CBSE : SCIENCE PAPER

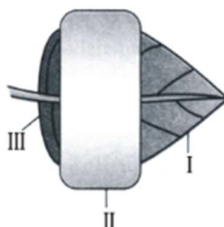**MAX. MARKS : 80**   **Time Allowed: 3 hours**

GENERAL INSTRUCTIONS:

‣ This question paper consists of 39 questions in 3 sections.

Section A is Biology,

Section B is Chemistry and

Section C is Physics.

‣ All questions are compulsory. However, an internal choice is provided in some questions.

A student is expected to attempt only one of these questions.

SECTION - A (BIOLOGY)

1. _____ molecules of pyruvic acid are formed at the end of glycolysis.   **(1)**

(A) 1   (B) 2   (C) 3   (D) 4

2. Function of chlorophyll in photosynthesis is   **(1)**

(A) Absorbing light energy   (B) Breaking down H_2O molecules

(C) No function   (D) Reduction of CO_2

3. Which of following statement is correct regarding the fishes?   **(1)**

(A) Blood passes twice through the heart.

(B) Both oxygenated and deoxygenated blood flows through the heart.

(C) Only deoxygenated blood flows through the heart.

(D) Heart has three chambers, 2 atrium & 1 ventricle.

4. The instrument by which BP of man is determined   **(1)**

(A) Ultrasound   (B) BP meter

(C) Stethoscope   (D) Sphygmomanometer

5. Glycolysis occurs in   **(1)**

(A) Cytoplasm   (B) Mitochondria

(C) Chloroplast   (D) Golgi complex

6. Given alongside is a sketch of a leaf partially covered with black paper and which is to be used in the experiment to show that light is compulsory for the process of photosynthesis. At the end of the experiment, which one of the leaf parts labelled, I, II and III will become bluish black when dipped in iodine solution?

(A) I only   (B) II only   (C) I and III   (D) II and III   **(1)**

7. Lumen is wide in   **(1)**

(A) Artery   (B) Veins

(C) Capillaries   (D) None of these

8. Assertion(A): When guard cells become turgid due to entry of water, the stomata get closed

   Reason(R): When guard cells become flaccid due to the loss of water, the stomata get opened **(1)**

   (A) Both A and R are true and R is the correct explanation of A

   (B) Both A and R are true and R is the not correct explanation of A

   (C) A is true but R is false

   (D) Both A & R are false

9. **Assertion:** Lymph flows in one direction only i.e. from tissues to heart **(1)**

   Reason: It consists of plasma proteins, RBCs and WBCs.

   (A) If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

   (B) If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

   (C) If Assertion is True but the Reason is False.

   (D) If Assertion is False but the Reason is True.

10. What are the necessary conditions for autotrophic nutrition and what are its by products? **(2)**

11. **Attempt either option A or B:** **(2)**

A. Is nutrition necessary for an organism? Explain.

<div align="center">**OR**</div>

B. What are the advantages of sexual reproduction over asexual reproduction?

12. What are the advantages of tissue culture? **(2)**

13. (i) What is ozone depletion ? **(3)**

    (ii) How to control the ozone depletion

14. Write a short note on excretion in plants. **(3)**

15. **Attempt either subpart A or B:** **(4)**

A. List the various characters that Mendel studied in garden pea plant also give their dominant and recessive forms.

<div align="center">**OR**</div>

B. How is the equal genetic contribution of male and female parents ensured in the progeny?

16. **Attempt either option A or B:** **(5)**

A. (i) Mention three major regions of brain. Write one function of each.

   (ii) State one example of chemotropism.

   (iii) Name the hormones secreted by the following endocrine glands.

   (a) Thyroid   (b) Pituitary   (c) Pancreas

<div align="center">**OR**</div>

B. What is vegetative propagation? When is it used? Name three methods of vegetative propagation. Explain any one method.

