

Date: 11.12.2020

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 of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. Each case study has 5 case based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part B

1. It consists of three sections III, IV and V.
2. In section III, questions 21-26 are very short answer type question of 2 marks each.
3. In section IV, question numbers 27-33 are short answer type question of 3 marks each.
4. In section V, questions 34 to 36 are long answer type questions of 5 marks each.
5. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART-A
SECTION-1

- Q1.** If H.C.F. of 60 and 168 is 12, find their L.C.M.
- Q2.** After how many decimals the rational number $\frac{7}{2^4 \times 5}$ will terminate.
- Q3.** State the fundamental theorem of arithmetic.
- Q4.** For what values of P does the pair of equation given below has unique solution

$$4x + py + 8 = 0$$

$$2x + 2y + 5 = 0$$

- Q5.** Comment on the nature of the graphs of the equations

$$3x + 2y = 5$$

$$2x - 3y = 7$$

- Q6.** If the sum of the roots of the equation $x^2 - (k + 6)x + 2(2k - 1)$ is equal to half their product, then what is k.

OR

If 3 is a solution of $3x^2 + (k - 1)x + 9 = 0$, then find the value of k.

- Q7.** What is the value of x, if $x - 2$, $4x - 1$, and $5x + 2$ are in A.P.
- Q8.** If $\triangle ABC \sim \triangle DEF$, and the ratio of area of $\triangle ABC$ to that of area of $\triangle DEF$ is 49:25, then what is the ratio of their corresponding medians?
- Q9.** ABC and BDE are two equilateral triangles such that D is the midpoint of BC. Find the ratio of area of triangles ABC and BDE.
- Q10.** ABC is an isosceles triangle right angled at C. Find AB^2

OR

If ABC is an equilateral triangle of side 2a, then find its altitude.

- Q11.** In $\triangle ABC$, $PQ \parallel AB$ and $\frac{PQ}{AB} = \frac{3}{8}$, then what is the area of $\triangle CPQ$ if area of $\triangle CAB = 128 \text{ cm}^2$.

OR

In $\triangle ABC$, $DE \parallel BC$. If $\frac{AD}{DB} = \frac{2}{3}$ and $AC = 18$ cm, find AE .

Q12. If the midpoint of the line segment joining the points $P(a, b - 2)$ and $Q(-2, 4)$ is $(2, -3)$, find 'a' and 'b'.

OR

Find the distance of the point $(-3, -2)$ from the origin.

Q13. What point on X axis is at a distance of 5 units from the point $(5, -4)$.

Q14. If $\cos \theta = \frac{p}{2}$, evaluate $\frac{1}{p} \sec \theta$

Q15. Tangents AP and AQ are drawn from an external point A to the circle with center 'O' are perpendicular to each other and length of each tangent is 5 cm, then find the radius.

Q16. Two coins are tossed simultaneously. What is the probability of getting exactly one head?

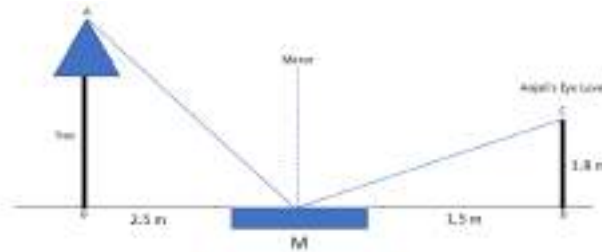
OR

A card is drawn from a pack of 52 cards. What is the probability that the card is a red queen?

SSECTION- II

Case study based asked questions are compulsory. Attempt any four sub parts of each question. Each sub part carries 1 mark.

Q17. Teacher gives an activity to the students to measure the height of the tree and asks them who will do the activity. Anjali accepts the challenge. She places a mirror on level ground to determine the height of the tree. She stands at a certain distance so that she can see the top of the tree reflected from the mirror. Anjali's eye level is 1.8 m above ground. The distance of Anjali and the tree from the mirror are 1.5 m and 2.5 m respectively. Answer the questions stated below



a. Name the two similar triangles formed in the diagram.

- i. $\triangle ABM \sim \triangle CMD$ ii. $\triangle AMB \sim \triangle CDM$
iii. $\triangle ABM \sim \triangle CDM$ iv. None of the above

b. State the criteria of similarity that is applicable here

- i. S.S.S ii. S.A.S iii. A.A iv. A.S.A

c. Find the height of the tree

- i. 3 m ii. 3.5 m iii. 2.5 m iv. 4 m

d. In $\triangle ABM$, if angle $BAM = 30^\circ$, then find the angle MCD

- i. 40° ii. 45° iii. 60° iv. 30°

e. If $\triangle ABM$ and $\triangle CDM$ are similar, $CD = 6$ cm, $MD = 8$ cm and $BM = 24$ cm, then what is AB

- i. 17 cm ii. 18 cm iii. 12 cm iv. 24 cm

Q18. Underground water sump is popular in India. It is usually used for large water sump storage and can be built cheaply using cement-like materials. Underground water sump is typically chosen by people

who want to save space. The water in the underground sump is not affected by extreme weather conditions. The underground sump maintains cool temperatures in both winter and summer.



