

**Version - 3**

**Instructions to Examinee**

<b>Duration</b>	<b>3 hrs 20 mins</b>
<b>Max. Marks</b>	<b>270</b>

<b>NAME</b>	
<b>Hall Ticket No.</b>	
<b>SCHOOL</b>	

**Instructions**

- This paper contains 70 questions divided in three sections
- Instructions for each section is as given below

**Section A (Maximum Marks: 120)**

**Instructions for Q. no. 1 to 30**

- This section has **THIRTY** (30) questions.
- **Q.No 1 to 10- PHYSICS, 11 to 20- MATHEMATICS and 21 to 30- CHEMISTRY**
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct.
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- To answer the question darken corresponding bubble in ORS.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4 If only (all) the correct option(s) is(are) chosen;

Partial Marks : +3 If all the four options are correct but **ONLY** three options are chosen;

Partial Marks : +2 If three or more options are correct but **ONLY** two option are chosen and both of which are correct;

Partial Marks : +1 If two or more options are correct but **ONLY** one option is chosen and it is a correct option;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks : -2 In all other cases.

**For example**, in a question, if (A), (B) and (D) are the **ONLY** three options corresponding to correct answers, then choosing **ONLY** (A), (B) and (D) will get +4 marks; choosing **ONLY** (A) and (B) will get +2 marks; choosing **ONLY** (A) and (D) will get +2marks; choosing **ONLY** (B) and (D) will get +2 marks; choosing **ONLY** (A) will get +1 mark; choosing **ONLY** (B) will get +1 mark; choosing **ONLY** (D) will get +1 mark; choosing no option(s) (i.e. the question is unanswered) will get 0 marks and choosing any other option(s) will get -2 marks

**Section B (Maximum Marks : 30)**

**Instruction for question number 31 to 40**

- This section contains **TEN** (10) questions on **BIOLOGY**.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- To answer the question darken corresponding bubble in ORS.
- Answer to each question will be evaluated **according to the following marking scheme:**
- Full Marks : +3 If **ONLY** the correct option is chosen;
- Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);
- Negative Marks : -1 In all other cases.

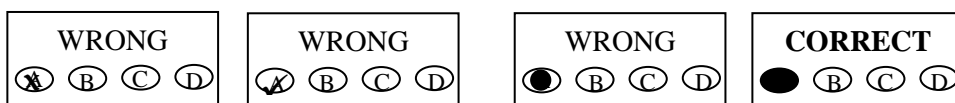
**Section C (Maximum Marks: 120)**

**Instructions for Q. no. 41 to70**

- This section contains **THIRTY** (30) questions.
- **Q.No 41 to 50- PHYSICS, 51 to 60- MATHEMATICS and 61 to 70- CHEMISTRY**
- The answer to each question is a **INTEGER** ranging from 00 to 99, both inclusive.
- Round off your answer to nearest integer if needed.
- To answer the question, enter the correct integer value in ORS and darken the corresponding bubbles.
- Answer to each question will be evaluated **according to the following marking scheme:**
- Full Marks : +4 If **ONLY** the correct integer is entered;
- Zero Marks : 0 In all other cases.

**Instructions for filling the ORS (Optical Response Sheet):**

1. Write your **name** and **register number** with black ball point pen in the response sheet and darken the appropriate circle **under** each alphabet/digit.
2. While marking your answers in the ORS, darken the circle/s (in full) as shown in the example below using **Black ball point pen**.



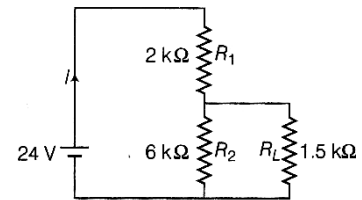
3. Folding of ORS, stray markings on the ORS will lead to rejection during evaluation.
4. Space for rough work is provided in the question paper booklet.