SECTION - B (CHEMISTRY)

17. Which one of the following is an example of a double decomposition reaction as well as precipitation reaction ? Given that reactants are taken in aqueous solution (1)

   (A) $NaOH + HCl \rightarrow NaCl + H_2O$

   (B) $FeS + H_2SO_4 \rightarrow FeSO_4 + H_2S$

   (C) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

   (D) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

18. Which of the following reaction is an endothermic reaction? (1)

   (A) Burning of coal

   (B) Decomposition of vegetable matter into compost

   (C) Process of respiration

   (D) Decomposition of calcium carbonate to form quick lime and carbon dioxide

19. Sodium carbonate (Na_2CO_3) was treated with dilute hydrochloric acid. The gas evolved was continuously passed through lime water. The changes observed will be - (1)

   (A) first colourless, then milky   (B) first milky, then colourless

   (C) milky throughout   (D) colourless throughout

20. During the preparation of hydrogen chloride gas on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to (1)

   (A) absorb the evolved gas

   (B) moisten the gas

   (C) absorb moisture from the gas

   (D) absorb Cl^- ions from the evolved gas

21. Which of the following statements is not correct? (1)

   (A) Metal oxide are basic in nature whereas non-metal oxides are acidic .

   (B) Amphoteric oxides are neutral oxides which

   neither react with acids nor with bases

   (C) Sodium metal cannot be kept in the open air

   (D) Copper is more reactive than silver

22. In the electrolytic refining of copper (1)

   (A) Impure copper is made the anode and cathode is of pure copper

   (B) Impure copper is made the cathode and anode is of pure copper

   (C) Impurities fall below the pure copper plate

   (D) This method is used only for refining of copper and for no other metal

23. Ethene reacts with Br_2 in CCl_4 to give (1)

   (A) 1, I-dibromoethane   (B) I-bromoethane

   (C) 1, 2-dibromoethane   (D) tetrabromoethane

24. The following question consists of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below: (1)

   Assertion (A): Urea is an organic compound.

   Reason (R): It dissolves in water.

   (A) Both A and R are true, and R is the correct explanation of A.

   (B) Both A and R are true, and R is not the correct explanation of A.

   (C) A is true but R is false.

   (D) A is false but R is true.

25. Which the help of chemical equation show and name the process of converting vegetable oil to vegetable ghee. (2)

26. **Attempt either option A or B.**

(A) A metal M is found in nature as its carbonate, MCO_3. It is used in galvanisation of iron articles. Identify the metal M and name its ore, MCO_3. How will you convert this carbonate ore into free metal? Explain with equation. (3)

OR

(B) An ore on treatment with dilute hydrochloric acid gives a smell like that of rotten eggs. What type of ore is this? How can the metal be obtained from the concentrate ore?

27. A white powder is used by doctors to support fractured bones (3)

(a) Write the name and chemical formula of the powder.

(b) How is this powder prepared?

(c) When this white powder is mixed with water, a hard solid mass obtained. Write a balanced chemical equation for this change.

(d) Give one more use of this white powder.

28. What would a student report nearly after 30 minutes of placing duly cleaned strips of aluminium copper, iron and zinc in freshly prepared iron sulphate solution taken in four beakers. (4)

OR

2g of ferrous sulphate crystals are heated in dry boiling tube.

(a) List any one observation.

(b) Name the type of chemical reaction taking place.

(c) Write balanced chemical equation for the reaction and name the products formed.

29. *Attempt either option A or B.* (5)

(A) The formulae of the four organic compounds are given below:

A	B	C	D
C_2H_4	CH_3COOH	C_2H_5OH	C_2H_6

(i) Which one of compounds A, B, C or D is a saturated hydrocarbon?

(ii) Identify the organic acid and give its structural formula.

(iii) Which of the above compounds when heated to 443 K in the presence of concentrated H_2SO_4 forms ethene as the major product? What is the role played by concentrated H_2SO_4 in this reaction? Also write the chemical equation involved.

