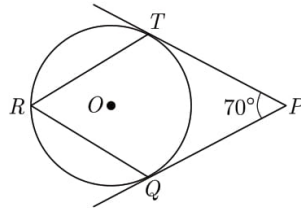
In an AP, if the  $12^{\text{th}}$  term is  $-13$  and the sum of its first four terms is  $24$ , find the sum of its first ten terms.

- Q30. In the given figure,  $\triangle ABC$  and  $\triangle DCB$  are on the same base  $BC$ .  $AD$  and  $BC$  intersect at  $O$ . Prove that  $\frac{\text{ar}(\triangle ABC)}{\text{ar}(\triangle DCB)} = \frac{AO}{DO}$ .



- Q31. Prove that :  $\frac{\text{cosec}^2\theta}{\text{cosec}\theta - 1} - \frac{\text{cosec}^2\theta}{\text{cosec}\theta + 1} = 2\sec^2\theta$

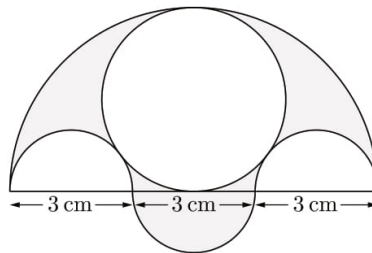
- Q32. In figure,  $O$  is the centre of a circle.  $PT$  are tangents to the circle from an external point  $P$ . If  $\angle TPQ = 70^\circ$ , find  $\angle TRQ$ .



- Q33. Draw a circle of radius  $3$  cm. From a point  $P$ ,  $7$  cm away from centre draw two tangents to the circle. Measure the length of each tangent.

- Q34. Find the values of  $k$  for which the equation  $(3k+1)^2 + 2(k+1)x + 1$  has equal roots. Also find the roots.

- Q35. 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.



Q36. If the mean of the following frequency distribution is 91, and sum of frequency is 150, find the missing frequency  $x$  and  $y$  :

Class	0- 30	30- 60	60- 90	90-120	120-150	150-180
Frequency	12	21	$x$	52	$y$	11

**OR**

Find the median of the following data :

<b>Profit (in lakh of rupee)</b>	<b>Number of shops</b>
More than of equal to 5	30
More than of equal to 10	28
More than of equal to 15	16
More than of equal to 20	14
More than of equal to 25	10
More than of equal to 30	7
More than of equal to 35	3

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 5**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
- 

**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1. Calculate the HCF of  $3^3 \times 5$  and  $3^2 \times 5^2$ .
- Q2. If the square of difference of the zeroes of the quadratic polynomial  $x^2 + px + 45$  is equal to 144, then what is the value of  $p$  ?
- Q3. If  $\alpha$  and  $\beta$  are the roots of  $ax^2 - bx + c = 0$  ( $a \neq 0$ ), then calculate  $\alpha + \beta$ .
- Q4. Value of the roots of the quadratic equation,  $x^2 - x - 6 = 0$  are .....

**OR**

If quadratic equation  $3x^2 - 4x + k = 0$  has equal roots, then the value of  $k$  is .....

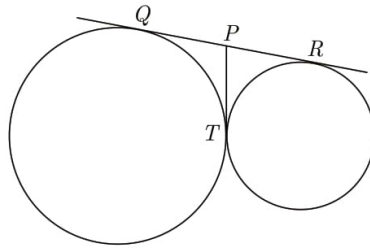
- Q5. Which of the term of AP 5, 2, -1,..... is -49?

**OR**

Find the first four terms of an AP Whose first term is -2 and common difference is -2.

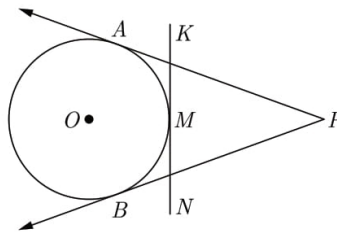
- Q6. If triangle  $ABC$  is similar to triangle  $DEF$  such that  $2AB = DE$  and  $BC = 8$  cm then find  $EF$ .
- Q7. The co-ordinate of the point dividing the line segment joining the points  $A(1, 3)$  and  $B(4, 6)$  in the ratio 2 : 1 is .....

- Q8. Find the coordinates of a point  $A$ , where  $AB$  is diameter of a circle whose centre is  $(2, -3)$  and  $B$  is the point  $(1, 4)$ .
- Q9. If  $\sin\theta + \sin^2\theta = 1$  then prove that  $\cos^2\theta + \cos^4\theta = 1$ .
- Q10. If  $\tan(3x + 30^\circ) = 1$  then find the value of  $x$ .
- Q11. If  $k + 1 = \sec^2\theta(1 + \sin\theta)(1 - \sin\theta)$ , then find the value of  $k$ .
- Q12. In the figure,  $QR$  is a common tangent to given circle which meet at  $T$ . Tangent at  $T$  meets  $QR$  at  $P$ . If  $QP = 3.8$  cm, then find length of  $QR$ .



**OR**

$PA$  and  $PB$  are tangents from point  $P$  to the circle with centre  $O$  as shown in figure. At point  $M$ , a tangent is drawn cutting  $PA$  at  $K$  and  $PB$  at  $N$ . Prove that  $KN = AK + BN$



- Q13. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find area of minor segment. ( $\pi = 3.14$ )

**OR**

If the perimeter of a semi-circular protractor is 36 cm, find its diameter. (Use  $\pi = \frac{22}{7}$ ).

- Q14. What is the volume of a right circular cylinder of base radius 7 cm and height 10 cm? Use  $\pi = \frac{22}{7}$
- Q15. Which central tendency is obtained by the abscissa of point of intersection of less than type and more than type ogives?
- Q16. If a number  $x$  is chosen a random from the number  $-3, -2, -1, 0, 1, 2, 3$ . What is probability that  $x^2 \leq 4$ ?

**OR**

Out of 200 bulbs in a box, 12 bulbs are defective. One bulb is taken out at random from the box. What is the probability that the drawn bulb is not defective?

## SECTION II

Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.

- Q17. Shalvi is a tuition teacher and teaches mathematics to some kids at her home. She is very innovative and always plan new games to make her students learn concepts. Today, she has planned a prime number game. She announce the number 2 in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In this way by multiplying to a prime number the last student got 173250. He told this number to Shalvi in class. Now she asked some questions to the students as given below.



- (i) How many students are in the class?  
(a) 3 (b) 9  
(c) 4 (d) 7
- (ii) What is the highest prime number used by student?  
(a) 11 (b) 7  
(c) 5 (d) 3
- (iii) What is the least prime number used by students ?  
(a) 2 (b) 7  
(c) 5 (d) 3
- (iv) Which prime number has been used maximum times ?  
(a) 2 (b) 7  
(c) 5 (d) 3
- (v) Which prime number has been used minimum times ?  
(a) 2 (b) 7  
(c) 5 (d) 3

- Q18. Due to ongoing Corona virus outbreak, Wellness Medical store has started selling masks of decent quality. The store is selling two types of masks currently type *A* and type *B*.

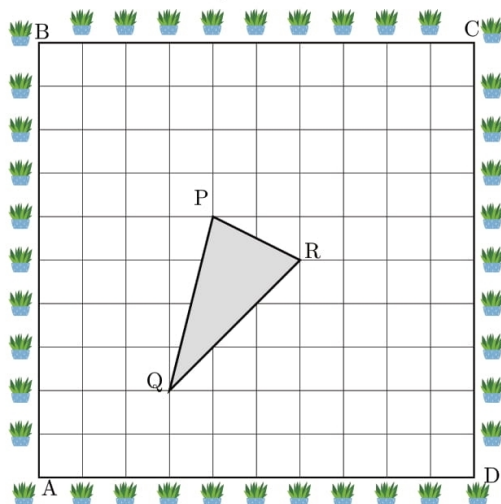


The cost of type *A* mask is Rs. 15 and of type *B* mask is Rs. 20. In the month of April, 2020, the store sold 100 masks for total sales of Rs. 1650.



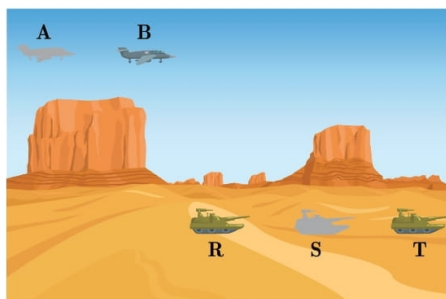
- (i) How many masks of each type were sold in the month of April?
- 40 masks of type *A*, and 60 masks of type *B*
  - 60 masks of type *A*, and 40 masks of type *B*
  - 70 masks of type *A*, and 30 masks of type *B*
  - 30 masks of type *A*, and 70 masks of type *B*
- (ii) If the store had sold 50 masks of each type, what would be its sales in the month of April?
- Rs 550
  - Rs 560
  - Rs 1050
  - Rs 1750
- (iii) Due to great demand and short supply, the store has increased the price of each type by Rs. 5 from May 1, 2020. In the month of May, 2020, the store sold 310 masks for total sales of Rs. 6875. How many masks of each type were sold in the month of May?
- 175 masks of type *A*, and 135 masks of type *B*
  - 200 masks of type *A*, and 110 masks of type *B*
  - 110 masks of type *A*, and 200 masks of type *B*
  - 135 masks of type *A*, and 175 masks of type *B*
- (iv) What percent of masks of each type sale was increased in the month of May, compared with the sale of month April?
- 110 % in type *A* and 180 % in type *B*
  - 180 % in type *A* and 110 % in type *B*
  - 350 % in type *A* and 150 % in type *B*
  - 150 % in type *A* and 350 % in type *B*
- (v) What extra profit did store earn by increasing price in May month.
- Rs 1550
  - Rs 3100
  - Rs 1650
  - Rs 1825

- Q19. A garden is in the shape of rectangle. Gardener grew sapling of Ashoka tree on the boundary of garden at the distance of 1 meter from each other. He want to decorate the garden with rose plants. He choose triangular region inside the park to grow rose plants. On the above situation, gardener took help from the students of class 10th. They made a chart for it which looks as the above figure.



- (i) If  $A$  is taken as origin, What are the coordinates of triangle  $PQR$
- (a)  $P(4, 6), Q(3, 2), R(6, 5)$                       (b)  $P(6, 4), Q(2, 3), R(5, 6)$   
(c)  $P(5, 7), Q(3, 3), R(5, 5)$                       (d)  $P(6, 6), Q(2, 3), R(6, 6)$
- (ii) If  $C$  is taken as origin, what is the co-ordinate of point  $P$
- (a)  $(-12, 2)$     (b)  $(12, 2)$   
(c)  $(12, -2)$     (d)  $(-12, -2)$
- (iii) If  $B$  is taken as origin, what are the co-ordinate of  $P$
- (a)  $(4, 3)$     (b)  $(-4, 3)$   
(c)  $(4, -3)$     (d)  $(-4, -3)$
- (iv) What is distance between  $P$  and  $Q$  if origin is taken  $A$ ?
- (a)  $\sqrt{71}$     (b)  $\sqrt{17}$   
(c)  $\sqrt{65}$     (d)  $\sqrt{50}$
- (v) What is distance between  $P$  and  $Q$  if origin is taken  $B$ ?
- (a)  $\sqrt{50}$     (b)  $\sqrt{71}$   
(c)  $\sqrt{17}$     (d)  $\sqrt{61}$

- Q20. An air-to-surface missile (ASM) or air-to-ground missile (AGM or ATGM) is a missile designed to be launched from military aircraft and strike ground targets on land, at sea, or both. They are similar to guided glide bombs but to be deemed a missile,





A military fighter plane is flying at an altitude of 600 metres with the speed of 200 km/h. The pilot spots enemy tanks at point  $R$  on ground. After getting the permission from command centre to hit the target at  $R$ , pilot fires a missile. Fighter plane was at point  $A$  at the time of fire of missile. Missile moves to target at enemy tanks stationed at  $R$  at an angle of  $45^\circ$  at a speed of 300 km/h.