## Section A PHYSICS

### Multiple choice questions with one or more than one correct alternative/s

1. Mark the correct option/s for the circuit shown in the figure.

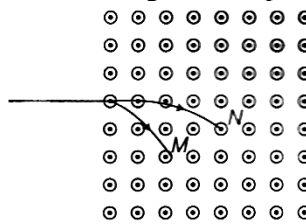
- (A) The current  $I$  through the battery is 7.5 mA
- (B) The potential difference across  $R_L$  is 18 V
- (C) Ratio of powers dissipated in  $R_1$  and  $R_2$  is 3
- (D) If  $R_1$  and  $R_2$  are interchanged, magnitude of the power dissipated in  $R_L$  will decrease by a factor of 9



2. Two wires of the same material and having same uniform area of cross-section are connected in an electric circuit. The masses of the wires are  $m$  and  $2m$  respectively. When a current  $I$  flows through the circuit, the heat produced in them in a given time is in the ratio

- (A) 2 : 1 when they are connected in series
- (B) 2 : 1 when they are connected in parallel
- (C) 1 : 2 when they are connected in parallel
- (D) 1 : 2 when they are connected in series

3. Two charged particles  $M$  and  $N$  enter a space of uniform magnetic field with velocities perpendicular to the magnetic field. The paths are as shown in the figure. The possible reasons for different paths may be



- (A) the charge of  $M$  is greater than that of  $N$
- (B) the momentum of  $M$  is greater than that of  $N$
- (C) specific charge of  $M$  is greater than that of  $N$
- (D) the speed of  $M$  is less than that of  $N$

4. 24 cells, each of emf 1.5 V and internal resistance is  $2 \Omega$ . Then,

- (A) in order to send the maximum current through a  $12 \Omega$  resistor, connect the two rows of 12 cells in series
- (B) the current in each row is 0.375 A
- (C) the current in each cell is 0.75 A
- (D) none of (A), (B) and (C)

5. Identify the correct statement/s:

- (A) MRI (Magnetic Resonance Imaging) machine works by magnetizing iron atoms in the human body.
- (B) Very fine particles scatter mainly blue light whereas particles of larger size scatters more red light.
- (C) Sun is visible for about 2 minutes before sunrise due to atmospheric refraction.
- (D) One pair of donated eyes gives vision to up to four corneal blind people.

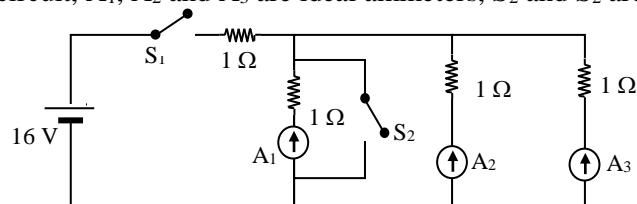
6. An electron and proton are moving on straight parallel paths with same velocity. They enter a semi-infinite region of a uniform magnetic field perpendicular to the velocity. Which of the following statement(s) is/are correct?

- (A) They will never come out of the magnetic field region
- (B) They will come out travelling along parallel paths
- (C) They will come out at the same time
- (D) They will come out at different times

7. A child can adjust the focal length of his eye lens between 513 cm to 2.5 cm. His far point is infinity.  
 (A) The distance between eye lens and retina is 2.5 cm  
 (B) The distance between eye lens and retina is 513 cm  
 (C) The near point is 10 cm  
 (D) The near point is 5 cm
8. Which of the following statements are correct regarding magnetic field?  
 (A) Magnetic field has both magnitude and direction.  
 (B) The direction of magnetic field due to a long straight current carrying wire is given by Right hand thumb rule.  
 (C) If a magnetic field is applied parallel to the current carrying wire, then the wire will not experience any force due to the magnetic field.  
 (D) Magnetic field always form a closed loop.

**Read the passage given below and answer questions 09 and 10 by choosing the correct alternative/s**

In the following electrical circuit,  $A_1$ ,  $A_2$  and  $A_3$  are ideal ammeters,  $S_1$  and  $S_2$  are switches.



9. If switch  $S_1$  is closed, and  $S_2$  is open, then  
 (A)  $A_1$  reads 4A  
 (B)  $A_2$  reads 2A  
 (C) the power delivered by the battery is 192 W  
 (D) the power delivered by the battery is 150 W
10. If  $S_1$  and  $S_2$  all are closed  
 (A)  $A_1$  reads 4A  
 (B)  $A_2$  reads 2A  
 (C)  $A_3$  reads 4A  
 (D) all ammeters read zero ampere

