



Time: 3 Hr.

General Instructions:

Marks:80

1. This Question Paper has 5 Sections A, B, C, D and E and total 6 pages.
2. Section A has 20 MCQs carrying 1 mark each including 2 assertion- reason questions.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marker questions of Section E.

Section A

- 1 If HCF $(16, y) = 8$ and LCM $(16, y) = 48$, then the value of y is (1)
(a) 24
(b) 16
(c) 8
(d) 48
- 2 If one zero of the quadratic polynomial $x^2 + 3x + b$ is 2, then the value of b is (1)
(a) 10
(b) -8
(c) 9
(d) -10
- 3 The pair of equations $3x - 5y = 7$ and $-6x + 10y = 7$ have (1)
(a) a unique solution
(b) infinitely many solutions
(c) no solution
(d) two solutions
- 4 The pair of equations $7x - y = 5$; $21x - 3y = 10$ represents two lines which are (1)
(a) intersecting at one point
(b) parallel
(c) intersecting at two points
(d) coincident
- 5 The equation $12x^2 + 4kx + 3 = 0$ has real and equal roots, if (1)
(a) $k = \pm 3$
(b) $k = \pm 9$
(c) $k = 4$
(d) $k = \pm 2$
- 6 The points $(-5, 1)$, $(1, p)$ and $(4, -2)$ are collinear if the value of p is (1)
(a) 3
(b) 2
(c) 1

- (d) -1
- 7 The distance between the point P(1, 4) and Q(4, 0) is
 (a) 4
 (b) 5
 (c) 6
 (d) $3\sqrt{3}$
- 8 If 7 times the 7th term of an A.P. is equal to 11 times its 11th term, then 18th term is (1)
 (a) 18
 (b) 9
 (c) 77
 (d) 0
- 9 If $x = a$, $y = b$ is the solution of the pair of equations $x - y = 2$ and $x + y = 4$, then the respective values of a and b are (1)
 (a) 3, 5
 (b) 5, 3
 (c) 3, 1
 (d) -1, -3
- 10 If $x \tan 45^\circ \sin 30^\circ = \cos 30^\circ \tan 30^\circ$, then x is equal to (1)
 (a) $\sqrt{3}$
 (b) $\frac{1}{2}$
 (c) $\frac{1}{\sqrt{2}}$
 (d) 1
- 11 A sphere of maximum volume is cut out from a solid hemisphere of radius 7 cm. The ratio of the volume of the hemisphere to that of the cutout sphere is: (1)
 (a) 1:8
 (b) 8:1
 (c) 4:1
 (d) 1:2
- 12 A card is drawn from a deck of 52 cards. The event E is that the card is not an ace of hearts. The number of outcomes favorable to E is: (1)
 (a) 4
 (b) 13
 (c) 48
 (d) 51
- 13 If two parallel lines touch the circle at points A and B respectively. If area of the circle is $25\pi \text{ cm}^2$, then AB is equal to: (1)
 (a) 5cm
 (b) 25 cm
 (c) 8 cm
 (d) 10 cm
- 14 If in ΔABC and ΔPQR , we have $AB/QR = BC/PR = CA/PQ$ then: (1)
 (a) $\Delta PQR \sim \Delta CAB$
 (b) $\Delta PQR \sim \Delta ABC$