- (i) What is the horizontal distance between fighter plane at  $A$  and tank at  $R$  ?  
 (a) 300 metre (b)  $300\sqrt{3}$  metre  
 (c) 600 metre (d)  $600\sqrt{3}$  metre
- (ii) How much time will missile take to hit the target  $R$  ?  
 (a)  $\frac{36\sqrt{2}}{5}$  sec (b)  $\frac{5\sqrt{2}}{36}$  sec  
 (c)  $\frac{36\sqrt{3}}{5}$  sec (d)  $\frac{34\sqrt{3}}{5}$  sec
- (iii) Another enemy tank at point  $S$  on ground moving with a speed of 90 km/h in straight line away from plane. Pilot fires another missile at an angle of  $60^\circ$  from its flight path position  $B$  at the instant when enemy's tank was at  $S$  and it hits this enemy tank at point  $T$ . How much time is taken by second missile to hit the enemy tank at point  $T$  ?  
 (a)  $\frac{24\sqrt{3}}{5}$  sec (b)  $\frac{5\sqrt{2}}{24}$  sec  
 (c)  $\frac{24\sqrt{2}}{5}$  sec (d)  $\frac{5\sqrt{3}}{24}$  sec
- (iv) What is the horizontal distance between fighter plane at  $B$  and tank at  $T$  ?  
 (a) 200 metre (b)  $100\sqrt{3}$  metre  
 (c) 100 metre (d)  $200\sqrt{3}$  metre
- (v) What is the distance of point  $T$  from  $S$  ?  
 (a)  $80\sqrt{3}$  metre (b)  $120\sqrt{3}$  metre  
 (c)  $160\sqrt{3}$  100 metre (d)  $240\sqrt{3}$  metre

### PART - B

All questions are compulsory. In case of internal choices, attempt anyone.

Q21. Find the zeroes of the quadratic polynomial  $\sqrt{3}x^2 - 8x + 4\sqrt{3}$ .

OR

Find a quadratic polynomial, the sum and product of whose zeroes are 6 and 9 respectively. Hence find the zeroes.

Q22. For what value of  $k$ , the system of equations  $kx + 3y = 1$ ,  $12x + ky = 2$  has no solution.

OR

Solve the following pair of linear equations by cross multiplication method:

$$x + 2y = 2$$

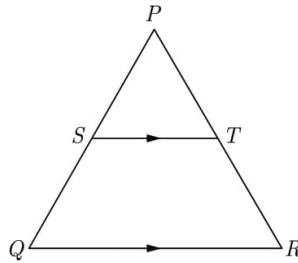
$$x - 3y = 7$$

Q23. Find the roots of the following quadratic equation :

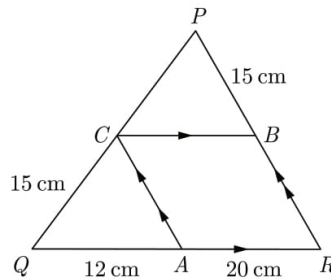
$$15x^2 - 10\sqrt{6}x + 10 = 0$$

OR

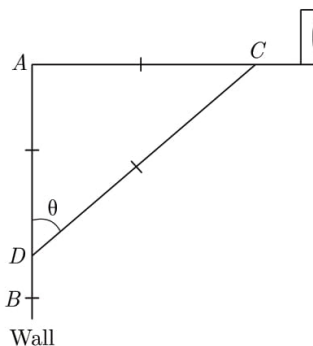
- Q24. In the given figure, in a triangle  $PQR$ ,  $ST \parallel QR$  and  $\frac{PS}{SQ} = \frac{3}{5}$  and  $PR = 28$  cm, find  $PT$ .



- Q25. If  $\theta$  be an acute angle and  $5 \operatorname{cosec} \theta = 7$ , then evaluate  $\sin \theta + \cos^2 \theta - 1$ .
- Q26. The mean and median of 100 observation are 50 and 52 respectively. The value of the largest observation is 100. It was later found that it is 110. Find the true mean and median.
- Q27. Solve the following equation:  $\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2$
- Q28. The sum of four consecutive number in AP is 32 and the ratio of the product of the first and last term to the product of two middle terms is 7 : 15. Find the numbers.
- Q29. In the given figure,  $CB \parallel QR$  and  $CA \parallel PR$ . If  $AQ = 12$  cm,  $AR = 20$  cm,  $PB = CQ = 15$  cm, calculate  $PC$  and  $BR$ .



- Q30. The rod of TV disc antenna is fixed at right angles to wall  $AB$  and a rod  $CD$  is supporting the disc as shown in Figure. If  $AC = 1.5$  m long and  $CD = 3$  m, find (i)  $\tan \theta$  (ii)  $\sec \theta + \operatorname{cosec} \theta$ .



OR

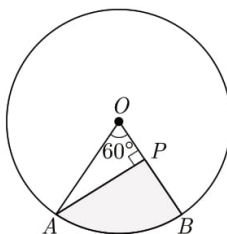
Prove that :  $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \frac{1 + \cot \theta}{\sin \theta}$

Q31. Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at an angle of  $60^\circ$  to each other.

**OR**

Draw a circle of radius 3 cm. From a point  $P$ , 7 cm away from centre draw two tangents to the circle. Measure the length of each tangent.

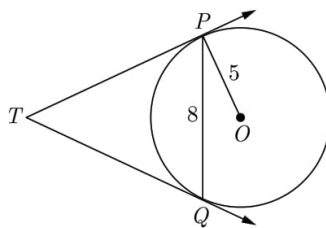
Q32. In the given figure,  $AOB$  is a sector of angle  $60^\circ$  of a circle with centre  $O$  and radius 17 cm. If  $AP \perp OB$  and  $AP = 15$  cm, find the area of the shaded region.



Q33. If the median of the following data is 240, then find the value of  $f$  :

Classes	0- 100	100-200	200-300	300-400	400-500	500-600	600-700
Frequency	15	17	$f$	12	9	5	2

Q34. In Figure,  $PQ$  is a chord of length 8 cm of a circle of radius 5 cm and centre  $O$ . The tangents at  $P$  and  $Q$  intersect at point  $T$ . Find the length of  $TP$ .



**OR**

If the angle between two tangents drawn from an external point  $P$  to a circle of radius  $a$  and centre  $O$ , is  $60^\circ$ , then find the length of  $OP$ .

Q35. Hence, radius of the ice-cream cone is 3 cm A well of diameter 4 m is dug 14 m deep. The earth taken out is spread evenly all around the well to form a 40 m high embankment. Find the width of the embankment.

Q36. A box contains 125 shirts of which 110 are good 12 have minor defects and 3 have major defects. Ram Lal will buy only those shirts which are good while Naveen will reject only those which have major defects. A shirt is taken out at random from the box. Find the probability that :

- (i) Ram Lal will buy it
- (ii) Naveen will buy it

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 6**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
- 

**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1. If HCF  $(a, b) = 12$  and  $a \times b = 1,800$ , then find LCM  $(a, b)$ .
- Q2. If one of the zeroes of the quadratic polynomial  $(k - 1)x^2 + kx + 1$  is  $-3$ , then what is the value of  $k$  ?
- Q3. Calculate the zeroes of the polynomial  $p(x) = 4x^2 - 12x + 9$ .
- Q4. Find the positive root of  $\sqrt{3x^2 + 6} = 9$ .

**OR**

If  $x = -\frac{1}{2}$ , is a solution of the quadratic equation  $3x^2 + 2kx - 3 = 0$ , find the value of  $k$ .

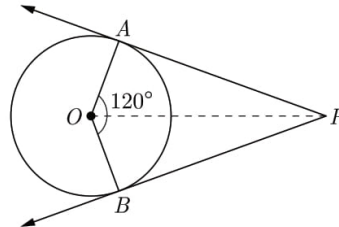
- Q5. Find the tenth term of the sequence  $\sqrt{2}, \sqrt{8}, \sqrt{18}, \dots$

**OR**

Find the next term of the series  $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$

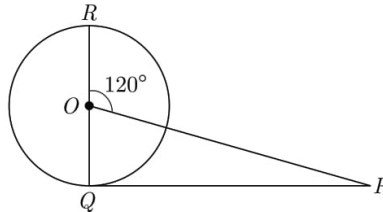
- Q6. Are two triangles with equal corresponding sides always similar?
- Q7. Find the distance of a point  $P(x, y)$  from the origin.
- Q8. Find the value of  $a$ , for which point  $P(\frac{a}{3}, 2)$  is the midpoint of the line segment joining the Points  $Q(-5, 4)$  and  $R(-1, 0)$ .

- Q9. In a triangle  $ABC$ , write  $\cos\left(\frac{B+C}{2}\right)$  in terms of angle  $A$ .
- Q10. What happens to value of  $\cos\theta$  when  $\theta$  increases from  $0^\circ$  to  $90^\circ$ .
- Q11. Find the value of  $\sin^2 41^\circ + \sin^2 49^\circ$
- Q12. In the figure,  $PA$  and  $PB$  are tangents to a circle with centre  $O$ . If  $\angle AOB = 120^\circ$ , then find  $\angle OPA$ .



**OR**

$PQ$  is a tangent drawn from an external point  $P$  to a circle with centre  $O$ ,  $QOR$  is the diameter of the circle. If  $\angle POR = 120^\circ$ , What is the measure of  $\angle OPQ$  ?



- Q13. The radius of a circle is 17.5 cm. find the area of the sector of the circle enclosed by two radii and an arc 44 cm in length.

**OR**

Find the area of the sector of a circle of radius 6 cm whose central angle is  $30^\circ$ . (Take  $\pi = 3.14$ )

- Q14. If the radius of the base of a right circular cylinder is halved, keeping the height same, find the ratio of the volume of the reduced cylinder to that of original cylinder.
- Q15. What is abscissa of the point of intersection of the “Less than type” and of the “More than type” cumulative frequency curve of a grouped data ?
- Q16. A card is drawn at random from a well shuffled pack of 52 cards. Find the probability of getting neither a red card nor a queen.

**OR**

A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.

## SECTION II

**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

- Q17. Amar, Akbar and Anthony are playing a game. Amar climbs 5 stairs and gets down 2 stairs in one turn. Akbar goes up by 7 stairs and comes down by 2 stairs every time. Anthony goes 10 stairs up and 3 stairs down each time.



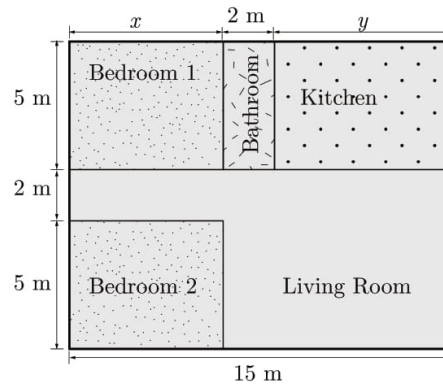
Doing this they have to reach to the nearest point of 100th stairs and they will stop once they find it impossible to go forward. They can not cross 100th stair in anyway.

- (i) Who reaches the nearest point?  
 (a) Amar (b) Akbar  
 (c) Anthony (d) All together reach to the nearest point.
- (ii) How many times can they meet in between on same stair ?  
 (a) 3  
 (b) 4  
 (c) 5  
 (d) No, they cannot meet in between on same stair.
- (iii) Who takes least number of steps to reach near hundred?  
 (a) Amar (b) Akbar  
 (c) Anthony (d) All of them take equal number of steps.
- (iv) What is the first stair where any two out of three will meet together?  
 (a) Amar and Akbar will meet for the first time on 15th stair.  
 (b) Akbar and Anthony will meet for the first time on 35th stair.  
 (c) Amar and Anthony will meet for the first time on 21th stair.  
 (d) Amar and Akbar will meet for the first time on 21th stair.
- (v) What is the second stair where any two out of three will meet together?  
 (a) Amar and Akbar will meet on 21th stair.  
 (b) Akbar and Anthony will meet on 35th stair.  
 (c) Amar and Anthony will meet on 21th stair.  
 (d) Amar and Anthony will meet on 35th stair.

Q18. An architect is a skilled professional who plans and designs buildings and generally plays a key role in their construction. Architects are highly trained in the art and science of building design. Since they bear responsibility for the safety of their buildings' occupants, architects must be professionally licensed.



Varsha is a licensed architect and design very innovative house. She has made a house layout for her client which is given below. In the layout, the design and measurements has been made such that area of two bedrooms and kitchen together is 95 sq. m.