(iv) Give a chemical equation when B and C react with each other in the presence of concentrated H_2SO_4. Name the major product formed and mention one of its important use.

OR

(B) (a) Define the term 'isomer'.

(b) Two compounds have same molecular formula C_3H_6O. Write the names of these compounds and their structural formula.
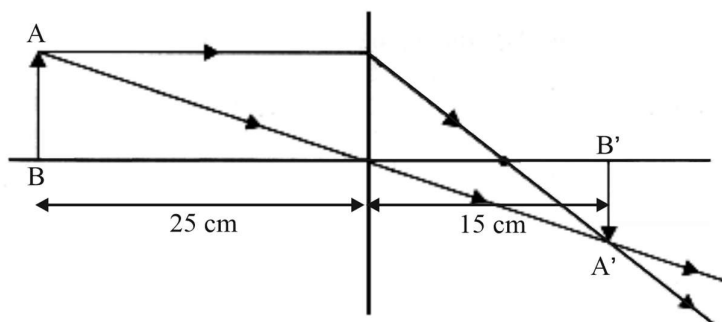
(c) How will you bring the following conversions:

(i) Ethanol to ethene.

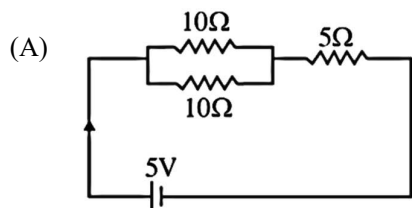(ii) Propanol to propanoic acid.

SECTION - C (PHYSICS)

30. Read the following statements **(1)**

(i) Current through a wire is inversely proportional to its resistance.

(ii) Resistance of a wire is directly proportional to its length and inversely proportional to its area of cross-section.

(iii) Resistance of a wire is directly proportional to resistivity of its material which depends on shape and size of the wire.

Choose from the following the correct option that lists the correct statements about resistance and current through a wire.

(A) i and ii   (B) i, ii and iii   (C) ii and iii   (D) i and iii

31. Where should the light bulb of car headlight be placed on the axis of concave mirror to give strong parallel beam of light. **(1)**

(A) Centre of Curvature   (B) Infinity

(C) Focus   (D) Between Focus and Pole

32. The following question consists of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below: **(1)**

Assertion (A): The blue colour of sky is due to scattering of light by air molecules and other fine particles in the atmosphere.

Reason(R): The blue color of the sky is due to longer wavelengths like red and orange scattering more than shorter wavelengths, making blue stand out more.

(A) Both A and R are true, and R is the correct explanation of A.

(B) Both A and R are true, and R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

33.

The above image shows the formation of an image with an optical instrument. **(2)**

(A) Identify the optical instrument in the image.

(B) What type of image is formed in this case?

(C) Based on the measurements given in the image, calculate the focal length of the instrument.
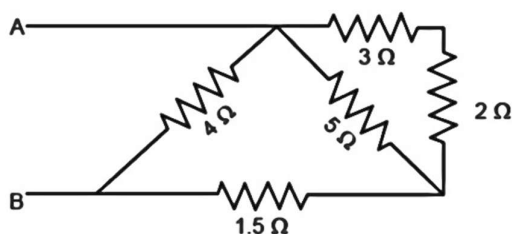
34. Attempt either A or B **(2)**

(A)

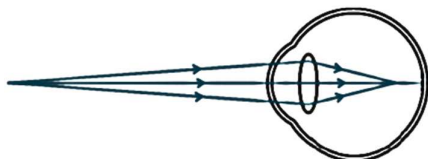Find out the following in the electric circuit given in the figure:

(i) Effective resistance of two 10 ohm resistors in the combination.

(ii) Current flowing through the 5 ohm resistor

OR

(B)   Calculate the total resistance of the given circuit across the ends A and B.