### MATHEMATICS

**Multiple choice questions with one or more than one correct alternative/s**

11. The value of  $k$  for which the equation  $(k + 1)x^2 - 2(k - 1)x + 1 = 0$  has real and equal roots are  
 (A) 0  
 (B) 1  
 (C) 2  
 (D) 3
12. If the co-ordinates of A and B are (3, 4) and (5, -2) respectively. If  $PA = PB$  and area of  $\Delta PAB = 10$ , then the co-ordinates of P are  
 (A) (2, 7)  
 (B) (7, 2)  
 (C) (1, 0)  
 (D) (0, 1)
13. A person standing on the bank of a river observes the angle of elevation of the top of a tree standing on the opposite bank is  $60^\circ$ . After he moves 40 meters away from the bank, he finds that the angle of elevation to be  $30^\circ$ . If  $h$  denotes the height of the tree and  $x$  denotes the width of the river then  
 (A)  $h = 20\sqrt{3}m$   
 (B)  $h = \frac{20}{\sqrt{3}}m$   
 (C)  $x = 20m$   
 (D)  $x = \frac{20}{\sqrt{3}}$

14. If the two vertices of an equilateral triangle be  $(0, 0)$  and  $(3, \sqrt{3})$ , then the third vertex can be  
 (A)  $(0, \sqrt{3})$  (B)  $(-3, \sqrt{3})$  (C)  $(0, 2\sqrt{3})$  (D)  $(3, -\sqrt{3})$
15. Let the opposite angular points of a square be  $(3, 4)$  and  $(1, -1)$ . Then the coordinates of the remaining angular points are  
 (A)  $(\frac{9}{2}, \frac{1}{2})$  (B)  $(\frac{-9}{2}, \frac{-1}{2})$  (C)  $(-\frac{1}{2}, \frac{5}{2})$  (D)  $(-\frac{1}{2}, -\frac{5}{2})$
16. The sum of the first three terms of an AP is  $-3$  and their product is 8. Then the common difference of the AP is  
 (A) 2 (B) 3 (C)  $-2$  (D)  $-3$
17. A right circular cone is of height 8.4 cm and radius of its base is 2.1 cm. It is melted and recast into a sphere then the radius of the sphere is  
 (A) 2.1 cm (B) 1.4 cm (C) 4.2 cm (D) 3 cm
18. In a circle of radius 21 cm an arc subtends an angle of  $60^\circ$  at centre. Then  
 (A) Length of arc = 22 cm  
 (B) Area of the sector formed by the arc =  $231 \text{ cm}^2$   
 (C) Area of the segment formed by the corresponding chord of the arc =  $40.05 \text{ cm}^2$   
 (D) Area of circle =  $1386 \text{ cm}^2$

**Read the passage given below and answer questions 19 and 20 by choosing the correct alternative/s**

Let us consider  $\frac{\sin A}{\sin B} = \frac{\sqrt{3}}{2}$  and  $\frac{\cos A}{\cos B} = \frac{\sqrt{5}}{2}$   $0 < A, B < \frac{\pi}{2}$ , then answer the following questions

19. Which of the following(s) is/are correct?

- (A)  $\tan B = -1$  (B)  $\tan B = 1$   
 (C)  $\tan A = \frac{\sqrt{3}}{\sqrt{5}}$  (D)  $\tan A + \tan B = \frac{\sqrt{3} + \sqrt{5}}{\sqrt{5}}$

20. Which of the following(s) is/are incorrect?

- (A)  $\tan A = \frac{\sqrt{3}}{\sqrt{5}} \tan B$  (B)  $\tan A = \frac{\sqrt{5}}{\sqrt{3}} \tan B$   
 (C)  $\tan A - \tan B = \frac{\sqrt{3} + \sqrt{5}}{\sqrt{5}}$  (D)  $\tan A + \tan B = \frac{\sqrt{3}}{\sqrt{5}}$

