# 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.** Select the option in which all organisms show autotrophic mode of nutrition. **(1)**

(A) Cuscuta, Algae, Grass, Mango

(B) Algae, Grass, Mango, Rose

(C) Yeast, Mushroom, Mango, Grass

(D) Lichen, Mango, Grass, Tapeworm

**2.** The breakdown of glucose in the presence of oxygen results in: **(1)**

(A) Lactic acid + Energy

(B) Carbon dioxide + Water + Energy

(C) Ethanol + Carbon dioxide + Energy

(D) Lactic acid + Carbon monoxide + Energy

**3.** Which part of the brain controls involuntary actions like heartbeat and breathing? **(1)**

(A) Cerebrum (B) Cerebellum

(C) Medulla oblongata (D) Pons

**4.** A person has low thyroxine levels. Which gland is not functioning properly? **(1)**

(A) Adrenal (B) Thyroid (C) Parathyriod (D) Pancreas

**5.** In a cross between red-flowered pea plant (RR) and white-flowered pea plant (rr), all $F_1$ plants bear red flowers. Which law of inheritance does this illustrate? **(1)**

(A) Law of Independent Assortment (B) Law of Dominance

(C) Law of Segregation (D) Law of Recessiveness

**6.** Which of the following statements about ozone is incorrect?

(A) Ozone protects life on Earth from harmful UV rays. **(1)**

(B) Ozone is formed in the upper atmosphere by the action of UV light.

(C) Ozone is destroyed by chlorofluorocarbons (CFCs).

(D) Ozone is gas with 4 oxygen atoms

**7.** Which of the following activities can help reduce non-biodegradable waste? **(1)**

(A) Burning of plastic

(B) Composting of leaves

(C) Reusing plastic bottles

(D) Using more polythene bags

**8.** Assertion (A):Stomata are present on the surface of leaves. **(1)**

Reason (R): Stomata help in gaseous exchange and transpiration.

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

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

(C) A is true, but R is false.

(D) A is false, but R is true.

**9.** Assertion (A):Energy flow in a food chain is unidirectional. **(1)**

Reason (R): The energy available to each successive trophic level increases.

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

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

(C) A is true, but R is false.

(D) A is false, but R is true.

**10.** Why do plants not have a specialized excretory system like animals? Explain briefly. **(2)**

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

A. Describe the process of double circulation in humans.

**OR**

B. Explain with the help of a diagram how oxygen and carbon dioxide are transported in alveoli in human beings.

**12.** If Ravi is consuming curd/yogurt for lunch, which trophic level in a food chain should he be considered as occupying? **(2)**

**13.** Mention three major regions of brain. Write one function of each. **(3)**

**14.** In a genetic experiment, plants with pure tall red flowers (TTRR) were crossed with plants having dwarf white flowers (ttrr). **(3)**

(i) Show the gametes formed when $F_1$ plants are self-pollinated.

(ii) Out of 256 offspring obtained in $F_2$ generation, show the number of plants with each possible combination of height and flower colour.

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

A. Rina ate a meal consisting of rice and fried paneer.

(i) Which nutrients are present in these foods?

(ii) Describe how each nutrient is digested and absorbed in the body.

**OR**

B. Explain photosynthesis and its importance.

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

A. (i) How does asexual reproduction differ from sexual reproduction?

(ii) Mention one advantage and one disadvantage of this Asexual reproduction.

**OR**

B. A farmer grew 20 pumpkin plants in two greenhouses. In Greenhouse 1, he manually dusted pollen grains from male flowers onto female flowers. In Greenhouse 2, he did not perform any such activity.

(i) Which greenhouse will yield more fruits and why?

(ii) Mention any three structural or physiological changes that happen in a flower after fertilization.

