(Pages : 4)   S 1831

S.S.L.C. EXAMINATION, MARCH - 2018
CHEMISTRY
(English)

Time : 1½ Hours   Total Score : 40

General Instructions :

- First **15** minutes is cool-off time.
- Read all the instructions carefully.
- Questions with scores **1, 2, 3** and **4** are categorised separately.
- **5** questions are given in each category. Answer **any four** from each category.
- Answer each question by keeping time.

                                                              Score

(Answer **any 4** questions from **1** to **5**. Each question carries **1** score.)

1.   The number of moles in 400 g $CaCO_3$ is _____.
     [Hint : Gram atomic masses : Ca = 40 g, C = 12 g, O = 16 g]

2.   Which of the following is a reversible reaction ?
     A : $NaCl(aq) + AgNO_3(aq) \rightarrow NaNO_3(aq) + AgCl(s)$
     B : $NH_4Cl(s) \rightleftharpoons NH_3(g) + HCl(g)$

3.   Find the relation and fill in the blank.
     Amino group : $-NH_2$
     Carboxylic group : _____

4.   Which colour is given by cobalt oxides to glass ?

5.   The medicines which relieve pain are called _____.

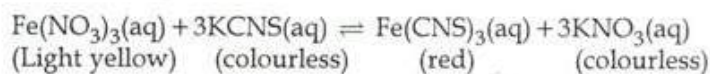(Answer **any 4** questions from **6** to **10**. Each question carries **2** score.)

6.   The balanced chemical equation for the formation of ammonia gas by the reaction between nitrogen gas and hydrogen gas is given.
     $N_2 + 3H_2 \rightarrow 2NH_3$
     (a) Write the ratio between the number of moles of reactants and products in the correct order.
     (b) How many moles of ammonia are formed when 6 moles of N_2 react with 6 moles of H_2 ?

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7. (a) Which of the following statements is correct about chemical equilibrium ?

    (i)   At equilibrium both the reactants and products coexist.

    (ii) At equilibrium the rate of forward reaction is greater than the rate of backward reaction.

    (b) Write any one activity to increase the red colour in the following reaction.

$$Fe(NO_3)_3(aq) + 3KCNS(aq) \rightleftharpoons Fe(CNS)_3(aq) + 3KNO_3(aq)$$
(Light yellow)   (colourless)   (red)   (colourless)

8. Observe the diagram showing a copper rod kept immersed in silver nitrate solution.
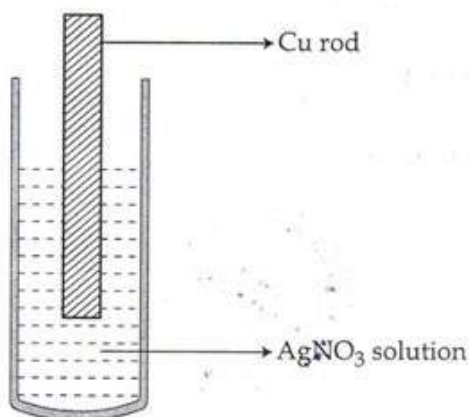
    (a) What is the colour change of the solution ?

    (b) Write the balanced chemical equation for the reaction.

9. (a) Write an example for a metal which can be refined by liquation ?

    (b) What is calcination ?

10. Esters are obtained by the reaction between alcohols and carboxylic acids.

    (a) Write the chemical formula of ethyl ethanoate.

    (b) Write the chemical equation for the formation of ethyl ethanoate.

(Answer **any 4** questions from **11** to **15**. Each question carries 3 score.)

11. (a) What is gram atomic mass ?

    (b) Calculate the following :

    (i) How many gram atoms of sodium is present in 115 g sodium ?

    (ii) Mass of 5 gram atoms of calcium.

    [Hint : Gram atomic masses : Na = 23 g, Ca = 40 g]

12. The outermost shell electronic configuration of an element 'A' (symbol given is not real) is $3s^2\, 3p^4$.

    (a) To which period of the periodic table does this element belong to ?

    (b) Find the group number of the element.

    (c) Which is the block to which the element belongs ?

13. What happens to the rate of the forward reaction of the equilibrium,

    $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) + $ Heat during the following situations ?