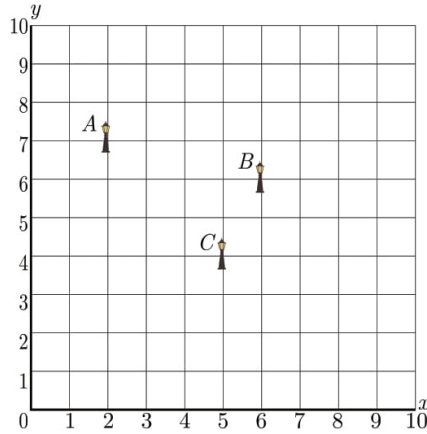
- (i) Which pair of linear equations does describe this situation ?
- (a)  $2x + y = 19$  and  $x + y = 13$   
 (b)  $x + 2y = 19$  and  $2x + y = 13$   
 (c)  $2x + y = 38$  and  $x + y = 13$   
 (d)  $2x + y = 38$  and  $2x + y = 13$
- (ii) What is the length of the outer boundary of the layout.
- (a) 24 m (b) 48 m  
 (c) 27 m (d) 54 m
- (iii) What is the area of bedroom 1 ?
- (a)  $24 \text{ m}^2$  (b)  $30 \text{ m}^2$   
 (c)  $28 \text{ m}^2$  (d)  $24 \text{ m}^2$
- (iv) What is the area of living room in the layout ?
- (a)  $54 \text{ m}^2$  (b)  $48 \text{ m}^2$   
 (c)  $75 \text{ m}^2$  (d)  $24 \text{ m}^2$
- (v) What is the cost of laying tiles in Kitchen at the rate of Rs. 50 per sq. m ?
- (a) Rs. 1500 (b) Rs. 2000  
 (c) Rs. 1750 (d) Rs. 3000

Q19. Resident Welfare Association (RWA) of a Gulmohar Society in Delhi have installed three electric poles  $A$ ,  $B$  and  $C$  in a society's common park. Despite these three poles, some parts of the park are still in dark.

So, RWA decides to have one more electric pole  $D$  in the park.



The park can be modelled as a coordinate systems given below.



On the basis of the above information, answer any four of the following questions:

- (i) What is the position of the pole  $C$ ?
- (a)  $(4, 5)$  (b)  $(5, 4)$   
(c)  $(6, 5)$  (d)  $(5, 6)$
- (ii) What is the distance of the pole  $B$  from the corner  $O$  of the park ?
- (a)  $6\sqrt{2}$  units (b)  $3\sqrt{2}$  units  
(c)  $6\sqrt{3}$  units (d)  $3\sqrt{3}$  units
- (iii) Find the position of the fourth pole  $D$  so that four points  $A, B, C$  and  $D$  form a parallelogram
- (a)  $(5, 2)$  (b)  $(1, 5)$   
(c)  $(1, 4)$  (d)  $(2, 5)$
- (iv) What is the distance between poles  $A$  and  $C$  ?
- (a)  $6\sqrt{2}$  units (b)  $3\sqrt{2}$  units  
(c)  $6\sqrt{3}$  units (d)  $3\sqrt{3}$  units
- (v) What is the distance between poles  $B$  and  $D$ ?
- (a)  $2\sqrt{3}$  units (b)  $\sqrt{28}$  units  
(c)  $6\sqrt{3}$  units (d)  $\sqrt{26}$  units

Q20. When an eagle looks at a rat on the ground, eagle does not attack the rat at its initial position. It takes into account the speed of the rat and the direction in which rat is moving. After analysing the situation (how? it may be God's gift) eagle attacks the rat in such a way that it may successful in catching the rat.



Suppose an eagle sitting on the tree of height 90 m, observe a rat with angle of depression  $45^\circ$ , and moving away from the tree with some speed. Eagle start flying with  $30^\circ$  downward and catch rat in 10 second.



- (i) What is the horizontal distance between tree and initial position of rat ?  
 (a) 60 m (b) 45 m  
 (c) 90 m (d) 120 m
- (ii) What is the distance travelled by rat in 10 seconds?  
 (a)  $60(\sqrt{3} - 1)$  m (b)  $60(\sqrt{2} - 1)$  m  
 (c)  $90(\sqrt{3} - 1)$  m (d)  $90(\sqrt{2} - 1)$  m
- (iii) What is the distance travelled by eagle to catch rat?  
 (a) 90 m (b) 180 m  
 (c) 270 m (d) 240 m
- (iv) What is the speed of rat ?  
 (a) 18 m/s (b)  $9(\sqrt{3} + 1)$  m/s  
 (c) 64.8 m/s (d)  $9(\sqrt{3} - 1)$  m/s
- (v) What is the speed of eagle ?  
 (a) 18 km/h (b)  $9(\sqrt{3} + 1)$  km/h  
 (c)  $9(\sqrt{3} + 1)$  km/h (d) 64.8 km/h

### PART - B

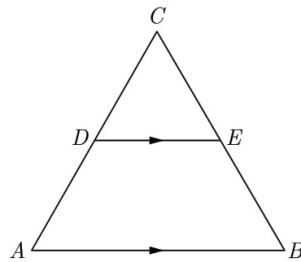
All questions are compulsory. In case of internal choices, attempt anyone.

- Q21. Find the quadratic polynomial whose sum and product of the zeroes are  $\frac{21}{8}$  and  $\frac{5}{16}$  respectively.
- Q22. Solve the following pair of linear equations by substitution method:  
 $3x + 2y - 7 = 0$   
 $4x + y - 6 = 0$
- Q23. Solve the following quadratic equation for  $x$  :  
 $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$

OR

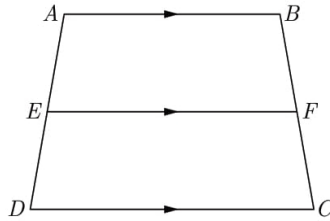
Solve for  $x$  :  $x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$

- Q24. In the given figure,  $\angle A = \angle B$  and  $AD = BE$ . Show that  $DE \parallel AB$ .



OR

In the given figure, if  $ABCD$  is a trapezium in which  $AB \parallel CD \parallel EF$ , then prove that  $\frac{AE}{ED} = \frac{BF}{FC}$



Q25. If  $\sin A = \frac{\sqrt{3}}{2}$ , find the value of  $2 \cot^2 A - 1$ .

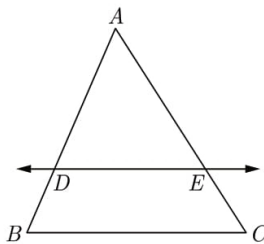
Q26. Given below is the distribution of weekly pocket money received by students of a class. Calculate the pocket money that is received by most of the students.

Pocket Money (in Rs.)	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Number of students.	2	2	3	12	18	5	2

Q27. Find the values of  $k$  for which the quadratic equation  $x^2 + 2\sqrt{2k}x + 18 = 0$  has equal roots.

Q28. The sum of the first 7 terms of an AP is 63 and that of its next 7 terms is 161. Find the AP.

Q29. In Figure, in  $\triangle ABC$ ,  $DE \parallel BC$  such that  $AD = 2.4$  cm,  $AB = 3.2$  cm and  $AC = 8$  cm, then what is the length of  $AE$ ?



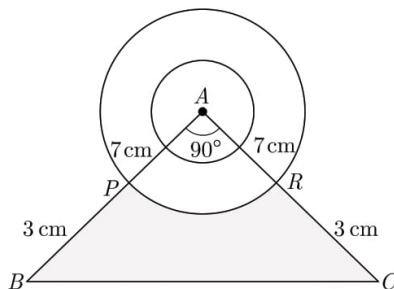
Q30. If  $\sin \theta + \cos \theta = \sqrt{2}$  prove that  $\tan \theta + \cot \theta = 2$

Q31. Draw two concentric circle of radii 3 cm and 5 cm. Taking a point on the outer circle, construct the pair of tangents to the inner circle.

Q32. Find the area of minor segment of a circle of radius 14 cm, when its centre angle is  $60^\circ$ . Also find the area of corresponding major segment. Use  $\pi = \frac{22}{7}$ .

**OR**

A momento is made as shown in the figure. Its base  $PBCR$  is silver plate from the front side. Find the area which is silver plated. Use  $\pi = \frac{22}{7}$ .



- Q33. The following table shows the weights (in gms) of a sample of 100 apples, taken from a large consignment :

Weight (in gms)	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130
No. of Apples	8	10	12	16	18	14	12	10

Find the median weight of apples.

**OR**

Weekly income of 600 families is given below :

Income (in Rs.)	0- 1000	1000-2000	2000-3000	3000-4000	4000-5000	5000-6000
No. of Families	250	190	100	40	15	5

Find the median.

- Q34.  $a, b$  and  $c$  are the sides of a right triangle, where  $c$  is the hypotenuse. A circle, of radius  $r$ , touches the sides of the triangle. Prove that  $r = \frac{a+b-c}{2}$ .
- Q35. Water is flowing at the rate of 5 km/hour through a pipe of diameter 14 cm into a rectangular tank of dimensions 50 m  $\times$  44 m. Find the time in which the level of water in the tank will rise by 7 cm.

**OR**

A right triangle whose sides are 15 cm is made to revolve about its hypotenuse. Find the volume and the surface area of the double cone so formed. (Use  $\pi = 3.14$ )

- Q36. The king, queen and jack of clubs are removed from a deck of 52 cards. The remaining cards are mixed together and then a card is drawn at random from it. Find the probability of getting
- a face card,
  - a card of heart,
  - a card of clubs
  - a queen of diamond

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 7**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

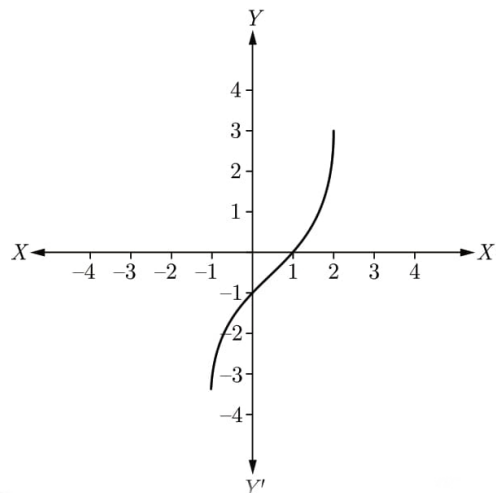
1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
- 

**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1. What is the condition for the decimal expansion of a rational number to terminate? Explain with the help of an example.
- Q2. Find a quadratic polynomial, whose zeroes are  $-3$  and  $4$  ?
- Q3. In given figure, the graph of a polynomial  $p(x)$  is shown. Calculate the number of zeroes of  $p(x)$ .



Q4. Find the roots of the quadratic equation  $\sqrt{3}x^2 - 2x - \sqrt{3} = 0$

**OR**

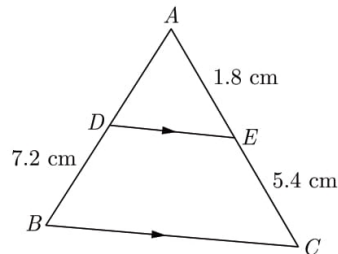
Find the value of  $k$ , for which one root of the quadratic equation  $kx^2 - 14x + 8 = 0$  is six times the other.

Q5. Is series  $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12}, \dots$  an AP? Give reason.

**OR**

What is the next term of an AP  $\sqrt{7}, \sqrt{28}, \sqrt{63}, \dots$ ?

Q6. In Figure,  $DE \parallel BC$ . Find the length of side  $AD$ , given that  $AE = 1.8$  cm,  $BD = 7.2$  cm and  $CE = 5.4$  cm.



Q7. If the mid-point of the line segment joining the points  $A(3, 4)$  and  $B(k, 6)$  is  $P(x, y)$  and  $x + y - 10 = 0$ , find the value of  $k$ .

Q8. The ordinate of a point  $A$  on  $y$ -axis is 5 and  $B$  has co-ordinates  $(-3, 1)$ . Find the length of  $AB$ .

Q9. If  $\sec \theta \cdot \sin \theta = 0$ , then find the value of  $\theta$ .

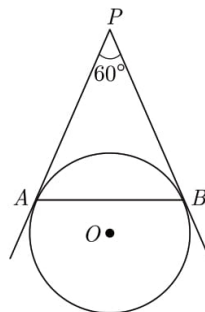
Q10. If  $A$  and  $B$  are acute angles and  $\sin A = \cos B$ , then find the value of  $A + B$ .

Q11. If  $\tan(A + B) = \sqrt{3}$  and  $\tan(A - B) = \frac{1}{\sqrt{3}}$ ,  $A > B$ , then the value of  $A$  is .....