## SECTION - B (CHEMISTRY)

**17.** Which of the given statements about the reaction below are incorrect? (1)

$$2PbO(S) + C(s) \rightarrow 2Pb(s) + CO_2(g)$$

a. Lead is getting reduced

b. Carbon dioxide is getting oxidised

c. Carbon is getting oxidised

d. Lead oxide is getting reduced

(A) (a) and (b) (B) (a) and (c)

(C) (a), (b) and (c) (D) All

**18.** Four statements about the reactions of oxides with dilute hydrochloric acid and aqueous sodium hydroxide are listed. (1)

I. Lead oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide.

II. Calcium oxide reacts with dilute hydrochloric acid and aqueous sodium hydroxide.

III. Zinc oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide.

IV. Sulphur dioxide does not react with either dilute hydrochloric acid or aqueous sodium hydroxide.

Which statements are correct?

(A) I and II (B) I and III (C) II and IV (D) III and IV

**19.** Which of the following is the correct arrangement of the given metals in ascending order of their reactivity?

Zinc, Iron, Magnesium, Sodium (1)

(A) Zinc > Iron > Magnesium > Sodium

(B) Sodium > Magnesium > Iron > Zinc

(C) Sodium > Zinc > Magnesium > Iron

(D) Sodium > Magnesium > Zinc > Iron

**20.** Methyl orange is added to dilute hydrochloric acid and to aqueous sodium hydroxide. What is the colour of the methyl orange in each solution? (1)

| | colour in dilute hydrochloric acid | colour in aqueous sodium hydroxide |
|---|---|---|
| (A) | Orange | Red |
| (B) | Red | Yellow |
| (C) | Red | Orange |
| (D) | Yellow | Red |

**21.** A solution reacts with crushed-egg shells to give a gas that turns lime water milky. The solution contains

(A) NaCl - Neutral (B) HCl - low PH

(C) LiCl -high PH (D) KCl- high PH (1)

**22.** When excess of carbon dioxide is passed through lime water, the milkiness disappears because

(A) water soluble calcium carbonate converts to water soluble calcium bicarbonate.

(B) insoluble calcium carbonate converts to water soluble calcium bicarbonate.

(C) water soluble calcium carbonate converts to insoluble calcium bicarbonate.

(D) insoluble calcium carbonate converts to insoluble calcium bicarbonate.

**23.** In the reaction of aqueous solution of barium chloride with aqueous solution of sodium sulphate, the aqueous solution formed will be: (1)

(A) $BaCl_2$ (B) $BaSO_4$ (C) $Na_2SO_4$ (D) NaCl

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

**Assertion (A):** $C_4H_8$, $C_4H_{10}$ and $C_4H_{12}$ are members of the same homologous series

**Reason (R):** $C_4H_8$, $C_4H_6$, $C_3H_4$, $C_3H_6$ are unsaturated hydrocarbons. (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 not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

**25.** A cloth' strip dipped in onion juice is used for testing a liquid 'X. The liquid 'X changes its odour. Which type of an indicator is onion juice? The liquid 'X turns blue litmus red. List the observations the liquid 'X will show on reacting with the following:

(a) Zinc granules;

(b) Solid sodium carbonate

Write the chemical equations for the reactions involved. (2)

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

**A.** An element 'Z' is stored in kerosene, and cannot be extracted from its ore using a reducing agent. 'Z' forms an ionic compound on reaction with Bromine. (3)

(i) Can we store 'Z' in water? Give reason to support your answer.

(ii) Identify element 'Z'. Name the process used and write the equation for extraction of 'Z' from its ore.

**OR**

**B.** The domes of many building in Europe are made of copper. These domes now appear greenish in colour.

(i) Why do the domes appear greenish though copper is orange-red in colour?

(ii) In your opinion, should the copper domes be replaced by iron domes to overcome the problem of change of colour of copper domes?

(iii) Domes used to be made from thin sheets of metals. Why did the ancient architects use copper to make domes?