35.   **(3)**
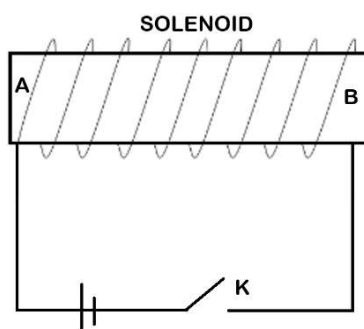

The above image shows a particular defect of vision.

(i) Identify the defect of vision and state what kind of lens is used to correct this defect.

(ii) Draw and label a ray diagram that shows the defect of vision in the above case after correction.

36.   Figure shows the circuit diagram of a solenoid connected to a battery. Based on the diagram answer following questions: **(3)**

(i) State the polarity of ends A and B when the circuit is closed.

(ii) How the polarity of ends can be reversed?

(iii) State the nature of magnetic field lines within the solenoid. Justify your answer.

37.   A piece of wire of resistance 10 ohm is stretched to double its length. Calculate the resistance of new wire. Also how much does resistance change if diameter of original wire is doubled?   **(3)**

38.   Read the given passage: **(4)**

In case of Spherical Mirror size and nature of the image depends upon the type of reflective surface of the mirror and the position of the object from the mirror. Concave mirror which is curved inward can converge the light rays and Convex mirror which is curved outward diverges the light rays coming from the object resulting in image formation. Spherical Mirror finds use in torch, car headlight, car rear view mirror, dentist mirror etc.

Answer the following question based on above passage:

(A)   No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be

(a) only convex   (b) only plane

(c) either plane or convex   (d) only concave

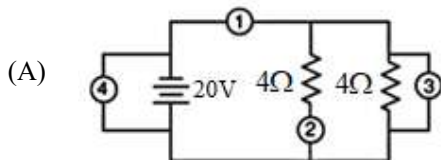(B)   Which mirror is used by dentist. Explain why?

Attempt either subpart C or D

(C) A dentist uses a mirror of focal length 2 cm to view defects in tooth of a patient. The mirror forms 3 times magnified image of the tooth. Calculate the object (tooth) distance from the mirror.

OR

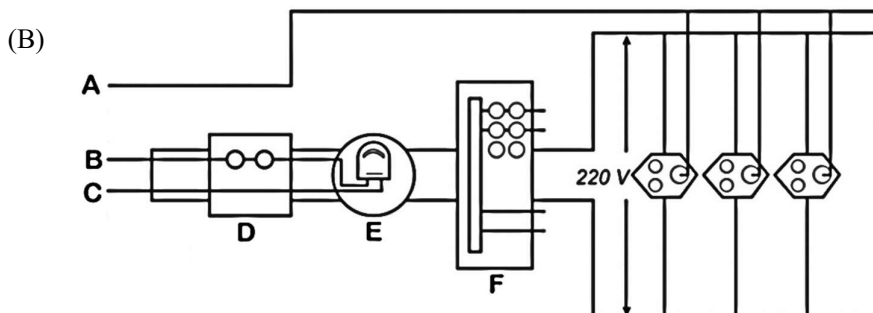(D) Draw a suitable Ray Diagram to show image formation by a Convex Mirror.

39. *Attempt either option A or B* **(5)**

(A)

In the above circuit diagram two equal resistances of value 4 ohm are connected to a voltage source of 20 V. Possible locations of an ammeter and a voltmeter in the circuit is marked by circles 1, 2, 3, 4.

(i) Calculate the current in each resistance

(ii) Calculate the power dissipated across each resistance

(iii) Mention where should an ammeter be placed in the circuit to measure the total current and where should a voltmeter be placed to measure the total voltage correctly. Justify your answer.

(B)

Above diagram shows common domestic circuit. Different electrical components are marked with letters A, B, C, D, E and F. Based on the diagram answer the following questions

(i) Name the components marked with letter A, B and C respectively.

(ii) Name the components which are used as safety measures in the domestic circuits. Briefly explain how will they prevent from accidents and damage.