- (c) $\triangle CBA \sim \triangle PQR$
 (d) $\triangle BCA \sim \triangle PQR$

15 For the following distribution

C.I.	0-10	10-20	20-30	30-40	40-50
f	20	30	24	40	18

the sum of lower limits of the modal class and the median class is

- (a) 20
 (b) 30
 (c) 40
 (d) 50
- 16 Two poles are 25 m and 15 m high and the line joining their tops makes an angle of 45° with the horizontal. The distance between these poles is:
 (a) 5 m
 (b) 8 m
 (c) 9 m
 (d) 10 m
- 17 From a point P which is at a distance of 13 cm from the point O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is
 (a) 60 cm^2
 (b) 65 cm^2
 (c) 30 cm^2
 (d) 32.5 cm^2
- 18 $\triangle ABC \sim \triangle DEF$. If $AB = 4 \text{ cm}$, $BC = 3.5 \text{ cm}$, $CA = 2.5 \text{ cm}$ and $DF = 7.5 \text{ cm}$, then the perimeter of $\triangle DEF$ is
 (a) 10 cm
 (b) 14 cm
 (c) 30 cm
 (d) 25 cm
- 19 (Assertion): If the HCF of two numbers is 5 and their product is 150, then their LCM is 40. (1)
 Statement R(Reason): For any two positive integers p and q, $\text{HCF}(p, q) \times \text{LCM}(p, q) = p \times q$
 (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
 (c) Assertion is true but Reason is false.
 (d) Assertion is false but Reason is true.
- 20 Assertion: The point $(-1, 6)$ divides the line segment joining the points $(-3, 10)$ and $(6, -8)$ in the ratio 2 : 7 internally. (1)
 Reason: Given three points, i.e. A, B, C form an equilateral triangle, then $AB = BC = AC$.
 (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
 (c) Assertion is true but Reason is false.
 (d) Assertion is false but Reason is true.

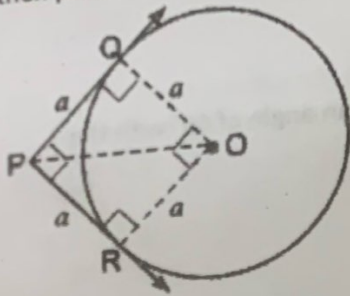
Section B

- 21 E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\Delta ABE \sim \Delta CFB$. (2)

OR
 ABC is a triangle in which $AB = AC$ and D is a point on AC such that $BC^2 = AC \times CD$. Prove that $BD = BC$.

- 22 If radii of two concentric circles are 4 cm and 5 cm, then find the length of each chord of one circle which is tangent to the other circle. (2)

OR
 If angle between two tangents drawn from a point P to a circle of radius 'a' and centre O is 90° , then prove that $OP = a\sqrt{2}$.



- 23 Solve for x and y: $2x + 3y = 11$ and $2x - 4y = -24$ (2)

- 24 To warn ships for underwater rocks, a lighthouse spreads a red coloured light over a sector of angle 80° to a distance of 16.5 km. Find the area of the sea over which the ships are warned. (Use $\pi = 3.14$) (2)

- 25 If α, β are zeroes of polynomial $x^2 - 6x + k$, find the value of k such that $(\alpha + \beta)^2 - 2\alpha\beta = 40$. (2)

Section C

- 26 Prove that $\sqrt{13}$ is an irrational number. (3)

- 27 A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60° . Find the time taken by the car to reach the foot of the tower from this point. (3)

- 28 The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. If we increase the length by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle. (3)

OR
 Students of a class are made to stand in rows. If one student is extra in each row, there would be 2 rows less. If one student is less in each row, there would be 3 rows more. Find the number of students in the class.

- 29 Prove that: $\frac{\tan^3 \theta}{1 + \tan^2 \theta} + \frac{\cot^3 \theta}{1 + \cot^2 \theta} = \sec \theta \operatorname{cosec} \theta - 2 \sin \theta \cos \theta$ (3)

- 30 Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the center of the circle. (3)

- 31 Two different dice are thrown together. Find the probability that the numbers obtained (3)

- (i) have a sum less than 7
- (ii) have a product less than 16
- (iii) is a doublet of odd numbers.

Section D

- 32 Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. (5)

OR

A passenger, while boarding the plane, slipped from the stairs and got hurt. The pilot took the passenger in the emergency clinic at the airport for treatment. Due to this, the plane got delayed by half an hour. To reach the destination 1500 km away in time, so that the passengers could catch the connecting flight, the speed of the plane was increased by 250 km/hour than the usual speed. Find the usual speed of the plane.