**27.** Antima electrolysed distilled water using the set-up shown in figure 1. She was expecting two gases to be evolved at the anode and cathode respectively (3)

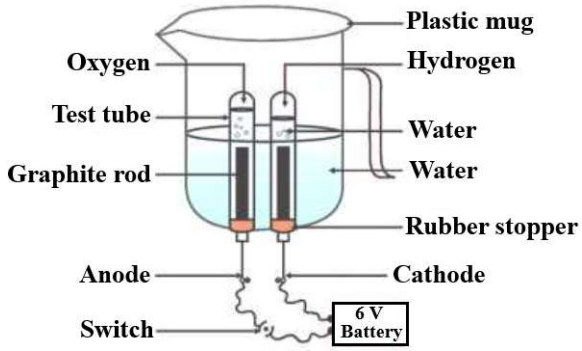



Fig.1

Suddenly, she realised that the bulb in the circuit did not glow when she used distilled water (figure 2)

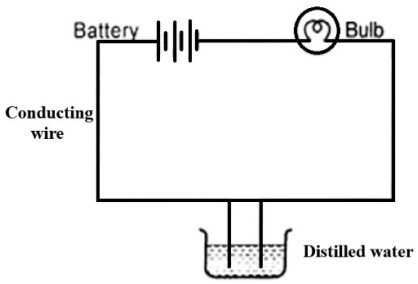



Fig. 2

After this realization, she added a substance to the distilled water for electrolysis to take place.

Answer the following questions based on the information given above:

(A) Which gas was she expecting to be formed at the anode and which one at the cathode respectively?

(B) Why did the bulb not glow when Amrita passed electricity through distilled water?

(C) Which substance was added by Amrita to distilled water to get the expected result?

**28.**

**A.** (a) Three acidic solutions A, B and C have pH = 0, 3 and 5 respectively.

(i) Which solution has highest concentration of H+ ions?

(ii) Which solution has the lowest concentration of H+ ions?

(b) How concentrated sulphuric acid can be diluted? Describe the process. (4)

**OR**

**B.** (a) Define the term 'isomers'

(b) Draw two possible isomers of the compound with molecular formula $C_3H_6O$ and write their names.

(c) Give the electron dot structures of the above two compounds.

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

**A.** A hydrocarbon with the formula $C_xH_y$ undergoes complete combustion as shown in the following equation:

$$2C_xH_y + 9O_2 \rightarrow 6CO_2 + 6H_2O.$$

(a) What are the values of 'x' and 'y'? (5)

(b) Give the chemical (IUPAC) name of the hydrocarbon.

(c) Draw its electron dot structure.

(d) Name the alcohol which on heating with conc. $H_2SO_4$ will produce the above hydrocarbon $C_xH_y$.

(e) Write a balanced chemical equation for the reaction of $C_xH_y$ with hydrogen gas in presence of Nickel.

**OR**

**B.**

(I) White coloured powder is used by doctors for supporting fractured bones.

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

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

(II) During electrolysis of brine, a gas 'G' is liberated at anode. When this gas 'G' is passed through slaked lime, a compound 'C' is formed, which is used for disinfecting drinking water.

(i) Write formula of 'G' and 'C'.

(ii) State the chemical equations involved.

(iii) What is common name of compound 'C'? Give its chemical name.

## SECTION - C (PHYSICS)

**30.** Which of the following statement is true? **(1)**

(1) For concave mirror magnification of +1 is possible.

(2) For concave mirror magnification of +2 is possible.

(3) For concave mirror always real image is formed.

(A) Statement 2 is true

(B) Statement 1 is true

(C) Statement 1, 2, 3 are true

(D) All statements are incorrect.

**31.** The refractive index of water with respect to air is $\frac{4}{3}$. What is the refractive index of air with respect to water. **(1)**

(A) 0.75 (B) 0.65

(C) 0.45 (D) None of above

**32.** **Assertion based question.** **(1)**

**Assertion:-** A ray passing through the centre of curvature of a concave mirror after reflection reflected back along the some path.