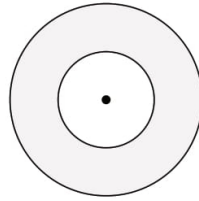
Q12. Two tangents making an angle of  $60^\circ$  between them are drawn to a circle of radius  $\sqrt{3}$  cm, then find the length of each tangent.

**OR**

In figure,  $AP$  and  $BP$  are tangents to a circle with centre  $O$ , such that  $AP = 5$  cm and  $\angle APB = 60^\circ$ . Find the length of chord  $AB$ .



- Q13. Two coins of diameter 2 cm and 4 cm respectively are kept one over the other as shown in the figure, find the area of the shaded ring shaped region in square cm.



**OR**

The diameter of two circle with centre  $A$  and  $B$  are 16 cm and 30 cm respectively. If area of another circle with centre  $C$  is equal to the sum of areas of these two circles, then find the circumference of the circle with centre  $C$ .

- Q14. The radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3, find the ratio of their volumes.
- Q15. Find the mean of the data using an empirical formula when it is given that mode is 50.5 and median in 45.5.
- Q16. Cards marked with number 3, 4, 5, ....., 50 are placed in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the selected card bears a perfect square number.

**OR**

20 tickets, on which numbers 1 to 20 are written, are mixed thoroughly and then a ticket is drawn at random out of them. Find the probability that the number on the drawn ticket is a multiple of 3 or 7.

## **SECTION II**

**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

- Q17. The Republic Day parade, first held in 1950, has been a yearly ritual since. The parade marches from the Rashtrapati Bhawan along the Rajpath in New Delhi. Several regiments of the army, navy, and air force, along with their bands, march to India Gate. The parade is presided over by the President of India, who is the Commander-in-Chief of the Indian Armed Forces. As he unfurls the tricolour, the national anthem is played. The regiments of the Armed Forces then start their march past. Prestigious awards like Kirti Chakra, Ashok Chakra, Paramvir Chakra and Vir Chakra are given out by the President. Nine to twelve different regiments of the Indian Army, in addition to the Navy and Air Force march toward India Gate along with their bands. Contingents of paramilitary forces and other civil forces also participate in the parade.



On 71th republic day parade, captain RS Meel is planing for parade of following two group:

- (a) First group of Army troops of 624 members behind an army band of 32 members.
- (b) Second group of CRPF troops with 468 soldiers behind the 228 members of bikers.

These two groups are to march in the same number of columns. This sequence of soldiers is followed by different states Jhanki which are showing the culture of the respective states.

- (i) What is the maximum number of columns in which the army troop can march?
  - (a) 8
  - (b) 16
  - (c) 4
  - (d) 32
- (ii) What is the maximum number of columns in which the CRPF troop can march?
  - (a) 4
  - (b) 8
  - (c) 12
  - (d) 16
- (iii) What is the maximum number of columns in which total army troop and CRPF troop together can march past?
  - (a) 2
  - (b) 4
  - (c) 6
  - (d) 8
- (iv) What should be subtracted with the numbers of CRPF soldiers and the number of bikers so that their maximum number of column is equal to the maximum number of column of army troop?
  - (a) 4 Soldiers and 4 Bikers
  - (b) 4 Soldiers and 2 Bikers
  - (c) 2 Soldiers and 4 Bikers
  - (d) 2 Soldiers and 2 Bikers
- (v) What should be added with the numbers of CRPF soldiers and the number of bikers so that their maximum number of column is equal to the maximum number of column of army troop?
  - (a) 4 Soldiers and 4 Bikers
  - (b) 12 Soldiers and 12 Bikers
  - (c) 6 Soldiers and 6 Bikers
  - (d) 12 Soldiers and 6 Bikers

Q18. Dipesh bought 3 notebooks and 2 pens for Rs. 80. His friend Ramesh said that price of each notebook could be Rs. 25. Then three notebooks would cost Rs.75, the two pens would cost Rs. 5 and each pen could be for Rs. 2.50. Another friend Amar felt that Rs. 2.50 for one pen was too little. It should be at least Rs. 16. Then the price of each notebook would also be Rs.16.

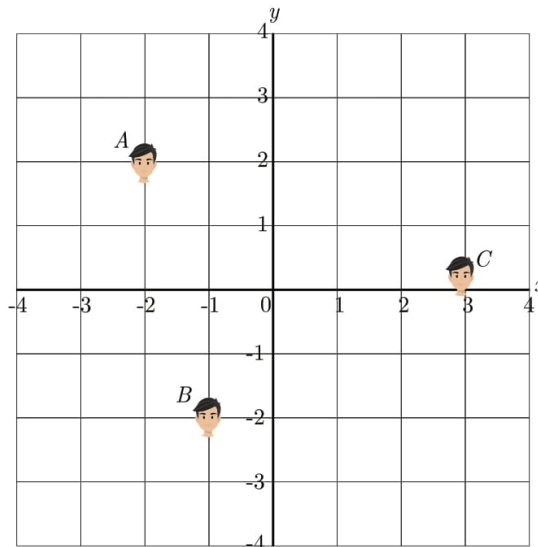


Aditya also bought the same types of notebooks and pens as Dipesh. He paid 110 for 4 notebooks and 3 pens.

- (i) Whether the estimation of Ramesh and Amar is applicable for Aditya?
  - (a) Ramesh's estimation is wrong but Amar's estimation is correct.
  - (b) Ramesh's estimation is correct but Amar's estimation is wrong.

- (c) Both estimation are correct.  
 (b) Ramesh's estimation is wrong but Amar's estimation is also wrong.
- (ii) Let the cost of one notebook be  $x$  and that of pen be  $y$ . Which of the following set describe the given problem ?
- (a)  $2x + 3y = 80$  and  $3x + 4y = 110$       (b)  $3x + 2y = 80$  and  $4x + 3y = 110$   
 (c)  $2x + 3y = 80$  and  $4x + 3y = 110$       (d)  $3x + 2y = 80$  and  $3x + 4y = 110$
- (iii) What is the exact cost of the notebook?  
 (a) Rs 10      (b) Rs 20  
 (c) Rs 16      (d) Rs 24
- (iv) What is the exact cost of the pen?  
 (a) Rs 10      (b) Rs 20  
 (c) Rs 16      (d) Rs 24
- (v) What is the total cost if they purchase the same type of 15 notebooks and 12 pens.  
 (a) Rs 410      (b) Rs 200  
 (c) Rs 420      (d) Rs 240

Q19. Ajay, Bhigu and Colin are fast friend since childhood. They always want to sit in a row in the classroom . But teacher doesn't allow them and rotate the seats row-wise everyday. Bhigu is very good in maths and he does distance calculation everyday. He consider the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Bhigu make the following diagram of their seating position.



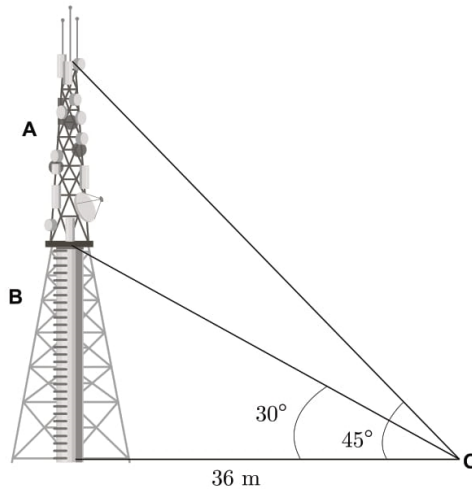
- (i) What are the coordinates of point A?  
 (a) (2, 2)      (b) (2, - 2)  
 (c) (- 2, 2)      (d) (- 2, - 2)
- (ii) What is the distance of point A from origin ?  
 (a) 8      (b)  $2\sqrt{2}$   
 (c) 4      (d)  $4\sqrt{2}$
- (iii) What is the distance between A and B ?  
 (a)  $3\sqrt{19}$       (b)  $3\sqrt{5}$   
 (c)  $\sqrt{17}$       (d)  $2\sqrt{5}$



- (iv) What is the distance between  $B$  and  $C$  ?
- (a)  $3\sqrt{19}$  (b)  $3\sqrt{5}$   
(c)  $2\sqrt{17}$  (d)  $2\sqrt{5}$
- (v) A point  $D$  lies on the line segment between points  $A$  and  $B$  such that  $AD:DB = 4:3$ . What are the coordinates of point  $D$  ?
- (a)  $(\frac{10}{7}, \frac{2}{7})$  (b)  $(\frac{2}{7}, \frac{7}{7})$   
(c)  $(-\frac{10}{7}, -\frac{2}{7})$  (d)  $(-\frac{2}{7}, -\frac{7}{7})$

Q20. 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  $45^\circ$ .



- (i) What is the height of the section  $B$  ?
- (a)  $12\sqrt{3}$  m (b)  $12\sqrt{2}$  m  
(c)  $8\sqrt{3}$  m (d)  $4\sqrt{2}$  m
- (ii) What is the height of the section  $A$  ?
- (a)  $12(2 - \sqrt{2})$  (b)  $24(2 - \sqrt{2})$   
(c)  $12(3 - \sqrt{3})$  (d)  $24(3 - \sqrt{3})$
- (iii) What is the length of the wire structure from the point  $O$  to the top of section  $A$  ?
- (a)  $32\sqrt{2}$  m (b)  $24\sqrt{3}$  m  
(c)  $28\sqrt{3}$  m (d)  $36\sqrt{2}$  m
- (iv) What is the length of the wire structure from the point  $O$  to the top of section  $B$  ?
- (a)  $12\sqrt{3}$  m (b)  $24\sqrt{3}$  m  
(c)  $28\sqrt{3}$  m (d)  $16\sqrt{3}$  m
- (v) What is the angle of depression from top of tower to point  $O$  ?
- (a)  $30^\circ$  (b)  $45^\circ$   
(c)  $15^\circ$  (d)  $75^\circ$

## PART - B

All questions are compulsory. In case of internal choices, attempt anyone.

- Q21. If  $m$  and  $n$  are the zeroes of the polynomial  $3x^2 + 11x - 4$ , find the value of  $\frac{m}{n} + \frac{n}{m}$ .
- Q22. In the figure given below,  $ABCD$  is a rectangle. Find the values of  $x$  and  $y$ .
- Q23. Find the roots of the following quadratic equation :  
 $(x+3)(x-1) = 3\left(x - \frac{1}{3}\right)$
- Q24. In a rectangle  $ABCD$ ,  $E$  is a point on  $AB$  such that  $AE = \frac{2}{3}AB$ . If  $AB = 6$  km and  $AD = 3$  km, then find  $DE$ .
- Q25. Show that :  $\frac{\cos^2(45^\circ + \theta) + \cos^2(45^\circ - \theta)}{\tan(60^\circ + \theta)\tan(30^\circ - \theta)} = 1$

OR

If  $\cos(40^\circ + x) = \sin 30^\circ$ , find the value of  $x$ .

- Q26. Find the unknown values in the following table :

Class Interval	Frequency	Cumulative Frequency
0-10	5	5
10-20	7	$x_1$
20-30	$x_2$	18
30-40	5	$x_3$
40-50	$x_4$	30

OR

Calculate the median from the following data :

Marks	0-10	10-20	20-30	30-40	40-50
Number of Students	5	15	30	8	2

- Q27. If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $f(x) = x^2 - 4x - 5$  then find the value of  $\alpha^2 + \beta^2$

OR

Find the quadratic polynomial, the sum and product of whose zeroes are  $-3$  and  $2$  respectively. Hence find the zeroes.

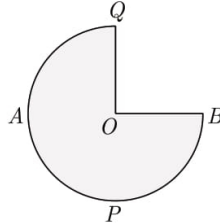
- Q28. Show that the sum of all terms of an AP whose first term is  $a$ , the second term is  $b$  and last term is  $c$ , is equal to  $\frac{(a+c)(b+c-2a)}{2(b-a)}$

OR

If in an AP, the sum of first  $m$  terms is  $n$  and the sum of its first  $n$  terms is  $m$ , then prove that the sum of its first  $(m+n)$  terms is  $-(m+n)$ .

- Q29. Two right triangles  $ABC$  and  $DBC$  are drawn on the same hypotenuse  $BC$  and on the same side of  $BC$ . If  $AC$  and  $BD$  intersect at  $P$ , prove that  $AP \times PC = BP \times DP$ .