    (a) increase in temperature

    (b) SO_3 is removed

    (c) pressure is decreased

14. (a) What are isomers ?

    (b) Write the structural formulae of any two position isomers of an alcohol with molecular formula $C_5H_{12}O$.

15. Petroleum is a mixture of different hydrocarbons.

    (a) Which method is used for separating the components of petroleum ?

    (b) Which is the hydrocarbon present in liquified petroleum gas (LPG) ?

    (c) Write any two environmental issues caused by the excessive consumption of fossil fuels.

(Answer **any 4** questions from **16** to **20**. Each question carries 4 score.)

16. There are sub shells in shells around the nucleus.

    (a) What is the maximum number of electrons that can be accommodated in d-sub shell ?

    (b) Write the possible sub shells in 3rd shell in the increasing order of energy.

    (c) Which of the following is the outermost electronic configuration of copper ?

    (Atomic number = 29)

    A : $3d^9\, 4s^2$

    B : $3d^{10}\, 4s^1$

    Justify your answer.

                                                                                          P.T.O.

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17. Ions are the current carriers in electrolytes.

(a) Sodium chloride in solid state is not an electrical conductor, but molten sodium chloride can conduct electricity. Give reason.

(b) What are the products obtained at anode and cathode during the electrolysis of molten sodium chloride ?

(c) If the aqueous solution of sodium chloride is subjected to electrolysis, what are the products obtained at each electrode ?

18. Different methods are used for the concentration of ores.

(a) What is the ore of aluminium ?

(b) Explain how the ore of aluminium is concentrated by leaching.

19. Organic compounds are obtained through different chemical reactions.

(a) What is the difference between substitution reactions and addition reactions ?

(b) Complete the following reactions :

(i) $CH_3 - CH_3 + Cl_2 \rightarrow$ _ _ _ _ _ $+ HCl$

(ii) $CH_3 - CH = CH - CH_3 + HI \rightarrow$ _ _ _ _ _

20. The structural formulae of some organic compounds are given below :

(i) $CH_3 - CH_2 - CO - CH_3$

(ii) $CH_3 - CH_2 - CH_2 - CHO$

(iii) $CH_3 - CH_2 - CH_2 - OH$

(iv) $CH_3 - CH_2 - CH_2 - CH_3$

(a) Which of these is an alkane ?

(b) Write the structural formula of the position isomer of the third compound.

(c) Which of the given compounds are functional isomers ?

(d) Write the structural formula of the chain isomer of the fourth compound.

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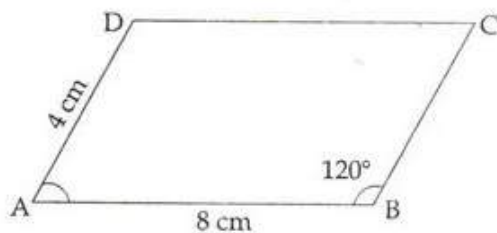Answer **any 5** questions from **5 to 11**. Each question carries **3** scores.

5. In the figure 'O' is the centre of the circle and A, B, C, D, E are the points on it
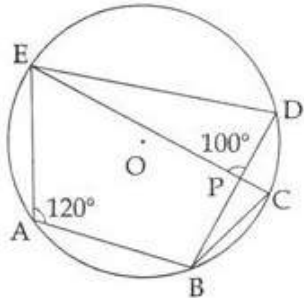
$\angle EAB = 120°$, $\angle EPD = 100°$. Write the measures of $\angle EDB$, $\angle ECB$ and $\angle DBC$.

6. The algebraic form for the sum of first n terms of an arithmetic sequence is $2n^2 + 8n$. How many consecutive terms of the sequence, starting from the first, are to be added to get 330 ?

7.

ABCD is a parallelogram. AB = 8 cm, AD = 4 cm, $\angle B = 120°$

(a) What is $\angle A$?

(b) What is the perpendicular distance from D to AB ?

(c) What is the area of ABCD ?

8. Draw a circle of radius 3 cm. Mark a point 7 cm away from it's centre. Draw the tangents to the circle from this point.