**Reason :-** Incident ray follows laws of reflection.

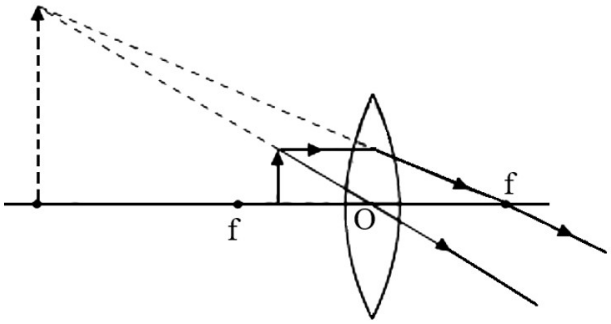
(A) Both A and R are true, and R is the correct explanation of A.

(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.** Object is placed at a distance of 20 cm from optical centre of a convex lens and virtual image is formed at 40 cm. **(2)**

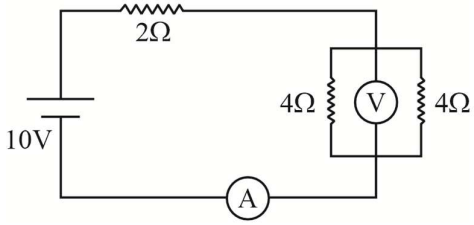



(A) What is the focal length of the lens?

(B) What is the magnification of the image formed?

**34.** **Attempt either A or B.** **(2)**

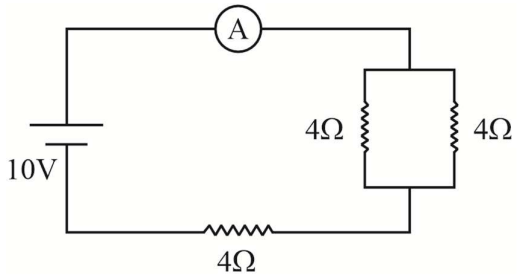
(A)




(i) Calculate the reading of Ammeter?

(ii) Calculate the reading of Voltmeter?

(B)




(i) What is the net resistance of the circuit?

(ii) What is the reading of the Ammeter?

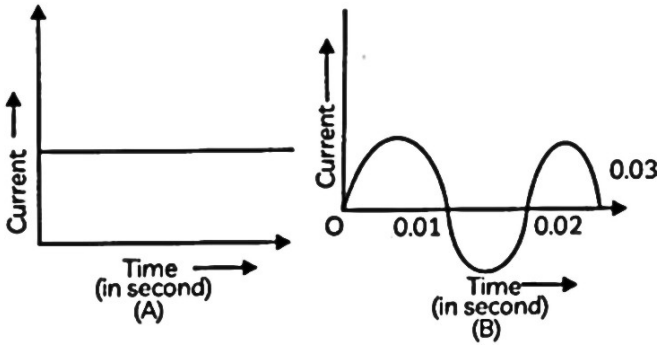
**35.** (i) What is Myopia? By using which lens this defect can be corrected. **(3)**

(ii) A person is not able to see the objects beyond 100 cm. Which lens is used and of what focal length to correct this defect?

**36.** (i) A wire of resistance 10Ω is stretched to triple its length. What is the new resistance of the wire?

(ii) If after starching the wire is compressed to half what is the new resistance of the wire? **(3)**

**37.** Current-time graph from two different sources are shown in the following diagram. Now, answer the following questions. **(3)**




(i) Name the type of current shown by graph A and graph B.

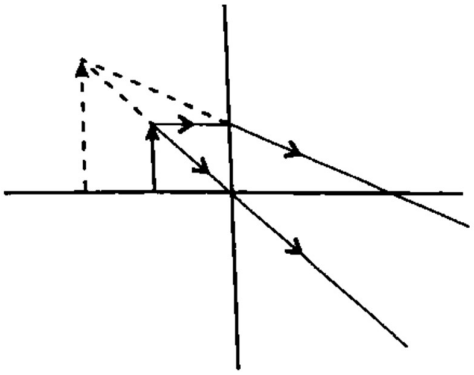
(ii) Name any one source of the current shown by graph A and graph B.

(iii) What is the frequency of current in case A and B?

(iv) Write two difference between the current shown by graph A and B.