## CHEMISTRY

**Multiple choice questions with one or more than one correct alternative/s**

21. Which of the following statement(s) is/are incorrect?

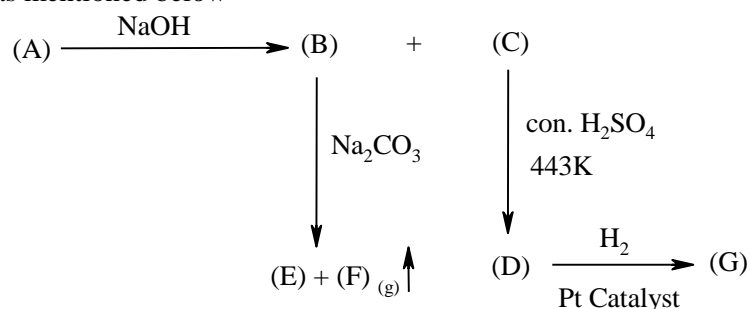
- (A) Upon mixing 100 mL of 1 M HCl with 200 mL of 1 M HCl, pH decreases  
 (B) Water can be used as a solvent to compare acid strength of HBr and HCl  
 (C) 1 mole of HCl react with 1 mole of NaOH to form a neutral solution  
 (D) 1 mole of  $\text{NH}_4\text{OH}$  react with 1 mole of HCl to form a neutral solution

22. Choose the correct statement(s) among the following
- (A) In case of Bee sting, rubbing the area with leaf of dock plant may give relief
  - (B) To treat hyperacidity, NaOH is used due its greater effectiveness as it is a strong base
  - (C) Calcium hydroxyapatite gets corroded when pH in mouth is 4
  - (D) Our body's pH constantly keeps increasing and decreasing drastically to adjust on going biochemical reactions
23. A student subjected molten alkali metal halide (MX) to decomposition by passing electric current to get A and B<sub>(gas)</sub>. 'A' was treated with O<sub>2</sub> to obtain 'C'. 'C' was dissolved in water to 'D'. 'B' is used as a bleaching agent in calculated amounts in drinking water. Identify the correct statement(s)
- (A) When 'D' is exposed to atmosphere, pH decreases
  - (B) When excess of 'B' is passed through water, pH decreases
  - (C) When equimolar amount of 'C' is treated with H<sub>2</sub>SO<sub>4</sub>, resulting solution will have a pH < 7
  - (D) Gas released upon treating 'D' with NH<sub>4</sub>NO<sub>3</sub> is basic
24. Identify the correct statement(s) among the following
- (A) H<sub>3</sub>PO<sub>4</sub> (basicity = 3) is a stronger acid than HCl (basicity = 1) because the former has more H<sup>+</sup> released compared to latter
  - (B) Upon increasing the temperature, pH of water decreases
  - (C) pH of 1 mole of NaOH (in 1 L) is higher than 1 mole of Mg(OH)<sub>2</sub> (in 1 L)
  - (D) Out of HF, HCl, HBr and HI, HCl is the strongest acid.
25. Standard reduction potential (E°) is a measure of ease of gaining electrons which forms the basis of activity series. Greater the E° value, higher is the tendency to accept electron and has lesser tendency to donate electrons and vice-versa. It is measured in terms of volts.  
E° for NO<sub>3</sub><sup>-</sup> is +0.96 V. Values of E° for some metal ions are given below
- |                                   |                               |
|-----------------------------------|-------------------------------|
| $V^{+2} + 2e^{-} \rightarrow V$   | $E^{\circ} = -1.19 \text{ V}$ |
| $Fe^{+3} + 3e^{-} \rightarrow Fe$ | $E^{\circ} = -0.04 \text{ V}$ |
| $Au^{+3} + 3e^{-} \rightarrow Au$ | $E^{\circ} = +1.40 \text{ V}$ |
| $Hg^{+2} + 2e^{-} \rightarrow Hg$ | $E^{\circ} = +0.86 \text{ V}$ |
- The pair(s) of metals that is/are oxidised by NO<sub>3</sub><sup>-</sup> in aqueous solution is/are
- (A) V and Hg
  - (B) Hg and Fe
  - (C) Fe and Au
  - (D) Fe and V
26. Identify the correct statements about extraction of metals and its characteristics
- (A) Upon increasing temperature electrical conductivity of metal decreases
  - (B) Electrochemical reduction is used for extraction of highly electropositive metals
  - (C) Al is used as reducing agent for Fe<sub>2</sub>O<sub>3</sub> to generate high amount of heat
  - (D) Metallic bonds are flexible and metal sheets can slip past each other like graphite
27. Identify the incorrect statement(s) regarding the same element forming oxides in different oxidation states
- (A) The oxide will be neutral in nature in which the element is in its highest oxidation state
  - (B) The oxide will be acidic in nature in which the element is its lower oxidation state
  - (C) Higher oxides will form an oxyacid when dissolved in water
  - (D) Lower oxides will form basic hydroxide when dissolved in water