9. The perimeter of the base of a square pyramid is 96 cm and its height is 16 cm.

(a) What is the length of a base edge ?

(b) What is the slant height ?

(c) Find the lateral surface area.

10.
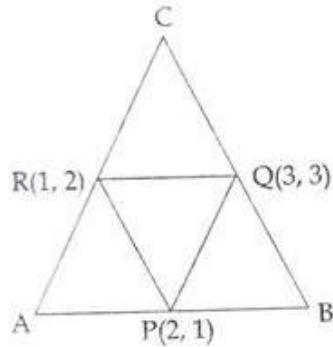
P, Q, R are the midpoints of the sides of the triangle ABC.

(a)   What type of the quadrilateral is PQCR ?

(b)   Write the Co-ordinates of the vertices A and C.

11. $P(x)$ is a second degree polynomial with $P(1) = 0$ and $P(-2) = 0$.

(a)   Find two first degree factors of $P(x)$.

(b)   Find the polynomial $P(x)$.

Answer **any 7** questions from **12** to **21**. Each question carries **4** scores.

12.   There are 20 terms in an arithmetic sequence. Sum of the first and last terms is 88.

(a)   What is the sum of the 2nd and 19th terms ?

(b)   If the 10th term is 42, what is the 11th term ?

(c)   What is the common difference of the sequence ?

(d)   What is the first term ?

13.   Draw a rectangle of length 4 cm, breadth 3 cm and draw a square of the same Area.

14.   There are 30 scouts and 20 guides in a school. In another school there are 20 scouts and 15 guides. From each school, one student among them is to be selected for participation in a seminar.
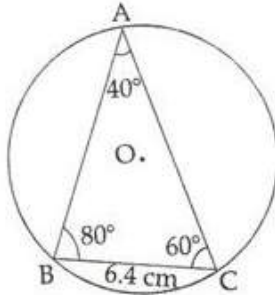
(a)   What is the total number of possible selections ?

(b)   What is the probability of both being Scouts ?

(c)   What is the probability of both being Guides ?

(d)   What is the probability of one scout and one guide ?

                                                                                     P.T.O.

15. 'O' is the centre of the circumcircle of triangle ABC.
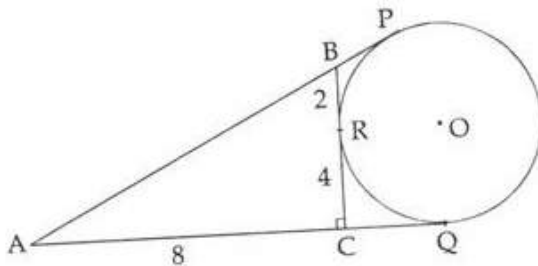

$\angle A = 40°$, $\angle B = 80°$, $\angle C = 60°$, $BC = 6.4$ cm.

   (a)   What is the diameter of the circle ?

   (b)   What is the length of the other two sides ?

	40	60	80
sin	0.64	0.87	0.98
cos	0.77	0.50	0.17
tan	0.84	1.73	5.67

16. A circle with centre (3, 2) passes through the point (6, 3).

   (a)   What is the radius of the circle ?

   (b)   Check whether each of the points with coordinates (0, 2), (3, 6), (0, 3) is inside, outside, or on the circle.

17.

In the figure, the circle with centre 'O' is the excircle of the right triangle ACB and P, Q, R are the points where the circle touches the sides of the triangle. AC = 8 cm; CR = 4 cm; BR = 2 cm.

   (a)   What is the length of AQ ?

   (b)   What is the perimeter of the triangle ACB ?

   (c)   What is the area of the triangle ACB ?

   (d)   What is the radius of the incircle of triangle ACB ?

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18. A circular sheet with radius 36 cm is divided into four equal sectors and one of them bent into a cone.
   (a) What is the slant height of the cone ?
   (b) What is the radius of the cone ?
   (c) What is the curved surface area ?

19. The coordinates of the vertices of a triangle are A(1, 1), B(5, 5), C(2, 5).
   (a) Write the co-ordinates of the midpoint D of AB.
   (b) What is the length of CD ?
   (c) What are the coordinates of the point dividing the line CD in the ratio 2 : 1 ?