**38.**

(A) Analyse the figure and answer the following questions: The above figure shows the formation of an image by a lens shown by a thick line. **(4)**



(a) What is the type of lens used?

(b) What is the nature of the image?

**Attempt either subpart C or D.**

(c) If the image is formed at a distance of 30 cm from the lens and the image is twice the size of the object, then where is the object placed?

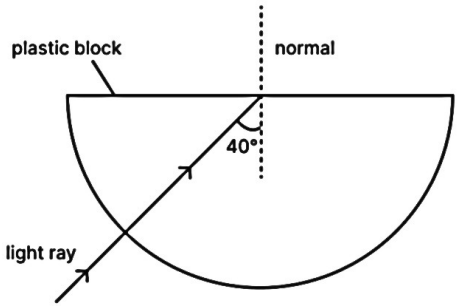
**OR**

(d) Explain why a swimming pool appears shallower than its actual depth. Support your answer with a simple ray diagram.

**OR**

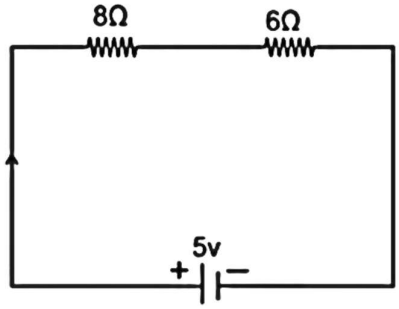
(B) (i) Explain why the refractive index of any material with respect to air is always greater than 1.

(ii) In the figure below, a light ray travels from air into the semi-circular boundary of plastic block. Give a reason why the ray does not deviate at the semi-circular boundary of the plastic block.




**39. Attempt any one A or B.** **(5)**

**(A)** In given circuit diagram two resistors are connected to a 5V supply.



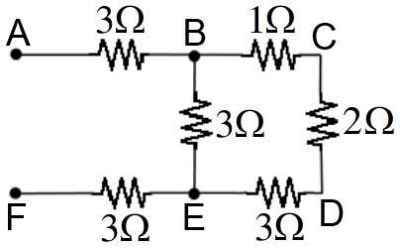

(i) Calculate current and potential difference across the 80 resistor

(ii) A third resistor 2Ω is now connected in parallel with 6Ω resistor. Will the potential difference across the 8Ω resistor be larger, smaller or same as before? Explain the reason for your answer.

**OR**

**(B)**

(i) In the given circuit diagram,




Calculate:

(a) Total resistance between the points B and E.

(b) Total resistance between the points A and F.

(ii) Express Joule's law of heating mathematically. What is the resistance of 12 m wire having radius $2 \times 10^{-4}$ m and specific resistivity $3.14 \times 10^{-8}$ Ω m?

# 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 $\pi$ =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 equation $x^2 - 8x + k = 0$ has real and distinct roots if

(a) $k = 8$ (b) $k > 16$ (c) $k = 16$ (d) $k < 16$

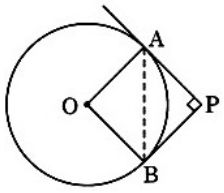
2. If three points $(0,0), (3,\sqrt{3})$ and $(3,\lambda)$ form an equilateral triangle, then $\lambda$ =

(a) –4 (b) 2 (c) –3 (d) None of these

3. The value of k for which the system of equations $3x - y + 8 = 0$ and $6x - ky + 16 = 0$ has infinitely many solutions, is

(a) –2 (b) 2 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

4. In the given figure, tangents PA and PB to the circle centred at O, from point P are perpendicular to each other. If PA = 5 cm, then length of AB is equal to




(a) 5cm (b) $5\sqrt{2}$ cm (c) $2\sqrt{5}$ cm (d) 10cm

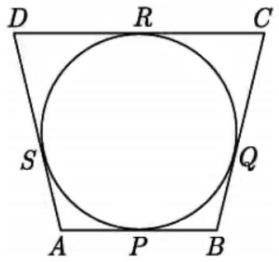
5. The mean of five numbers is 15. If we include one more number, the mean of six numbers becomes 17. The included number is :