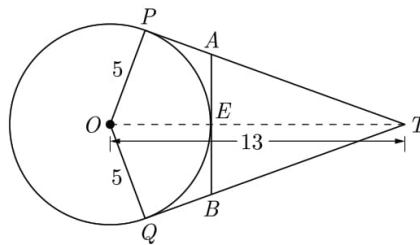
- Q30. If  $\sin\theta + \cos\theta = \sqrt{3}$ , then prove that  $\tan\theta + \cot\theta = 1$ .
- Q31. Draw a line segment  $AB$  of length 8 cm. Taking  $A$  as centre, draw a circle of radius 4 cm, and taking  $B$  as centre draw another circle of radius 3 cm. Construct tangents to each circle of radius centre of the other circle.
- Q32. In fig.  $APB$  and  $AQP$  are semi-circle, and  $AO = OB$ . If the perimeter of the figure is 47 cm, find the area of the shaded region. Use  $\pi = \frac{22}{7}$ .



- Q33. Find the mean of the following distribution by step deviation method :

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	13	20	15	7	5

- Q34. In figure  $O$  is the centre of a circle of radius 5 cm.  $T$  is a point such that  $OT = 13$  cm and  $OT$  intersects circle at  $E$ . If  $AB$  is a tangent to the circle at  $E$ , find the length of  $AB$ , where  $TP$  and  $TQ$  are two tangents to the circle.



- Q35. A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volume of the cylinder and toy. (Use  $\pi = 3.14$ )
- Q36. A box contains 90 discs which are numbered 1 to 90. If one disc is drawn at random from the box, find the probability that it bears  
 (i) a two digit number,  
 (ii) number divisible by 5.

**OR**

- Two different dice are thrown together. Find the probability that the numbers obtained have  
 (i) even sum, and  
 (ii) even product.

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 8**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
2. Question no. 27 to 33 are short answer type questions of 3 marks each.
3. Question no. 34 to 36 are long answer type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1. What is the HCF of smallest primer number and the smallest composite number?

**OR**

Write one rational and one irrational number lying between 0.25 and 0.32.

- Q2. Find the value of  $k$  for which the system of equations  $x + y - 4 = 0$  and  $2x + ky = 3$ , has no solution.

- Q3. If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $x^2 + 2x + 1$ , then what is the value of  $\frac{1}{\alpha} + \frac{1}{\beta}$  ?

**OR**

If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $2x^2 - 13x + 6$ , then what is the value of  $\alpha + \beta$ ?

- Q4. What is the value of  $x$  for which  $2x, (x + 10)$  and  $(3x + 2)$  are the three consecutive terms of an AP ?

**OR**

If the first term of AP is  $p$  and the common difference is  $q$ , then what is its 10th term?

- Q5.  $\triangle ABC$  and  $\triangle BDE$  are two equilateral triangle such that  $D$  is the mid-point of  $BC$ . Ratio of the areas of triangles  $ABC$  and  $BDE$  is .....

- Q6. In  $\triangle ABC$ , if  $X$  and  $Y$  are points on  $AB$  and  $AC$  respectively such that  $\frac{AX}{XB} = \frac{3}{4}$ ,  $AY = 5$  and  $YC = 9$ , then state whether  $XY$  and  $BC$  parallel or not.

- Q7. If  $\sec 5A = \operatorname{cosec}(A + 30^\circ)$ , where  $5A$  is an acute angle, then what is the value of  $A$ ?
- Q8. If  $\tan A = \cot B$ , then find the value of  $(A + B)$ .
- Q9. If the length of the ladder placed against a wall is twice the distance between the foot of the ladder and the wall. Find the angle made by the ladder with the horizontal.
- Q10. If a line intersects a circle in two distinct points, what is it called ?
- Q11. What is the length of the tangent drawn from a point 8 cm away from the centre of a circle of radius 6 cm ?
- Q12. If circumference of a circle is 44 cm, then what will be the area of the circle?

**OR**

A steel wire when bent in the form of a square encloses an area of  $121 \text{ cm}^2$ . If the same wire is bent in the form of a circle, then find the circumference of the circle.

- Q13. A solid metallic cuboid  $24 \text{ cm} \times 11 \text{ cm} \times 7 \text{ cm}$  is melted and recast and recast into solid cones of base radius 3.5 cm and height 6 cm. Find the number of cones so formed.
- Q14. What is the ratio of the total surface area of the solid hemisphere to the square of its radius.
- Q15. From the following frequency distribution, find the median class :

Cost of living index	1400-1500	1550-1700	1700-1850	1850-2000
Number of weeks	8	15	21	8

**OR**

In the following frequency distribution, find the median class.

Height (in cm)	104-145	145-150	150-155	155-160	160-165	165-170
Frequency	5	15	25	30	15	10

- Q16. In a frequency distribution, the mid value of a class is 10 and the width of the class is 6. What is the lower limit of the class?

## SECTION II

**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

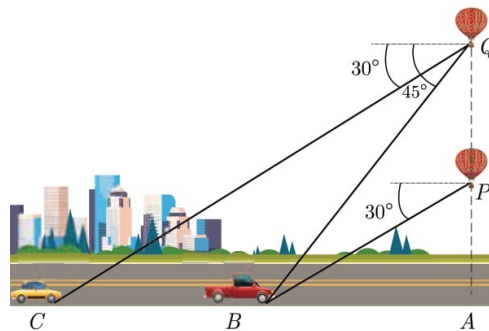
- Q17. The Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund was created on 28 March 2020, following the COVID-19 pandemic in India. The fund will be used for combating, and containment and relief efforts against the coronavirus outbreak and similar pandemic like situations in the future.



The allotment officer is trying to come up with a method to calculate fair division of funds across various affected families so that the fund amount and amount received per family can be easily adjusted based on daily revised numbers. The total fund allotted for a village is  $x^3 + 6x^2 + 20x + 9$ . The officer has divided the fund equally among families of the village and each family receives an amount of  $x^2 + 2x + 2$ . After distribution, some amount is left.

- (i) How many families are there in the village?  
 (a)  $x + 4$  (b)  $x - 3$   
 (c)  $x - 4$  (d)  $x + 3$
- (ii) If an amount of ₹ 1911 is left after distribution, what is value of  $x$ ?  
 (a) 190 (b) 290  
 (c) 191 (d) 291
- (iii) How much amount does each family receive?  
 (a) 24490 (b) 34860  
 (c) 22540 (d) 36865
- (iv) What is the amount of fund allocated?  
 (a) Rs 72 72 759 (b) Rs 75 72 681  
 (c) Rs 69 72 846 (d) Rs 82 74 888
- (v) How many families are there in the village?  
 (a) 191 (b) 98  
 (c) 187 (d) 195

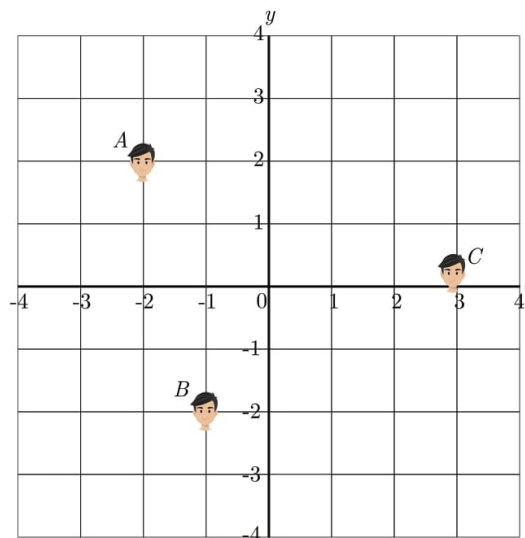
Q18. A hot air balloon is a type of aircraft. It is lifted by heating the air inside the balloon, usually with fire. Hot air weighs less than the same volume of cold air (it is less dense), which means that hot air will rise up or float when there is cold air around it, just like a bubble of air in a pot of water. The greater the difference between the hot and the cold, the greater the difference in density, and the stronger the balloon will pull up.



Lakshman is riding on a hot air balloon. After reaching at height  $x$  at point  $P$ , he spots a lorry parked at  $B$  on the ground at an angle of depression of  $30^\circ$ . The balloon rises further by 50 metres at point  $Q$  and now he spots the same lorry at an angle of depression of  $45^\circ$  and a car parked at  $C$  at an angle of depression of  $30^\circ$ .

- (i) What is the relation between the height  $x$  of the balloon at point  $P$  and distance  $d$  between point  $A$  and  $B$ ?
- (a)  $x = 3d$  (b)  $d = 3x$   
(c)  $d^2 = 3x^2$  (d)  $3d^2 = x^2$
- (ii) When balloon rises further 50 metres, then what is the relation between new height  $y$  and  $d$ ?
- (a)  $y = d + 50$  (b)  $d = y$   
(c)  $y = \sqrt{3}d$  (d)  $\sqrt{3}y = d$
- (iii) What is the new height of the balloon at point  $Q$ ?
- (a)  $50(\sqrt{3} + 3)$  m (b)  $25(\sqrt{3} + 1)$  m  
(c)  $50(\sqrt{3} + 1)$  m (d)  $25(\sqrt{3} + 3)$  m
- (iv) What is the distance  $AB$  on the ground?
- (a)  $50(\sqrt{3} + 3)$  m (b)  $25(3 + 3\sqrt{3})$  m  
(c)  $50(\sqrt{3} + 1)$  m (d)  $25(\sqrt{3} + 3)$  m
- (v) What is the distance  $AC$  on the ground?
- (a)  $75(1 + \sqrt{3})$  m (b)  $25(1 + \sqrt{3})$  m  
(c)  $50(1 + \sqrt{3})$  m (d)  $25(\sqrt{3} + 3)$  m

Q19. Ajay, Bhigu and Colin are fast friend since childhood. They always want to sit in a row in the classroom . But teacher doesn't allow them and rotate the seats row-wise everyday. Bhigu is very good in maths and he does distance calculation everyday. He consider the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Bhigu make the following diagram of their seating position.



- (i) What are the coordinates of point A?
- (a) (2, 2) (b) (2, -2)  
(c) (-2, 2) (d) (-2, -2)

- (ii) What is the distance of point  $A$  from origin ?  
 (a) 8 (b)  $2\sqrt{2}$   
 (c) 4 (d)  $4\sqrt{2}$
- (iii) What is the distance between  $A$  and  $B$  ?  
 (a)  $3\sqrt{19}$  (b)  $3\sqrt{5}$   
 (c)  $\sqrt{17}$  (d)  $2\sqrt{5}$
- (iv) What is the distance between  $B$  and  $C$  ?  
 (a)  $3\sqrt{19}$  (b)  $3\sqrt{5}$   
 (c)  $2\sqrt{17}$  (d)  $2\sqrt{5}$
- (v) A point  $D$  lies on the line segment between points  $A$  and  $B$  such that  $AD:DB = 4:3$ . What are the coordinates of point  $D$  ?  
 (a)  $(\frac{10}{7}, \frac{2}{7})$  (b)  $(\frac{2}{7}, \frac{7}{7})$   
 (c)  $(-\frac{10}{7}, -\frac{2}{7})$  (d)  $(-\frac{2}{7}, -\frac{7}{7})$

Q20. In two dice game, the player take turns to roll both dice, they can roll as many times as they want in one turn. A player scores the sum of the two dice thrown and gradually reaches a higher score as they continue to roll. If a single number 1 is thrown on either die, the score for that whole turn is lost. Two dice are thrown simultaneously.