28. Cleansing action of soaps and detergents are due to micelle formation that interact with grease/oil present on fabric. Which of the following statement is correct about cleansing action of soap?
- (A) Soaps form scum with hard water, therefore its cleaning action is affected  
 (B) The carboxylate end of soap is hydrophobic  
 (C) The long chain of hydrocarbon is hydrophobic and interacts with oil  
 (D) Oil is polar in nature

**Read the passage given below and answer questions 29 and 30 by choosing the correct alternative/s**

A sweet smelling organic compound (A) with molecular formula  $\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_3$  was subjected to the following reactions as mentioned below



29. Choose the *correct* statement(s) among the following
- (A) Compound (G) on reaction with  $\text{Cl}_2$  in presence of sunlight to form chloropropene  
 (B) Compound (D) can decolorise  $\text{Br}_2$  water  
 (C) Compound (C) can be converted to (B) by using acidified  $\text{K}_2\text{Cr}_2\text{O}_7$   
 (D) Compound (C) can turn moist blue litmus paper red and liberate  $\text{H}_2$  gas upon reacting with Na
30. Choose the *correct* statement(s) among the following
- (A) Compound (E) is an acidic salt  
 (B) The gas released when (G) is reacted with  $\text{O}_2$  at high temperature is same as (F)  
 (C) Compound (B) can turn moist red litmus paper blue  
 (D) When (B) and (C) are reacted in presence of  $\text{H}_2\text{SO}_4$ , we get (A)

## Section B

### BIOLOGY

**Multiple choice questions with one correct alternative**

31. Choose the correct statement
- (A) The Glomerulus is a cluster of thick-walled blood capillaries enclosed in Bowman's capsule  
 (B) The dialyzing fluid has same osmotic pressure as blood except it is devoid of Nitrogenous wastes  
 (C) The impulse travels from the axon to the cell body and then along the dendrites to its end  
 (D) The involuntary actions like blood pressure, vomiting, salivation are controlled by hypothalamus
32. A scientist conducted hybridisation experiment using purple flowering and white flowering pea plants. The  $F_1$  hybrids were self-pollinated. In  $F_2$  he obtained 120 plants. Find out the number of white flowering plants having identical alleles
- (A) 60                      (B) 90                      (C) 30                      (D) 40







39. Match the column

Column - I		Column - II	
(i)	Growth of pollen tubes towards ovules	(p)	Spores within sporangia
(ii)	Bread mould	(q)	Pseudopodia
(iii)	Amoeba	(r)	Chemotropism
(iv)	Movement of organic solutes in plants	(s)	Tissue culture
(v)	Disease free growth of plants	(t)	Osmotic pressure

(A) (i)-(p), (ii)-(r), (iii)-(q), (iv)-(t), (v)-(s)

(B) (i)-(r), (ii)-(p), (iii)-(q), (iv)-(t), (v)-(s)

(C) (i)-(r), (ii)-(q), (iii)-(p), (iv)-(s), (v)-(t)

(D) (i)-(t), (ii)-(s), (iii)-(q), (iv)-(r), (v)-(p)

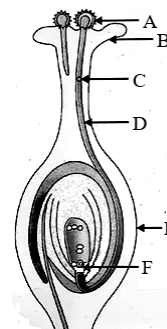
40. Identify the male and female parts involved in reproduction from the following diagram

(A) Male-A, C, F; Female-B, D, E

(B) Male-A, B, C; Female-D, E, F

(C) Male-A, C, D; Female-B, E, F

(D) Male-D, E, F; Female-A, B, C

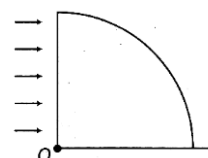


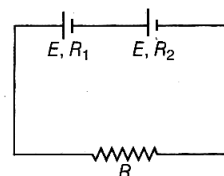
## Section C PHYSICS

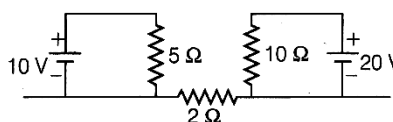
### Numerical problems

 41. A wire carries a current of 1.6 mA. If the number of electrons that pass a given point in the wire per second is  $10^n$ , what is the value of n, if the charge of the electron is  $1.6 \times 10^{-19}$  C?