(iii) In a household 5 bulbs of power 10 W, 3 fans of power 60 W and an AC of power 1.2 kW is connected to a power supply of 220 V. If all the appliances connected are used for 10 hours per day then calculate the cost of total energy to operate the appliances for 30 days at Rs. 3.00 per kWh.

SUBJECT: MATHEMATICS   **CLASS: FT (X)**

TIME: 3 HRS.   **MAX. MARKS: 80**

GENERAL INSTRUCTIONS:

‣ The question paper consists of **38 questions** divided into 3 section A, B & C.

‣ This Question Paper is divided into 5 Sections A, B, C, D and E.

‣ **SECTION-A** comprises of **20** questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.

‣ **SECTION-B** comprises of **5 q**uestions no. 21-25 are very short answer (VSA) type questions, carrying 2 marks each.

‣ **SECTION-C** comprises of **6 questions** no. 26-31 are short answer (SA) type questions, carrying 3 marks each.

‣ **SECTION-D** comprises of **4 questions** no. 32-35 are long answer (LA) type questions, carrying 5 marks each.

‣ **SECTION-E** comprises of **3 questions** no. 36-38 are case study-based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively

‣ All Questions are compulsory. However, an internal choice in 2 Questions of section B, 2 Questions of section C and 2 Questions of section D has been provided. And internal choice has been provided in all the 2 marks questions of Section E.

‣ Draw neat and clean figures wherever required.

‣ Take π =22/7 wherever required if not stated.

‣ Use of calculators is not allowed.
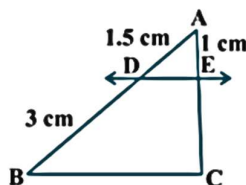
SECTION - A

Section A consists of 20 questions of 1 mark each.

1. The centroid of the triangle whose vertices are (3, –7), (–8, 6) and (5, 10) is

   (a) (0, 9)   (b) (0, 3)   (c) (1, 3)   (d) (3, 5)

2. The value of the expression $\csc(75+\theta) - \sec(15-\theta) - \tan(55+\theta) + \cot(35-\theta)$ is

   (a) –1   (b) 0   (c) 1   (d) $\dfrac{3}{2}$

3. IF the Distance Between the point A(4, p) and B(1, 0) is 5 units then the value of p is

   (a) 4 only   (b) – 4 only   (c) ± 4 (d) 0

4. If the sum of zeroes of the quadratic polynomial $kx^2 + 2x + 3k$ is equal to their product, then k equals to

   (a) $\dfrac{1}{3}$ (b) $-\dfrac{1}{3}$ (c) $\dfrac{2}{3}$ (d) $-\dfrac{2}{3}$

5. IF one zero of the quadratic polynomial $x^2 + 3x + K$ is 2, then value of K is

   (a) 10   (b) –10   (c) –7   (d) –2

6. In the adjoining figure, OABC is a square of side 7 cm, OAC is a quadrant of circle with centre O. The area of shaded region is
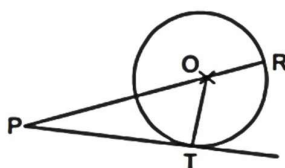

   (a) 10.5 cm²   (b) 38.5 cm²   (c) 49 cm²   (d) 11.5 cm²

7. If the angle of depression of object from a 75 m high tower is 30°, then the distance of object from the tower is

(a) $25\sqrt{3}$ m   (b) $50\sqrt{3}$ m   (c) $75\sqrt{3}$ m   (d) 150 m

8. In an A.P. if a = 3.5, d = 0, n = 101 then a_n will be

(a) 0   (b) 3.5   (c) 103.5   (d) 104.5

9. In the given figure DE∥BC. The value of EC is

(a) 1.5 cm   (b) 3 cm   (c) 2 cm   (d) 1 cm

10. If the radius of the sphere is increased by 100% the volume of the corresponding sphere is increased by

(a) 200%   (b) 500%   (c) 700%   (d) 800%

11. The Median and Mode Respectively of a frequency distribution are 26 and 29. Then its Mean is.

(a) 27.5   (b) 24.5   (c) 28.4   (d) 25.8

12. An event is very unlikely to happen. Its probability is closest to

(a) 0.0001   (b) 0.001   (c) 0.01   (d) 0.1

13. The 2 digit number which becomes $\frac{5}{6}$th of itself when its digits are reversed. The difference in the digits of the number being 1, then the two digits number is –