(a) 27 (b) 37 (c) 17 (d) 25

6. In and AP, if d = –4, n = 7 and $a_n = 4$, then a is equal to

(a) 6 (b) 7 (c) 20 (d) 28

7. 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 length of AD is




(a) 3 cm (b) 4 cm (c) 5 cm (d) 6 cm

8. For the following distribution.

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

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

(a) 15 (b) 25 (c) 30 (d) 35

9. If a and b are the zeroes of polynomial $x^2 + ax + b$, the values of a and b are

(a) 1 and 2 (b) 1 and –2 (c) –2 and 1 (d) 2 and 1

10. Volume of a spherical shell is given by

(a) $4\pi\left(R^2 - r^2\right)$ (b) $\pi\left(R^3 - r^3\right)$ (c) $4\pi\left(R^3 - r^3\right)$ (d) $\frac{4}{3}\pi\left(R^3 - r^3\right)$

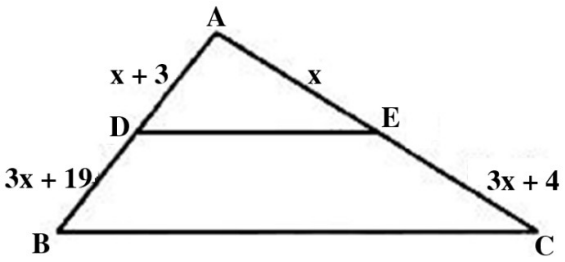
11. A bag contains 6 red and 5 blue balls. What is the probability that the ball drawn is not red?

(a) $\frac{5}{11}$ (b) $\frac{6}{11}$ (c) $\frac{2}{11}$ (d) $\frac{7}{11}$

12. Which of the following cannot be the probability of an event?

(a) $\frac{1}{3}$ (b) 0.1 (c) 3% (d) $\frac{17}{16}$

13. In the given figure value of x for which DE || BC is

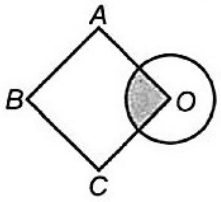



(a) 3 (b) 2 (c) 4 (d) 1

14. If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$, then the value of $\cos\theta - \sin\theta$ is

(a) $\sqrt{2}\sin\theta$ (b) $3\sin\theta$ (c) $\sin\theta$ (d) $2\sin\theta$

15. O is the centre of a circle of diameter 4 cm and OABC is a square, if the shaded area is $\frac{1}{3}$ area of the square, 3 then the side of the square is _____ .




(a) $\sqrt{3\pi}$cm (b) $\pi\sqrt{3}$cm (c) $3\pi$cm (d) $3\sqrt{\pi}$cm

16. If $\frac{x}{3} = 2\sin A, \frac{y}{3} = 2\cos A$, then the value of $x^2 + y^2$ is:

(a) 36 (b) 9 (c) 1 (d) 25

17. AD is a median of $\Delta$ ABC with vertices $A(5,-6)$, B(6, 4) and C(0, 0). Length AD is equal to:

(a) $\sqrt{68}$ units (b) $2\sqrt{15}$ units (c) $\sqrt{101}$ units (d) 10 units

18. Consider the frequency distribution of the heights of 60 students of a class:

| Height (in cm) | No. of Students | Cumulative Frequency |
|---|---|---|
| 150-155 | 16 | 16 |
| 155-160 | 12 | 28 |
| 160-165 | 9 | 37 |
| 165-170 | 7 | 44 |
| 170-175 | 10 | 54 |
| 175-180 | 6 | 60 |

The sum of the lower limit of the modal class and the upper limit of the median class is

(a) 320 (b) 315 (c) 330 (d) 310

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

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.

19. **Assertion (A) :** Mid-point of a line segment divides the line segment in the ratio 1:1.

**Reason (R):** The ratio in which the point (–3, k) divides the line segment joining the points (–5, 4) and (–2, 3) is 1: 2.