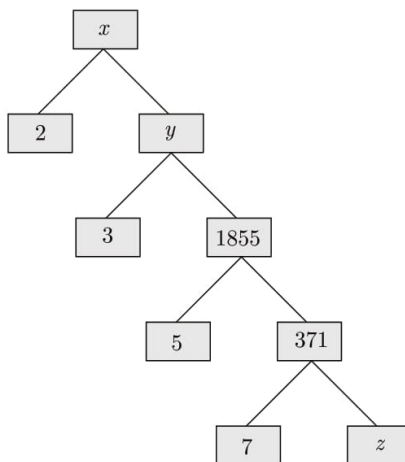
- (i) What is the probability of getting the sum as an even number ?  
 (a)  $\frac{3}{4}$  (b)  $\frac{1}{2}$   
 (c)  $\frac{1}{4}$  (d)  $\frac{5}{8}$
- (ii) What is the probability of getting the sum as a prime number ?  
 (a)  $\frac{5}{12}$  (b)  $\frac{1}{6}$   
 (c)  $\frac{7}{12}$  (d)  $\frac{11}{12}$
- (iii) What is the probability of getting the sum of atleast 10?  
 (a)  $\frac{5}{12}$  (b)  $\frac{5}{6}$   
 (c)  $\frac{1}{6}$  (d)  $\frac{7}{12}$
- (iv) What is the probability of getting a doublet of even number ?  
 (a)  $\frac{1}{12}$  (b)  $\frac{5}{12}$   
 (c)  $\frac{11}{12}$  (d)  $\frac{7}{12}$
- (v) What is the probability of getting a product of numbers greater than 16?  
 (a)  $\frac{7}{36}$  (b)  $\frac{2}{9}$   
 (c)  $\frac{5}{18}$  (d)  $\frac{11}{36}$



## PART - B

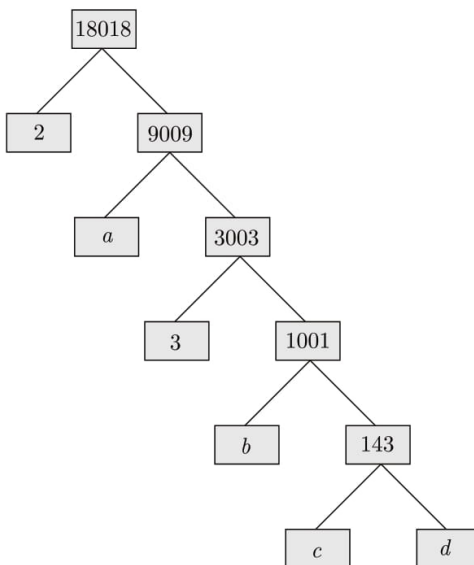
All questions are compulsory. In case of internal choices, attempt any one.

Q21. Complete the following factor tree and find the composite number  $x$



OR

Find the missing numbers  $a, b, c$  and  $d$  in the given factor tree:



Q22. In  $\triangle ABC$ ,  $AD \perp BC$ , such that  $AD^2 = BD \times CD$ . Prove that  $\triangle ABC$  is right angled at  $A$ .

OR

In an equilateral triangle, prove that three times the square of one side is equal to four times the square of one of its altitudes.

OR

Find the altitude of an equilateral triangle when each of its side is  $a$  cm.

Q23. Find the ratio in which the point  $P(\frac{3}{4}, \frac{5}{12})$  divides the line segment joining the point  $A(\frac{1}{2}, \frac{3}{2})$  and  $(2, -5)$ .

Q24. If  $\sin \phi = \frac{1}{2}$ , show that  $3 \cos \phi - 4 \cos^3 \phi = 0$ .

Q25. 12 solid spheres of the same size are made by melting a solid metallic cone of base radius 1 cm and height of 48 cm. Find the radius of each sphere.

Q26. Find the mean of the following data :

Class	0- 20	20-40	40-60	60-80	80-100	100- 120
Frequency	20	35	52	44	38	31

Q27. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together?

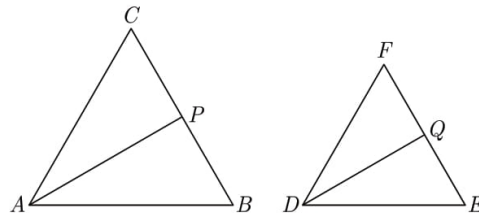
Q28. Solve for  $x$  and  $y$  :

$$\frac{x}{2} + \frac{2y}{3} = -1$$

$$x - \frac{y}{3} = 3$$

Q29. The sum of first  $n$  terms of three arithmetic progressions are  $S_1, S_2$  and  $S_3$  respectively. The first term of each AP is 1 and common differences are 1, 2 and 3 respectively. Prove that  $S_1 + S_3 = 2S_2$ .

Q30. In given figure  $\Delta ABC \sim \Delta DEF$ .  $AP$  bisects  $\angle CAB$  and  $DQ$  bisects  $\angle FDE$ .



Prove that :

(1)  $\frac{AP}{DQ} = \frac{AB}{DE}$

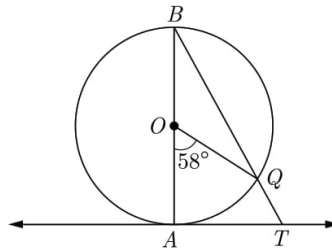
(2)  $\Delta CAP \sim \Delta FDQ$ .

Q31. In  $\Delta ABC$ ,  $\angle B = 90^\circ$ ,  $BC = 5$  cm,  $AC - AB = 1$ , Evaluate :  $\frac{1 + \sin C}{1 + \cos C}$ .

**OR**

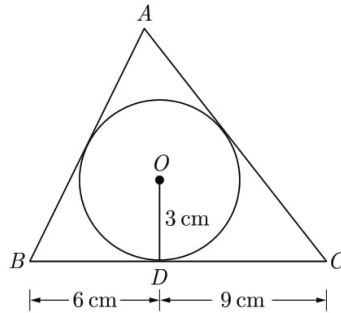
If  $b \cos \theta = a$ , then prove that  $\operatorname{cosec} \theta + \cot \theta = \sqrt{\frac{b+a}{b-a}}$ .

Q32. In given figure,  $AB$  is the diameter of a circle with centre  $O$  and  $AT$  is a tangent. If  $\angle AOQ = 58^\circ$ , find  $\angle ATQ$ .



**OR**

In figure, a triangle  $ABC$  is drawn to circumscribe a circle of radius 3 cm, such that the segments  $BD$  and  $DC$  are respectively of lengths 6 cm and 9 cm. If the area of  $\Delta ABC$  is  $54 \text{ cm}^2$ , then find the lengths of sides  $AB$  and  $AC$ .



Q33. Construct a triangle whose perimeter is 13.5 cm and the ratio of the three sides is 2:3:4.

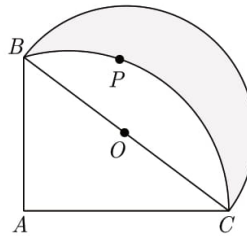
Q34. Solve for  $x$  :  $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$

$x \neq -1, -2, -4$

**OR**

Find the zeroes of the quadratic polynomial  $7y^2 - \frac{11}{3}y - \frac{2}{3}$  and verify the relationship between the zeroes and the coefficients.

Q35. In given figure  $ABPC$  is a quadrant of a circle of radius 14 cm and a semicircle is drawn with  $BC$  as diameter. Find the area of the shaded region.



Q36. If the median of the following frequency distribution is 32.5. Find the values of  $f_1$  and  $f_2$ .

Class	0- 10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	$f_1$	5	9	12	$f_2$	3	2	40

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 9**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
- 

**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1. Write whether rational number  $\frac{7}{75}$  will have terminating decimal expansion or a non-terminating decimal.

**OR**

Find HCF of the numbers given below:

$k, 2k, 3k, 4k$  and  $5k$ , where  $k$  is a positive integer.

- Q2. A fraction becomes 4 when 1 is added to both the numerator and denominator and it becomes 7 when 1 is subtracted from both the numerator and denominator. What is the numerator of the given fraction ?
- Q3.  $\Delta ABC$  is an equilateral triangle with each side of length  $2p$ . If  $AD \perp BC$  then what is the value of  $AD$  ?
- Q4. If the point  $P(k, 0)$  divides the line segment joining the points  $A(2, -2)$  and  $B(-7, 4)$  in the ratio 1 : 2, then what is the value of  $k$ ?

**OR**

Find the coordinates of a point  $A$  on  $y$ -axis, at a distance of 4 units from  $x$ -axis and below it.

- Q5. If  $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$ , ( $\theta \neq 90^\circ$ ) then what is the value of  $\tan \theta$  ?
- Q6. If  $4 \tan \theta = 3$ , then find  $\left( \frac{4 \sin \theta - \cos \theta}{4 \sin \theta + \cos \theta} \right)$ .

- Q7. An observer, 1.5 m tall is 20.5 away from a tower 22 m high, then what is the angle of elevation of the top of the tower from the eye of observer?

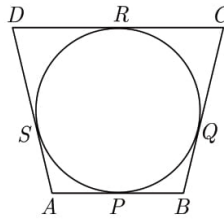
**OR**

A 6 m high tree cast a 4 m long shadow. At the same time, a flag pole cast a shadow 50 m long. How long is the flag pole?

- Q8. Two concentric circles of radii  $a$  and  $b$  where  $a > b$ , Find the length of a chord of the larger circle which touches the other circle.

**OR**

In the given figure, a circle touches all the four sides of quadrilateral  $ABCD$  with  $AB = 6$  cm,  $BC = 7$  cm and  $CD = 4$  cm, then what is the length of  $AD$  ?

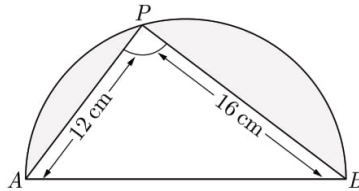


- Q9. To divide a line segment  $AB$  in the ratio 2:5, a ray  $AX$  is drawn such that  $\angle BAX$  is acute. Then points are marked at equal intervals on  $AX$ . What is the minimum number of these points ?

**OR**

To divide the line segment  $AB$  in the ratio  $2 : 3$ , a ray  $AX$  is drawn such that  $\angle BAX$  is acute,  $AX$  is then marked at equal intervals. Find minimum number of these marks.

- Q10. In the given figure,  $AB$  is the diameter where  $AP = 12$  cm and  $PB = 16$  cm. Taking the value of  $\pi$  as 3, find the perimeter of the shaded region.



- Q11. Find the area (in  $\text{cm}^2$ ) of the circle that can be inscribed in a square of side 8 cm.

- Q12. Consider the following frequency distribution of the heights of 60 students of a class

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180
Number of students	15	13	10	8	9	5

What is the upper limit of the median class in the given data?

- Q13. If  $x_i$ 's are the mid-points of the class intervals of grouped data,  $f_i$ 's are the corresponding frequencies and  $\bar{x}$  is the mean, then find  $\sum (f_i x_i - \bar{x})$ .

- Q14. Out of one digit prime numbers, one number is selected at random. What is the probability of selecting an even number?

- Q15. Find the probability of an impossible event.
- Q16. A number is selected at random from 1 to 30. Find the probability that it is a prime number.

## SECTION II

**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

- Q17. For a jewellery metal box to satisfy certain requirements, its length must be three meter greater than the width, and its height must be two meter less than the width.



- (i) If width is taken as  $x$ , which of the following polynomial represent volume of box ?
- (a)  $x^2 - 5x - 6$  (b)  $x^3 + x^2 - 6x$   
 (c)  $x^3 - 6x^2 - 6x$  (d)  $x^2 + x - 6$
- (ii) Which of the following polynomial represent the area of metal sheet used to make box ?
- (a)  $x^2 - 5x - 6$  (b)  $6x^2 + 4x - 12$   
 (c)  $x^3 - 6x^2 - 6x$  (d)  $6x^2 + 3x - 4$
- (iii) If it must have a volume of  $18 \text{ in}^3$ , what must be its length ?
- (a) 6 in (b) 3 in  
 (c) 4 in (d) 2 in
- (iv) At a volume of  $18 \text{ in}^3$ , what must be its height ?
- (a) 1 in (b) 3 in  
 (c) 2 in (d) 4 in
- (v) If box is made of a metal sheet which cost is 10 rs per  $\text{in}^2$ , what is the cost of metal ?
- (a) Rs 540 (b) Rs 1080  
 (c) Rs 270 (d) Rs 340
- Q18. Raju and his classmates planned a picnic in zoo. The total budget for picnic was Rs 2000 but 5 students failed to attend the picnic and thus the contribution for each student was increased by Rs 20.



The expense of different item was as follows.