(a) 45   (b) 54   (c) 36   (d) None of these

14. The nth term of the AP a, 3a, 5a is

(a) na   (b) $(2n-1)a$ (c) $(2n+1)a$ (d) 2na

15. For which value of p will the lines represented by the following pair of linear equations be parallel

$3x - y - 5 = 0$
$6x - 2y - p = 0$

(a) All real value except 10   (b) 10

(c) $\frac{5}{2}$ (d) $\frac{1}{2}$

16. $\left(x^2 + 1\right)^2 - x^2 = 0$ has

(a) Four real roots   (b) Two real roots

(c) No real roots   (d) One real roots

17. In figure, on a circle of radius 7 cm, tangent PT is drawn from a point p such that PT = 24cm. If O is the centre of the circle, then the length of PR is

(a) 30 cm   (b) 28 cm   (c) 32 cm   (d) 25 cm

18. Each root of $x^2 - bx + c = 0$ is decreased by 2. The resulting equation is $x^2 - 2x + 1 = 0$ then

    (a) b = 6, c = 9   (b) b = 3, c = 5   (c) b = 2, c = –1   (d) b = –4, c = 3

    DIRECTIONS: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

19. **Assertion (A) :** 12^n ends with the digit zero, where n is natural number.

    Reason (R): Any number ends with digit zero, if its prime factor is of the form $2^m \times 5^n$, where m, n are natural numbers.

    Choose the correct option:

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

    (B) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

    (C) Assertion (A) is true but reason (R) is false.

    (D) Assertion (A) is false but reason (R) is true.

20. **Assertion (A):** The value of y is 6 for which the distance between p(2, –3) and Q(10, y) is 10.

    Reason (R): Distance between two points $A(x_1, y_1)$ & $B(x_2, y_2)$ is given $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

    Choose the correct option:

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

    (B) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

    (C) Assertion (A) is true but reason (R) is false.

    (D) Assertion (A) is false but reason (R) is true.

SECTION - B

Section B consists of 5 questions of 2 marks each.

21. Find the value of sin 30° cos 60° + cos 30° sin 60° is it equal to sin 90° or cos 90°.

22. In a rectangle ABCD, E is a point on AB such that $AE = \dfrac{2}{3} AB.$ If AB = 6 km, and AD = 3 km then, find DE.

23. Find the mode of the following distribution

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

OR

The data regarding marks obtained by 48 students of a class in a class test is given below. Calculate modal marks of students.
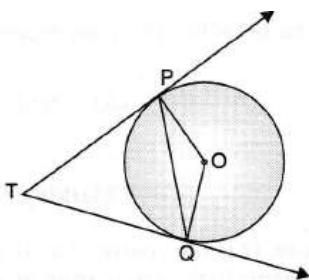
Marks obtained	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
Number of students	1	0	2	0	0	10	25	7	2	1

24. Show that 571 is a prime number.

OR

If two positive integers p and q are written as $p = a^2 b^3$ and $q = a^3 b$, where a and b are prime numbers than verify $LCM(p,q) \times HCF(p,q) = pq$

25. 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 point P and Q. Respectively find ∠PTQ.

SECTION - C

Section C consists of 6 questions of 3 marks each.

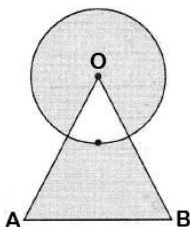26. The marks obtained by 110 students in an examination are given below.