 42. Water boils in an electric kettle for 15 minute. If the length of heating wire is decreased to  $\frac{2}{3}$  of its initial value, then same amount of water will boil with same supply voltage in \_\_\_\_ minute.

 43. A parallel beam of light is incident on a quarter cylinder lies on horizontal surface. The refractive index of the quarter cylinder is  $\mu = \sqrt{2}$  and radius is  $\sqrt{2}$  cm. Find the maximum distance (in cm) from O, where the patch of light be found.

 44. One kilowatt electric heater is to be used with 220 V DC supply. It converts  $\frac{N \times 10}{3}$  g of water at  $100^\circ\text{C}$  into steam at  $100^\circ\text{C}$  in one minute. If specific heat and latent heat of water are  $540 \text{ cal g}^{-1}$ . Find the value of N.

 45. Two cells of same emf E but internal resistances  $r_1 = 3 \Omega$  and  $r_2 = 1 \Omega$  are connected in series to an external resistance R. The value of R for which the potential difference across the terminals of the first cell becomes zero, is

 46. The power of a heater is 500 W at  $800^\circ\text{C}$ . The power at  $200^\circ\text{C}$  if the temperature coefficient of resistance,  $\alpha = 4 \times 10^{-4} \text{ }^\circ\text{C}^{-1}$  was found to be P watt, find  $\frac{P}{10}$ ?

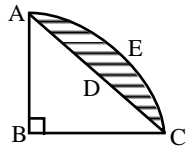
 47. In the circuit shown the current through  $2 \Omega$  resistance is


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48. A set of  $n$  equal resistors of resistance  $R$  each are connected in series to a battery of emf  $E$  and internal resistance  $R$ . A current  $I$  is observed to flow in the circuit. Then,  $n$ -resistors are connected in parallel to the same battery. It is observed that current is increased 10 times. What is the value of  $n$ ?
49. A far-sighted man, Ram and a short sighted man Shyam, see objects through their spectacles as a man with normal eye sight. When Ram accidentally wears the spectacles of Shyam, he finds that he can see distinctly only infinitely remote objects. At what minimum distance  $y$  can Shyam see a small word, if he wears Ram's spectacles, if  $y = \frac{25}{n}$  cm. Find the value of  $n$ .
50. A resistor develops 400 J of thermal energy in 10 s when a current of 2 A passed through it. When the current is increased to 4 A, then energy dissipated in 20 s as heat is found to be  $400\alpha$  J. Find the value of  $\alpha$  is \_\_\_\_\_ .

## MATHEMATICS

### Numerical problems

51. In a right angled triangle  $\Delta ABC$ , right angled at B,  $BC = 12$  cm,  $AB = 5$  cm. Then the radius of circle inscribed in  $\Delta ABC$  (in cm) is
52. If  $x^2 - 3x + 2$  is a factor of  $x^4 + ax^3 + 2x^2 + 5x + b$ , then the value of  $7(a - b)$  is
53. ABCD is a quadrant of a circle of radius 14 cm. With AC as a diameter, a semicircle is drawn. Find the area of the shaded position (in  $\text{cm}^2$ ) (note: Take  $\pi = \frac{22}{7}$ )
- 
54. Ramesh started work in 2020 at an annual salary of Rs. 5000 and received a Rs. 200 raised each year. In how many years his annual salary is Rs. 7000?
55. If  $\tan \theta - \cot \theta = a$  and  $\sin \theta + \cos \theta = b$ , then  $(b^2 - 1)^2 (a^2 + 4)$  is equal to
56. The radius of circle passing through the vertices of  $\Delta ABC$  where  $A(8, 6)$ ,  $B(8, -2)$  and  $C(2, -2)$  is
57. A tree of height 100 feet subtends a right angle at the top of another tree. If the height of the other tree is 64 m, then the distance between the two trees (in cm) is
58. If  $p^{\text{th}}$ ,  $q^{\text{th}}$  and  $r^{\text{th}}$  terms of an AP are  $a$ ,  $b$ , and  $c$  respectively, then the value of  $a(q - r) + b(r - p) + c(p - q)$  is
59. The number of real roots of the equation  $(a^2 + b^2)x^2 + 2(ac + bd)x + c^2 + d^2 = 0$  if  $ad \neq bc$  is
60. Let ABC is a triangle right angled at B and M, N are midpoints of sides AB and BC respectively. If  $4(AN^2 + CM^2) = n(AC^2)$ , then the value of  $n$  is