20. **Assertion (A):** Sum of first 10 terms of the arithmetic progression -0.5, -1.0, -1.5, ... is 27.5

**Reason (R) :** Sum of n terms of an A.P. is given as $S_n = \frac{n}{2}\left[2a + (n-1)d\right]$, where a = first term, d = common difference.

## SECTION - B

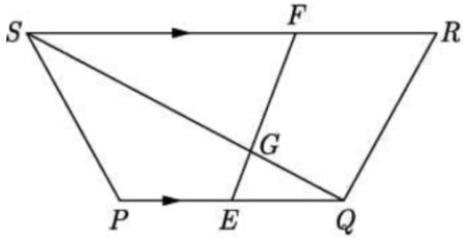
***Section B consists of 5 questions of 2 marks each.***

21. Evaluate : $\dfrac{5\tan 60^\circ}{(\sin^2 60^\circ + \cos^2 60^\circ)\tan 30^\circ}$

22. Find the type of triangle ABC formed whose vertices are $A(1,0), B(-5,0)$ and $C(-2,5)$.

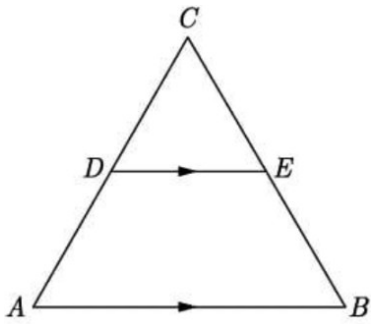
23. If the distance between the points A (4, p) and B(1, 0) is 5 units then what are the values of p?

24. In the figure, PQRS is a trapezium in which PQ || RS. On PQ and RS, there are points E and F respectively such that EF intersects SQ at G. Prove that EQ × GS = GQ × FS.




**OR**

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




25. Harpreet tosses two different coins simultaneously. What is the probability that she gets:

(i) at least one head? (ii) one head and one tail?

## SECTION - C

***Section C consists of 6 questions of 3 marks each.***

26. Calculate the mean of the following data:

| **Class:** | 4-6 | 7-9 | 10-12 | 13-15 |
|---|---|---|---|---|
| **Frequency:** | 5 | 4 | 9 | 10 |

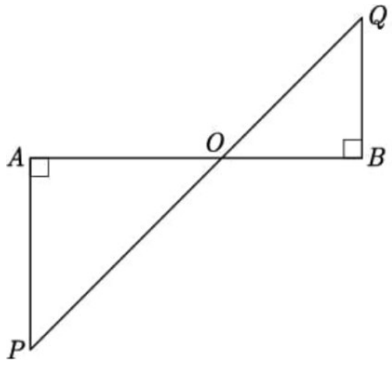
27. (a) If the sum of the first 14 terms of an A.P. is 1050 and the first term is 10, then find the 20th term and the nth term.

**OR**

(b) The first term of an A.P. is 5, the last term is 45 and the sum of all the terms is 400. Find the number of terms and the common difference of the A.P.

28. Prove that: $\dfrac{\tan\theta - \cot\theta}{\sin\theta\cos\theta} = \sec^2\theta - \operatorname{cosec}^2\theta$

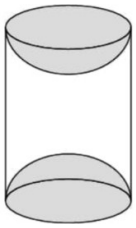
29. In the given figure, if $\angle A = 90°, \angle B = 90°$, OB = 4.5 cm OA = 6 cm and AP = 4 cm then find QB.




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

**OR**

A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in Figure. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm, find the total surface area of the article.



31. Find the median of the following data :

| Height (in cm) | Less than 120 | Less than 140 | Less than 160 | Less than 180 | Less than 200 |
|---|---|---|---|---|---|
| Number of students | 12 | 26 | 34 | 40 | 50 |

**OR**

Find the mean of the following distribution :

| Height (in cm) | Less than 75 | Less than 100 | Less than 125 | Less than 150 | Less than 175 | Less than 200 |
|---|---|---|---|---|---|---|
| No. of students | 5 | 11 | 14 | 18 | 21 | 28 |
| Height (in cm) | Less than 225 | Less than 250 | Less than 275 | Less than 300 | | |
| No. of students | 33 | 37 | 45 | 50 | | |

## SECTION - D

***Section D consists of 4 questions of 5 marks each.***

32. Find the positive values of k for which quadratic equation $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ both with have the real and equal roots.