Marks	$30-35$	$35-40$	$40-45$	$45-50$	$50-55$	$55-60$	$60-65$
No. of students	14	16	28	23	18	8	3

Find the mean marks of the students.

27. Find the middle term of the A.P. 7, 13, 19, …. 247.

28. The circumference of the circle exceeds the diameter by 16.8 cm. Find the radius of the circle. $\left(\text{use } \pi = \dfrac{22}{7} \right)$

OR

Find the area of shaded region shown in the given figure where a circular are of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre.

29. Prove that: $\left(\sin\theta + \operatorname{cosec}\theta \right)^2 + \left(\cos\theta + \sec\theta \right)^2 = 7 + \tan^2\theta + \cot^2\theta$

30. If the point C(–1, 2) divides internally the line segment joining the points A(2, 5) and B(x, y) in the ratio 3 : 4, find the value of $x^2 + y^2$.

OR

Find the ratio in which the point (–3, p) divides the line segment joining the points (–5, –4) and (–2, 3). Hence find the value of p.

31. 144 cartons of coke cans and 90 cartons of pepsi cans are to be stacked in a canteen. If each stack is of the same height and if it equal contain cartons of the same drink. What would be the greatest number of cartons each stack would have?

SECTION - D

Section D consists of 4 questions of 5 marks each.

32. 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 $r = \dfrac{a + b - c}{2}$

33. The internal and external diameters of a hollow hemispherical vessel are 16 cm and 12 cm respectively. If the cost of painting 1 cm² of the surface area is ₹5. Find the total cost of painting the vessel all over. $\left(\text{use } \pi = 3.14\right)$

34. Determine graphically whether the following pair of linear equations.

    $3x - y = 7$

    $2x + 5y + 1 = 0$ has

    (i) unique solution

    (ii) Infinite many solution or

    (iii) No solution

    OR

    Solve the following pair of linear equation graphically.

    $x + 3y = 12, \ 2x - 3y = 12$

    Also shade the region bounded by the line $3x - 3y = 2$ and both the co-ordinate axes.

35. A vertical tower stands on horizontal plane and is surmounted by a vertical flag-staff of height 6m. At a point on the ground angle of elevation of the bottom and top of the flag-staff are 30° and 45° respectively. Find the height of the tower. (Take $\sqrt{3} = 1.73$)

    OR

    From the top of tower, 100 m high, a men observes two cars on the opposite sides of the tower with the angles of depression 30° and 45° respectively. Find the distance between the cars (use $\sqrt{3} = 1.73$)

SECTION - E

Section E consists of 3 case study based questions of 4 marks each.

36. Family Structures: For a recent year, 51% of the families in the United States had no children under the age of 18; 20% had one child; 19% had two children; 7% had three children; and 3% had four or more children.

If a family is selected at random, find the following probability.

(i) Find the probability that the family has two or three children. **(1)**

(ii) Find the probability that the family has more than one child. **(1)**

(iii) Find the probability that the family has less than three children. **(2)**

OR

(iii) Find the probability that the family has more than three children.

37. Rani wants to make the curtains for her window as shown in the figure. The window is in the shape of a rectangle, whose width and height are in the ratio 2 : 3. The area of the window is 9600 square cm.

(i) What is the shape of the window that is uncovered? **(1)**

(ii) What will be the ratio of two sides of each curtain (other than hypotenuse)? **(1)**

(iii) What are the dimensions of the window? **(2)**

OR

(iii) How much window area is covered by the curtains?

38. Riya has a lawn with a flowerbed and grass land. The grass land is in the shape of rectangle while flowerbed is in the shape of square. The length of the grassland is found to be 3 m more than twice the length of the flowerbed. Total area of the whole lawn is 1260 m^2.

(i) If the length of the flowerbed is x m then what is the total length of the lawn? **(1)**

(ii) What is the value of x if the area of total lawn is 1260 m^2? **(1)**

(iii) What is the area of grassland? **(2)**

OR

(iii) What is the ratio of area of flowerbed to area of grassland?