20. $P(x) = x^3 + ax^2 - x + b$ and
   (a) Find the relation between a and b for $x - 1$ to be a factor of $P(x)$.
   (b) Find the relation between a and b for $x - 2$ to be a factor of $P(x)$.
   (c) Find a and b so that both $x - 1$ and $x - 2$ are factors of $P(x)$.

21. The table below shows the members in "Stree–Sakthi Kudambasree" sorted according to their ages.

Age group	Number of members
20 - 30	4
30 - 40	8
40 - 50	10
50 - 60	7
60 - 70	4
70 - 80	2
Total	35

   (a) If the members are arranged in increasing order of ages, the age of the member at what position is taken as the median ?
   (b) What is assumed to be age of the member at the 13th position ?
   (c) Find the median of the ages.

Answer any 5 questions from 22 to 28. Each question carries 5 scores.

22. Consider the numbers between 100 and 300 which leave remainder 2 on division by 3.
   (a) Which is the first number in this sequence ?
   (b) Which is the last number in this sequence ?
   (c) How many such numbers are there in this sequence ?
   (d) Find the sum of all numbers in the sequence.

P.T.O.

23. In the figure, the chord BD is perpendicular to the diameter AC. Find the measures of the following angles.
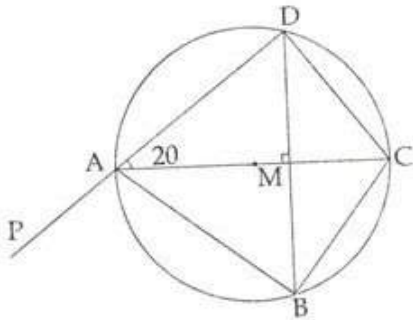
(a) ∠BAC

(b) ∠BCD

(c) ∠ADC

(d) ∠CDM

(e) ∠BAP

24. A rope of length 40 meters is cut into two pieces and two squares are made on the floor with them. The sum of the areas enclosed is 58 square meter.

(a) If the length of one piece is taken as x, what is the length of the other piece ?

(b) What are the lengths of the sides of the squares ?

(c) Write the given fact about area as an algebraic equation.

(d) What is the length of each piece ?

25. Draw a circle with radius 2.5 cm. Draw a triangle of two angles 50°, 60° with all its sides touching the circle.

26. A boy saw the top of a building under construction at an elevation of 30°. The completed building was 12 m higher and the boy saw its top at an elevation of 60° from the same spot.

(a) Draw a rough figure based on the given details.

(b) What is the height of the building ?

(c) What is the distance between the building and the boy ?

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27. The picture shows the shape of a boiler. Total height of the boiler is 12 m and the diameter is 6 meters, height of the cylindrical part is 6 meters.

   (a)   What is the height of the cone ?
   (b)   How many litres can the boiler hold ?
        ($1 \text{ m}^3 = 1000$ litre)

28. A circle with centre (3, 4) passes through the origin.
   (a)   What is the radius of the circle ?
   (b)   If a point in the circle is (x, y), write the relation between x, y ?
   (c)   Check whether the point $(-2, 1)$ lies on this circle.

29. Read the following, understand the mathematical idea expressed in it and answer the questions that follow :

                                              6x1=6

1, 4, 9, 16, ... are the squares of the counting numbers. The remainders got by dividing the square numbers with natural numbers have a cyclic property. For example, the remainders on dividing these numbers by 4 are tabulated here.

Number	1	4	9	16	25	-	-	-
Remainder	1	0	1	0	1	-	-	-

On dividing by 4 perfect squares leave only 0 and 1 as remainders - From this, we can conclude that an arithmetic sequence whose terms leaves remainder 2 on dividing by 4 do not have a perfect square.
   (a)   Which are the possible remainders on dividing any number with 4 ?
   (b)   Which are the numbers we would not get on dividing a perfect square by 4 ?
   (c)   What is the remainder that leaves on dividing the terms of the arithmetic sequence 2, 5, 8, 11, ... by 4 ?
   (d)   Does the arithmetic sequence 3, 7, 11, ... contain perfect squares ?
   (e)   Write a sequence with common difference 4 which contains many perfect squares.

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