OR

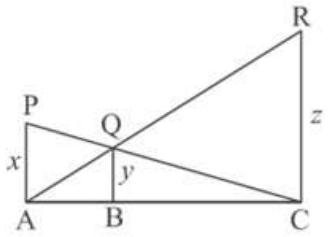
A fast train takes 3 hours less than a slow train for a journey of 60 km. If the speed of the slow train is 10 km/h less than that of the fast train, find the speed of each train.

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 3.5 m and 6 m, and slant height of the top is 4.2 m, find the area of canvas used for making the tent. Also, find the cost of canvas of the tent at the rate of ₹ 500 per m².

34. (a) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

**OR**

(b) In the given figure PA, QB and RC are each perpendicular to AC. If AP = x, BQ = y and CR = z, then prove that $\frac{1}{x}+\frac{1}{z}=\frac{1}{y}$




## SECTION - E

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

35. The following table shows the ages of the patients admitted in a hospital during a year:

| **Age (in years)** | 5-15 | 15-25 | 25-35 | 35-45 | 45-55 | 55-65 |
|---|---|---|---|---|---|---|
| **Number of patients** | 6 | 11 | 21 | 23 | 14 | 5 |

Find the mode and mean of the data given above.

36. The word 'circus' has the same root as 'circle'. In a closed circular area, various entertainment acts including human skill and animal training are presented before the crowd.

A circus tent is cylindrical upto a height of 8 m and conical above it. The diameter of the base is 28 m and total height of tent is 18.5 m .

Based on the above, answer the following questions:

(i) Find slant height of the conical part. **(1)**

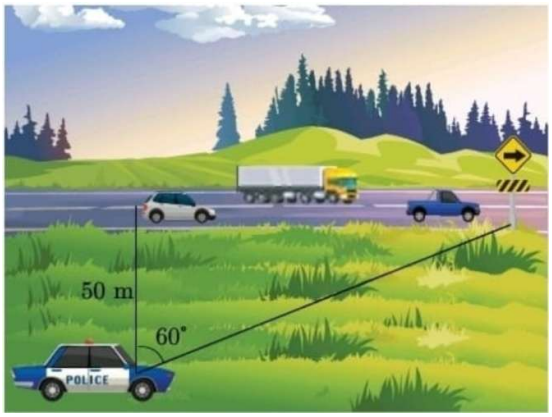
(ii) Determine the floor area of the tent. **(1)**

(iii) (a) Find area of the cloth used for making tent. **(2)**

**OR**

(b) Find total volume of air inside an empty tent. **(2)**

37. Speed Limit Enforcement : Rajendra works in traffic police and manage traffic on highway. His van is having radar detection equipment. He takes up a hidden position 50 meter from the highway. Using a sighting device he finds the angle between his position and a road sign in the distance is 60°.




He then uses a stop watch to determine how long it takes a vehicle to pass her location and reach the road sign. In quick succession–an 18-wheeler, a truck, and a car pass her position, with the time each takes to travel this distance noted. Find the speed of each vehicle in kilometre per hour if

(i) the 18-wheeler takes 8 sec [1]

(ii) the truck takes 6 sec [1]

(iii) the car takes 4 sec [2]

38. Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted prize.

While playing a treasure hunt game, some clues (numbers) are hidden in various spots collectively forming an A.P. If the number on the nth spot is 20+4n, then answer the following questions to help the players in spotting the clues:


(i) Which number is on first spot? [2]

(ii) (a) Which spot is numbered as 112? [2]

**OR**

(b) What is the sum of all the numbers on the first 10 spots? [2]

(iii) Which number is on the $(n-2)^{th}$ spot? [1]