A builder wants to build a sump to store water in an apartment. The volume of the rectangular sump will be modelled by $V(x) = x^3 + x^2 - 4x - 4$

- He planned in such a way that its base dimensions are $(x + 1)$ and $(x + 2)$. How much he has to dig?
 - $(x + 1)$
 - $(x - 2)$
 - $(x - 3)$
 - $(x + 2)$
- If $x = 4$ meter, what is the volume of the sump?
 - 30 m^3
 - 20 m^3
 - 15 m^3
 - 60 m^3
- If $x = 4$ and the builder wants to paint the entire inner portion on the sump, what is the total area to be painted?
 - 52 m^2
 - 96 m^2
 - 208 m^2
 - 104 m^2
- If the cost of paint is Rs. 25/- per square metre, what is the cost of painting?
 - 3900 Rs
 - 2600 Rs
 - 1300 Rs
 - 5200 Rs
- What is the storage capacity of this sump?
 - 3000 litres
 - 6000 litres
 - 60000 litres
 - 30000 litres

Q19. Arithmetic progression is sequence of numbers such that the difference of any row successive numbers of the sequence is a constant

Reema being a plant lover decides to open a nursery and she bought a few plants with pots. She wants to place pots in such a way that the numbers of pots in first row is 3, second is 5, third row is 7 and so on....

- If Reema wants to place 120 pots in total, then the total number of rows formed in this arrangement is



- 12
 - 10
 - 14
 - 8
- How many pots are placed in the last row.
 - 22
 - 21
 - 24
 - 18
 - Find the difference in the number of pots placed in 8th row and 3rd row
 - 10
 - 11
 - 14
 - 15
 - If Reema has sufficient space for 15 rows, then how many total numbers of pots are placed by her with the same arrangement
 - 200
 - 150
 - 255
 - 180
 - If for an A.P, $a_n = 4n + 5$, find the common difference
 - 5
 - 4
 - 1
 - 0

Q20. Application of Parabolas – highway overpasses/underpasses

A Highway underpass is parabolic in shape.

A parabola is the graph that results from $p(x) = ax^2 + bx + c$. Parabolas are symmetric about a vertical line known as the axis of symmetry. The axis of symmetry runs through the maximum or minimum point of the parabola is called the vertex.

a. If the highway overpass is represented by $x^2 - 4x$, then its zeros are:

- i. (2, -2) ii. (0, 4) iii. (0, -4) iv. (4, -4)

b. If one zero of polynomial $3x^2 - 8x - 2k - 1$ is seven times the other, the value of k is:

- i. 3 ii. $1/3$ iii. $-5/3$ iv. None of these

c. The representation of the highway whose zeros are 5 and -5 is:

- i. $x^2 - 5x - 5$ ii. $x^2 - 25$ iii. $x^2 - 5$ iv. $x^2 + 5x - 5$

d. If the product of the zeros of the polynomial $kx^2 + 41x + 42$ is 7, then the zeros of the polynomial $(k-4)x^2 + (k+1)x + 5$ is:

- i. (-1, 0) ii. (0, $5/3$) iii. (0, $5/2$) iv. (-1, $-5/2$)

e. If $p(x) = ax^2 + bx + c$ represents highway underpass and $a + c = b$, one of its zeros is:

- i. 0 ii. 1 iii. -1 iv. Cannot be determined

PART B

SECTION III

Q21. In a morning walk Arun, Tarun and Praveen step off together, their steps measures 84 cm, 90 cm and 120 cm respectively. What is the minimum distance each should walk so that one can cover the distance in complete steps.

Q22. Find the value of 'a' so that the point (3, a) lies on the line represented by $2x - 3y = 5$

Q23. For what value of k, does $(k - 12)x^2 + 2(k - 12)x + 2 = 0$ has equal roots

Q24. Find the roots of the quadratic equation $3\sqrt{2}x^2 - 5x - \sqrt{2} = 0$

OR

Solver the Equation $\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2$

Q25. If A (-2, 4), B (0, 0) and C (4, 2) are the vertices of ΔABC , then find the length of the median through the vertex A.

OR

If the point A (6, 1), B (8, 2), C (9, 4) and D (P, 3) are the vertices of a parallelogram, taken in order, find the value of P.

Q26. A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm, find the height of the cylinder

OR

A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to the radius. Find the volume of the solid in terms of π .

SECTION IV

Q27. Find the coordinates of the points of trisection of the line segment joining the points A (2, -2) and B (-7, 4)

Q28. Prove that $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$