## CHEMISTRY

### Numerical problems

61. How many of the following statement(s) are correct about electrolysis?
- (1) anions will go to anode to undergo reduction
  - (2) cations will go to cathode to undergo reduction
  - (3) pure metal strip is placed at cathode during electrorefining
  - (4) concentration of metal ions from electrolyte decreases during electrolysis at the stage of electrorefining
  - (5) During electrolysis of  $\text{NaCl}_{(\text{aq})}$ , Na metal is deposited at cathode
  - (6) Upon electrolysis of water, oxygen gas is released at cathode

62. The number of maximum possible structural isomers possible for  $C_7H_{16}$  is \_\_\_\_\_
63. 10 g of a sample of sulphuric acid was diluted with water and a piece of marble weighing 7 g was placed in it. When all the action had ceased, the marble was removed, washed, dried and found to weigh 2.2 g. The percentage strength (mass by mass percentage of solution) of sulphuric acid is \_\_\_\_\_ [round off to nearest integer] Given: Molecular weight of  $CaCO_3 = 100$ ;  $H_2SO_4 = 98$
64. The maximum number of structural isomers possible for  $C_5H_{11}Cl$  is \_\_\_\_\_
65. The mole fraction of a solute in a solution is 0.1. At 298 K, molarity of this solution is same as its molality. Density of this solution at 298 K is  $2.0 \text{ g cm}^{-3}$ .  
Given that  $\text{Molarity} = \frac{\text{Number of moles of solute}}{\text{Volume of solution (in litres)}}$ ;  $\text{Molality} = \frac{\text{Number of moles of solute}}{\text{mass of solvent (in Kg)}}$ ;  
The ratio of molecular weights of solute and solvent,  $\frac{MW_{(\text{solute})}}{MW_{(\text{solvent})}}$  is \_\_\_\_\_
66. A solid mixture weighing 5.0 g containing lead nitrate and sodium nitrate was heated below  $600^\circ\text{C}$  during which the following reactions take places  
 $Pb(NO_3)_2 \rightarrow PbO + NO_2 + O_2$  (unbalanced)  
 $NaNO_3 \rightarrow NaNO_2 + O_2$  (unbalanced)  
If the loss of mass is 28%, then the mass (in g) of lead nitrate in mixture is \_\_\_\_\_  
(round off to nearest integer)  
Given: Molecular weight of  $Pb(NO_3)_2 = 331$ ,  $NaNO_3 = 85$ ;  $NO_2 = 46$ ;  $O_2 = 32$
67. How many of the following compounds can change colour of moist blue litmus paper?  
 $CO_2$ ,  $H_2O$ ,  $Cl_2$ ,  $KNO_3$ ,  $NaCl$ ,  $NaHCO_3$ ,  $NO_2$ ,  $CO$ ,  $AlCl_3$ ,  $CH_3COONa$ ,  $NH_4Cl$
68. If 3 g of  $H_2$  react with 29.0 g of  $O_2$  to form  $H_2O$ , then the amount (in g) of  $H_2O$  formed is \_\_\_\_\_  
(round off to nearest integer)  
Given : atomic weight of  $H = 1$ ;  $O = 16$
69. How many of the following statement(s) is/are correct?  
(i) Ethanol has a higher boiling point than ethanoic acid and chloroform  
(ii) Graphite is more stable compared to diamond  
(iii) Buckminster fullerene ( $C_{60}$ ) has 80  $\sigma$ -bonds  
(iv) Difference in molecular weight between two consecutive homologue is 14 a.m.u  
(v) Alkynes are more reactive compared to alkenes towards addition reactions  
(vi) Alcohols can liberate  $H_2$  gas upon reacting with Na metal.  
(vii) Ethanal and methanol in very small quantities can cause death
70. The number of moles of ethane required to produce 176 g of  $CO_2$  on combustion is \_\_\_\_\_  
Given: atomic weight of  $C = 12$ ;  $H = 1$ ;  $O = 16$

\* \* \*

**-Space for rough work-**