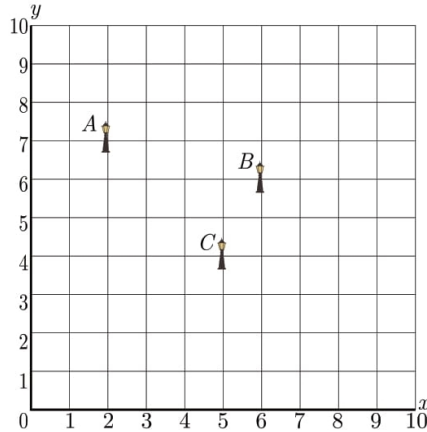
S. No.	Article	Cost per student
1	Entry ticket	Rs 5
2	Coffee	Rs 10
3	Food	Rs 25
4	Travelling cost	Rs 50
5	Ice-cream	Rs 15

- (i) If  $x$  is the number of students planned for picnic, which is the correct quadratic equation that describe the situation.
- (a)  $x^2 - 5x - 500 = 0$  (b)  $x^2 + 4x - 400 = 0$   
(c)  $x^2 + 5x - 500 = 0$  (d)  $x^2 - 4x + 400 = 0$
- (ii) What is the number of students planned for picnic ?  
(a) 30 (b) 40  
(c) 25 (d) 20
- (iii) What is the number of students who attended the picnic?  
(a) 20 (b) 40  
(c) 15 (d) 25
- (iv) What is the total expense for this picnic ?  
(a) Rs 1500 (b) Rs 2000  
(c) Rs 1000 (d) Rs 2100
- (v) How much money they spent for travelling ?  
(a) Rs 500 (b) Rs 1000  
(c) Rs 800 (d) Rs 3750

- Q19. Resident Welfare Association (RWA) of a Gulmohar Society in Delhi have installed three electric poles  $A$ ,  $B$  and  $C$  in a society's common park. Despite these three poles, some parts of the park are still in dark.  
So, RWA decides to have one more electric pole  $D$  in the park.



The park can be modelled as a coordinate systems given below.



On the basis of the above information, answer any four of the following questions:

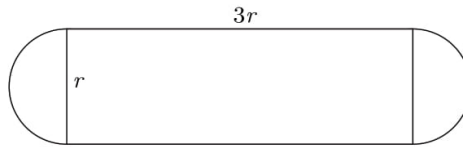
- (i) What is the position of the pole  $C$ ?
- (a)  $(4, 5)$  (b)  $(5, 4)$   
(c)  $(6, 5)$  (d)  $(5, 6)$
- (ii) What is the distance of the pole  $B$  from the corner  $O$  of the park?
- (a)  $6\sqrt{2}$  units (b)  $3\sqrt{2}$  units  
(c)  $6\sqrt{3}$  units (d)  $3\sqrt{3}$  units
- (iii) Find the position of the fourth pole  $D$  so that four points  $A, B, C$  and  $D$  form a parallelogram.
- (a)  $(5, 2)$  (b)  $(1, 5)$   
(c)  $(1, 4)$  (d)  $(2, 5)$
- (iv) What is the distance between poles  $A$  and  $C$ ?
- (a)  $6\sqrt{2}$  units (b)  $3\sqrt{2}$  units  
(c)  $6\sqrt{3}$  units (d)  $3\sqrt{3}$  units
- (v) What is the distance between poles  $B$  and  $D$ ?
- (a)  $2\sqrt{3}$  units (b)  $\sqrt{28}$  units  
(c)  $6\sqrt{3}$  units (d)  $\sqrt{26}$  units

Q20. The boiler is essentially a closed vessel inside which water is stored. Fuel is burnt in a furnace and hot gasses are produced. These hot gasses come in contact with water vessel where the heat of these hot gasses transfer to the water and consequently steam is produced in the boiler. Then this steam is piped to the turbine of thermal power plant. There are many different types of boiler utilized for different purposes like running a production unit, sanitizing some area, sterilizing equipment, to warm up the surroundings etc.





Rajesh has been given the task of designing a boiler for NTPC. Boiler consist of a cylindrical part in middle and two hemispherical part at its both end. The cross section of boiler is given below. Length of cylindrical part is the 3 times of radius of hemispherical part.



- (i) Which of the following is correct expression for the surface area of cylindrical part of boiler?
- (a)  $2\pi r^2$  (b)  $6\pi r^2$   
(c)  $4\pi r^2$  (d)  $8\pi r^2$
- (ii) Which of the following is correct expression for the total surface area of boiler?
- (a)  $\frac{22}{3}\pi r^2$  (b)  $\frac{11}{3}\pi r^2$   
(c)  $6\pi r^2$  (d)  $10\pi r^2$
- (iii) Which of the following is correct expression for the volume of boiler?
- (a)  $\frac{15}{4}\pi r^3$  (b)  $\frac{19}{3}\pi r^3$   
(c)  $\frac{13}{3}\pi r^3$  (d)  $\frac{17}{4}\pi r^3$
- (iv) What is the ratio of volume to the surface area?
- (a)  $\frac{13}{30}r$  (b)  $\frac{3}{10}r$   
(c)  $\frac{10}{3}r$  (d)  $\frac{3}{10}r$
- (v) If  $r = 3$  m, what is the volume of boiler?
- (a)  $117\pi \text{ m}^3$  (b)  $125\pi \text{ m}^3$   
(c)  $231\pi \text{ m}^3$  (d)  $238\pi \text{ m}^3$

### PART - B

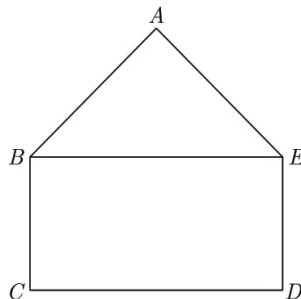
All questions are compulsory. In case of internal choices, attempt anyone.

Q21. Show that  $5\sqrt{6}$  is an irrational number.

OR

Write the denominator of the rational number  $\frac{257}{500}$  in the form  $2^m \times 5^n$ , where  $m$  and  $n$  are non-negative integers. Hence write its decimal expansion without actual division.

Q22. In the figure,  $ABCDE$  is a pentagon with  $BE \parallel CD$  and  $BC \parallel DE$ .  $BC$  is perpendicular to  $CD$ .  $AB = 5$  cm,  $AE = 5$  cm,  $BE = 7$  cm,  $BC = x - y$  and  $CD = x + y$ . If the perimeter of  $ABCDE$  is 27 cm. Find the value of  $x$  and  $y$ , given  $x, y \neq 0$ .



**OR**

Find the values of  $\alpha$  and  $\beta$  for which the following pair of linear equations has infinite number of solutions :  $2x + 3y = 7$ ;  $2\alpha x + (\alpha + \beta)y = 28$ .

- Q23. Find the roots of the quadratic equation  $4x^2 - 4px + (p^2 - q^2) = 0$
- Q24. In an equilateral triangle  $ABC$ ,  $AD$  is drawn perpendicular to  $BC$  meeting  $BC$  in  $D$ . Prove that  $AD^2 = 3BD^2$ .
- Q25. Prove that :  $\frac{\cos A}{1 + \tan A} - \frac{\sin A}{1 + \cot A} = \cos A - \sin A$
- Q26. Find the mode of the following distribution :

Classes	25-30	30-35	35-40	40-45	45-50	50-55
Frequency	25	34	50	42	38	14

- Q27. Prove that  $\sqrt{3}$  is an irrational number.
- Q28. Solve the following pair of equations for  $x$  and  $y$  :

$$\frac{a^2}{x} - \frac{b^2}{y} = 0, \frac{a^2b}{x} + \frac{b^2a}{y} = a + b, x \neq 0; y \neq 0.$$

**OR**

Solve for  $x$  and  $y$  :

$$ax + by = \frac{a+b}{2}$$

$$3x + 5y = 4$$

- Q29.  $\Delta ABC$  is right angled at  $C$ . If  $p$  is the length of the perpendicular from  $C$  to  $AB$  and  $a, b, c$  are the lengths of the sides opposite  $\angle A, \angle B$  and  $\angle C$  respectively, then prove that  $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$ .

**OR**

In  $\Delta ABC$ ,  $DE \parallel BC$ . If  $AD = x + 2$ ,  $DB = 3x + 16$ ,  $AE = x$  and  $EC = 3x + 5$ , then find  $x$ .

- Q30. Prove that :  $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = 0$
- Q31. Draw a circle of radius 3 cm. From a point  $P$ , 7 cm away from centre draw two tangents to the circle. Measure the length of each tangent.
- Q32. A wire when bent in the form of an equilateral triangle encloses an area of  $121\sqrt{3}$  cm<sup>2</sup>. If the wire is bent in the form of a circle, find the area enclosed by the circle. Use  $\pi = \frac{22}{7}$ .
- Q33. Compute the median from the following data :

Mid-values	115	125	135	145	155	165	175	185	195
Frequency	6	25	48	72	116	60	38	22	3

- Q34. If the sum of first  $n$  term of an AP is given by  $S_n = 3n^2 + 4n$ . Determine the AP and the  $n^{\text{th}}$  term.

**OR**

The sum of the  $3^{\text{rd}}$  and  $7^{\text{th}}$  terms of an AP is 6 and their product is 8. Find the sum of first 20 terms of the AP.

- Q35. If  $A(-2, 1)$ ,  $B(a, 0)$ ,  $C(4, b)$  and  $D(1, 2)$  are the vertices of a parallelogram  $ABCD$ , find the values of  $a$  and  $b$ . Hence find the lengths of its sides.
- Q36. Distance between two ships is 73.2 m. From the top of tower, 100 m high, a man observes two cars on the opposite sides of the tower with the angles of depression  $30^\circ$  and  $45^\circ$  respectively. Find the distance between the cars. (Use  $\sqrt{3} = 1.73$ )

**BIDWAN CLASSES  
BERHAMPUR  
MATH SET - 10**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part-A :**

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

**Part-B :**

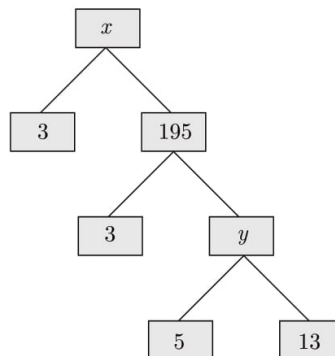
1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
  2. Question no. 27 to 33 are short answer type questions of 3 marks each.
  3. Question no. 34 to 36 are long answer type questions of 5 marks each.
  4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.
- 

**PART - A**

**SECTION - I**

**Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.**

- Q1. Complete the following factor tree and find the composite number  $x$ .



**OR**

Write the rational number  $\frac{7}{75}$  will have a terminating decimal expansion. or a non-terminating repeating decimal.

- Q2.  $x$  and  $y$  are 2 different digits. If the sum of the two digit numbers formed by using both the digits is a perfect square, then what is the value of  $x + y$  ?
- Q3. Two triangles are similar if their corresponding sides are .....

Q4. What is the distance of the point  $(-12, 5)$  from the origin ?

**OR**

What is the distance of point  $P(3, 4)$  from  $x$ -axis?

Q5. If  $\cos A = \frac{4}{5}$ , then find the value of  $\tan A$ .

Q6. If  $\sin \theta - \cos \theta = 0$ , then find the value of  $(\sin^4 \theta + \cos^4 \theta)$

Q7. The ..... of an object viewed, is the angle formed by the line of sight with the horizontal when it is above the horizontal level, i.e., the case when we raise our head to look at the object.

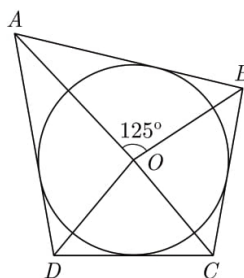
**OR**

The ..... of an object viewed, is the angle formed by the line of sight with the horizontal when it is below the horizontal level, i.e., the case when we lower our head to look at the object.

Q8. Two concentric circles are of radii 10 cm and 8 cm, then find the length of the chord of the larger circle which touches the smaller circle.

**OR**

In given figure, if  $\angle AOB = 125^\circ$ , then find the angle  $\angle COD$  ?



Q9. To find a point  $P$  on the line segment  $AB = 6$  cm, such that  $\frac{AP}{AB} = \frac{2}{5}$ , in which ratio the line segment  $AB$  is divided.

**OR**

A line Segment  $AB$  is divided at point  $P$  such that  $\frac{PB}{AB} = \frac{3}{7}$ , then find the ratio  $AP : PB$ .

Q10. Find the area of circle that can be inscribed in a square of side 10 cm.

Q11. If the radius of a circle is doubled, what about its area?

Q12. For finding the popular size of readymade garments, which central tendency is used?

Q13. For the following distribution find the sum of lower limits of the median class and modal class.

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

Q14. A bag contains 3 red and 2 blue marbles. If a marble is drawn at random, then find the probability of drawing a blue marble.

Q15. A card is drawn at random from a well-shuffled pack of 52 cards. Find the probability of getting a red king.

- Q16. A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from box, find the probability that it bears a prime number less than 23.

## SECTION II

**Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.**

- Q17. Pyramid, in architecture, a monumental structure constructed of or faced with stone or brick and having a rectangular base and four sloping triangular sides meeting at an apex. Pyramids have been built at various times in Egypt, Sudan, Ethiopia, western Asia, Greece, Cyprus, Italy, India, Thailand, Mexico, South America, and on some islands of the Pacific Ocean. Those of Egypt and of Central and South America are the best known.