- 33 A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per m^2 . Here the base of the tent is not being covered with canvas. (5)

OR

There are two identical solid cubical boxes of side 7cm. From the top face of the first cube a hemisphere of diameter equal to the side of the cube is scooped out. This hemisphere is inverted and placed on the top of the second cube's surface to form a dome. Find

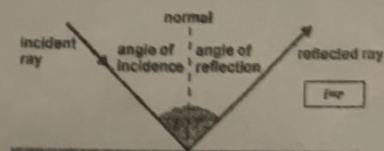
- (i) The ratio of the total surface area of the two new solids formed
 - (ii) Volume of each new solid formed.
- 34 The mean of the following frequency table is 50. But the frequencies f_1 and f_2 in class 20 – 40 and 60 – 80 respectively are missing. Find the missing frequencies. (5)

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

- 35 A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. (5)

Section E

- 36 The law of reflection states that when a ray of light reflects off a surface, the angle of incidence is equal to the angle of reflection. Ramesh places a mirror on level ground to determine the height of a pole (with traffic light fired on it). He stands at a certain distance so that he can see the top of the pole reflected from the mirror. Ramesh's eye level is 1.5 m above the ground. The distance of Ramesh and the pole from the mirror are 1.8 m and 6 m respectively. Based on the above information, answer the following questions:



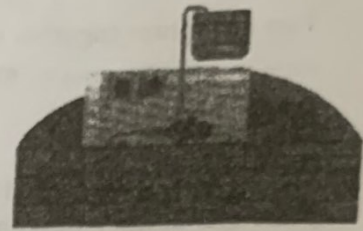
- (i) Which criterion of similarity is applicable to similar triangles?
- (ii) What is the height of the pole?
- (iii) If angle of incidence is i , find $\tan i$.

OR

- (1)
- (1)
- (2)

(iii) Now Ramesh moves behind such that distance between pole and Ramesh is 13 meters. He places a mirror between him and pole to see the reflection of light in right position. What is the distance between mirror and Ramesh ?

37 Underground water tank is popular in India. It is usually used for large water tank storage and can be built cheaply using cement-like materials. Underground water tanks are typically chosen by people who want to save space. The water in the underground tank is not affected by extreme weather conditions. The underground tanks maintain cool temperatures in both winter and summer. Electric pump is used to move water from the underground tank to overhead tank.



Ramesh recently built his house and installed a underground tank and overhead cylindrical tank. Dimensions of tanks are as follows :

Underground Tank : Base $2\text{ m} \times 2\text{ m}$ and Height 1.1 m .

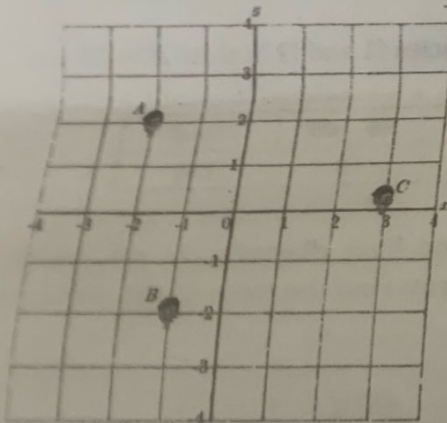
Overhead tank : Radius 50 cm and Height 175 cm

- (i) What is the capacity of the underground tank ? (1)
- (ii) What is the ratio of the capacity of the underground tank to the capacity of the overhead tank? (1)
- (iii) If curved part of overhead tank need to be painted to save it from corrosion, how much area need to be painted? (2)

OR

(iii) If water is filled in the overhead tank at the rate of 11 litre per minute, the tank will be completely filled in how much time?

38 Ajay, Bhigu and Colin are fast friends 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 considers the centre of class as origin and marks their position on a paper in a co-ordinate system. One day, Bhigu makes the following diagram of their seating position.

- (i) What is the distance of point Ajay from centre of the class ? (1)
- (ii) What is the distance between Ajay and Bhigu ? (1)
- (iii) Dhruv is sitting at the line segment between points Ajay and Bhigu such that $AD : DB = 4 : 3$. What are the the coordinates of point D? (2)

OR

(iii) Eklavya is sitting between Ajay and Colin such that Eklavya is at the mid point. What are the coordinates of point E?