The volume and surface area of a pyramid with a square base of area  $a^2$  and height  $h$  is given by

$$V = \frac{ha^2}{3} \text{ and } S = a^2 + 2a\sqrt{\left(\frac{a}{2}\right)^2 + h^2}$$

A pyramid has a square base and a volume of  $3y^3 + 18y^2 + 27y$  cubic units.

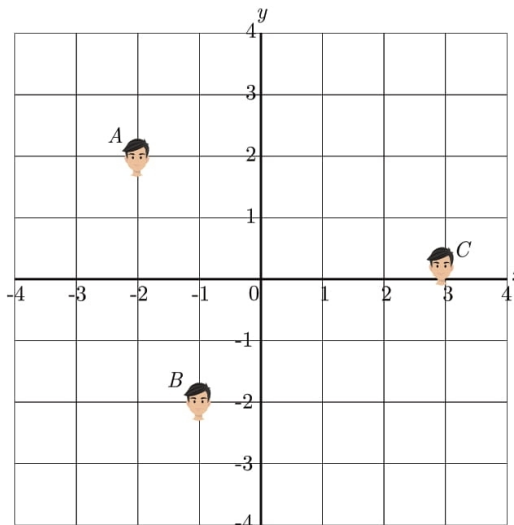
- (i) If its height is  $y$ , then what polynomial represents the length of a side of the square base ?
- (a)  $9(y+3)$  (b)  $9(y+3)^2$   
(c)  $3(y+3)$  (d)  $3(y+3)^2$
- (ii) If area of base is 576 metre, what is the side of base?
- (a) 24 metre (b) 16 metre  
(c) 13 metre (d) 12 metre
- (iii) What is the height of pyramid at above area of base ?
- (a) 4 metre (b) 6 metre  
(c) 5 metre (d) 12 metre
- (iv) What is the ratio of length of side to the height ?
- (a)  $\frac{1}{5}$  (b)  $\frac{2}{5}$   
(c)  $\frac{5}{24}$  (d)  $\frac{24}{5}$
- (v) What is surface area of pyramid ?
- (a)  $800 \text{ m}^2$  (b)  $2400 \text{ m}^2$   
(c)  $1200 \text{ m}^2$  (d)  $1600 \text{ m}^2$

- Q18. Optimal pricing strategy : The director of the Blue Rose Theatre must decide what to charge for a ticket to the comedy drama. If the price is set too low, the theatre will lose money; and if the price is too high, people won't come. From past experience she estimates that the profit  $P$  from sales (in hundreds) can be approximated by  $P(x) = -x^2 + 22x - 40$  where  $x$  is the cost of a ticket and  $0 \leq x \leq 25$  hundred rupees.



- (i) What is the lowest cost of a ticket that would allow the theatre to break even?  
 (a) Rs 3 hundred (b) Rs 4 hundred  
 (c) Rs 2 hundred (d) Rs 1 hundred
- (ii) What is the highest cost that the theatre can charge to break even?  
 (a) Rs 16 hundred (b) Rs 14 hundred  
 (c) Rs 4 hundred (d) Rs 20 hundred
- (iii) If theatre charge Rs 4 hundred for each ticket, what is the profit/loss ?  
 (a) Loss Rs 1600 (b) Profit Rs 1600  
 (c) Loss Rs 3200 (d) Profit Rs 3200
- (iv) If theatre charge Rs 25 hundred for each ticket, what is the profit/loss ?  
 (a) Loss Rs 11500 (b) Profit Rs 8500  
 (c) Loss Rs 8500 (d) Profit Rs 11500
- (v) What is the maximum profit which can be earned by theatre ?  
 (a) Rs 4000 (b) Rs 8100  
 (c) Rs 6100 (d) Rs 4200

Q19. Ajay, Bhigu and Colin are fast friend since childhood. They always want to sit in a row in the classroom . But teacher doesn't allow them and rotate the seats row-wise everyday. Bhigu is very good in maths and he does distance calculation everyday. He consider the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Bhigu make the following diagram of their seating position.



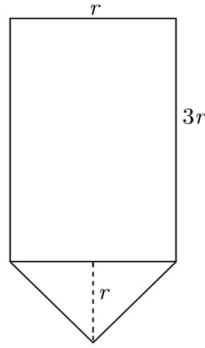
- (i) What are the coordinates of point A?
- (a) (2, 2) (b) (2, - 2)  
(c) (- 2, 2) (d) (- 2, - 2)
- (ii) What is the distance of point A from origin ?
- (a) 8 (b)  $2\sqrt{2}$   
(c) 4 (d)  $4\sqrt{2}$
- (iii) What is the distance between A and B ?
- (a)  $3\sqrt{19}$  (b)  $3\sqrt{5}$   
(c)  $\sqrt{17}$  (d)  $2\sqrt{5}$
- (iv) What is the distance between B and C ?
- (a)  $3\sqrt{19}$  (b)  $3\sqrt{5}$   
(c)  $2\sqrt{17}$  (d)  $2\sqrt{5}$
- (v) A point D lies on the line segment between points A and B such that  $AD : DB = 4 : 3$ . What are the the coordinates of point D ?
- (a)  $(\frac{10}{7}, \frac{2}{7})$  (b)  $(\frac{2}{7}, \frac{7}{7})$   
(c)  $(-\frac{10}{7}, -\frac{2}{7})$  (d)  $(-\frac{2}{7}, -\frac{7}{7})$

- Q20. The advantages of cone bottom tanks are found in nearly every industry, especially where getting every last drop from the tank is important. This type of tank has excellent geometry for draining, especially with high solids content slurries as these cone tanks provide a better full-drain solution. The conical tank eliminates many of the problems that flat base tanks have as the base of the tank is sloped towards the centre giving the greatest possible full-drain system in vertical tank design.



Rajesh has been given the task of designing a conical bottom tank for his client. Height of conical part is equal to its radius. Length of cylindrical part is the 3 times of its radius. Tank is closed from top. The cross section of conical tank is given below.





- (i) If radius of cylindrical part is taken as 3 meter, what is the volume of above conical tank ?  
 (a)  $120\pi \text{ m}^3$  (b)  $90\pi \text{ m}^3$   
 (c)  $60\pi \text{ m}^3$  (d)  $30\pi \text{ m}^3$
- (ii) What is the area of metal sheet used to make this conical tank ? Assume that tank is covered from top.  
 (a)  $27(7 + \sqrt{2})\pi \text{ m}^2$  (b)  $9(7 + \sqrt{2})\pi \text{ m}^2$   
 (c)  $27(5 + \sqrt{2})\pi \text{ m}^2$  (d)  $9(5 + \sqrt{2})\pi \text{ m}^2$
- (iii) What is the ratio of volume of cylindrical part to the volume of conical part?  
 (a) 6 (b) 9  
 (c)  $\frac{1}{6}$  (d)  $\frac{1}{9}$
- (iv) The cost of metal sheet is Rs 2000 per square meter and fabrication cost is 1000 per square meter. What is the total cost of tank ?  
 (a) Rs  $27000(7 + \sqrt{2})\pi$  (b) Rs  $54000(7 + \sqrt{2})\pi$   
 (c) Rs  $27000(5 + \sqrt{2})\pi$  (d) Rs  $54000(5 + \sqrt{2})\pi$
- (v) A oil is to be filled in the tank. The density of oil is 1050 kg per cubic meter. What is the weight of oil filled in tank ?  
 (a) 195 Tonne (b) 200 Tonne  
 (c) 297 Tonne (d) 174 Tonne

## PART - B

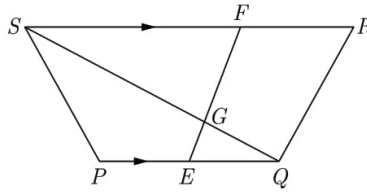
All questions are compulsory. In case of internal choices, attempt anyone.

- Q21. If two positive integers  $p$  and  $q$  are written as  $p = a^2b^3$  and  $q = a^3b$ , where  $a$  and  $b$  are prime numbers than verify  $\text{LCM}(p, q) \times \text{HCF}(p, q) = pq$
- Q22. Sum of the ages of a father and the son is 40 years. If father's age is three times that of his son, then find their respective ages.
- Q23. If  $x = \frac{2}{3}$  and  $x = -3$  are roots of the quadratic equation  $ax^2 + 7x + b = 0$ , find the values of  $a$  and  $b$ .

OR

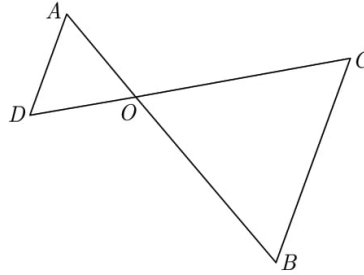
Find the roots of  $x^2 - 4x - 8 = 0$  by the method of completing square.

- Q24. In the figure,  $PQRS$  is a trapezium in which  $PQ \parallel RS$ . On  $PQ$  and  $RS$ , there are points  $E$  and  $F$  respectively such that  $EF$  intersects  $SQ$  at  $G$ . Prove that  $EQ \times GS = GQ \times FS$ .



**OR**

In the given figure,  $OA \times OB = OC \times OD$ , show that  $\angle A = \angle C$  and  $\angle B = \angle D$ .



Q25. Prove that :  $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$

Q26. The frequency distribution of agricultural holdings in a village below :

Area of land (in hectare)	1-3	3-5	5-7	7-9	9-11	11-13
Number of families	20	45	80	55	40	12

Find the modal agricultural holding of the village.

Q27. Prove that  $\sqrt{5}$  is an irrational number.

Q28. A chemist has one solution which is 50 % acid and a second which is 25 % acid. How much of each should be mixed to make 10 litre of 40 % acid solution.

Q29. If in  $\triangle ABC$ ,  $AD$  is median and  $AE \perp BC$ , then prove that  $AB^2 + AC^2 = 2AD^2 + \frac{1}{2}BC^2$ .

Q30. Prove that  $\frac{\tan^2 A}{\tan^2 A - 1} + \frac{\operatorname{cosec}^2 A}{\sec^2 A - \operatorname{cosec}^2 A} = \frac{1}{1 - 2 \cos^2 A}$

**OR**

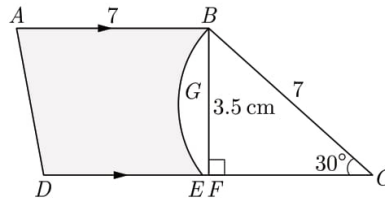
If in a triangle  $ABC$  right angled at  $B$ ,  $AB = 6$  units and  $BC = 8$  units, then find the value of  $\sin A \cos C + \cos A \sin C$ .

Q31. Draw two concentric circle of radii 3 cm and 5 cm. Taking a point on the outer circle, construct the pair of tangents to the inner circle.

**OR**

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 of radius centre of the other circle.

- Q32. Adjoining fig,  $ABCD$  is a trapezium with  $AB \parallel DC$  and  $\angle BCD = 30^\circ$ . Fig.  $BGEC$  is a sector of a circle with centre  $C$  and  $AB = BC = 7$  cm,  $DE = 4$  cm and  $BF = 3.5$  cm, then find the area of the shaded region. Use  $\pi = \frac{22}{7}$ .



- Q33. The mode of a distribution is 55 and the modal class is 45-60 and the frequency preceding the modal class is 5 and the frequency after the modal class is 10. Find the frequency of the modal class.
- Q34. Find the number of terms of the AP  $-12, -9, -6, \dots, 21$ . If 1 is added to each term of this AP, then find the sum of all the terms of the AP thus obtained.
- Q35. (i) Derive section formula.  
(ii) In what ratio does  $(-4, 6)$  divides the line segment joining the point  $A(-6, 4)$  and  $B(3, -8)$

**OR**

- $(1, -1), (0, 4)$  and  $(-5, 3)$  are vertices of a triangle. Check whether it is a scalene triangle, isosceles triangle or an equilateral triangle. Also, find the length of its median joining the vertex  $(1, -1)$  the mid-point of the opposite side.
- Q36. The angle of elevation of the top  $B$  of a tower  $AB$  from a point  $X$  on the ground is  $60^\circ$ . At point  $Y$ , 40 m vertically above  $X$ , the angle of elevation of the top is  $45^\circ$ . Find the height of the tower  $AB$  and the distance  $XB$ .