8559

SCIENCE (Theory) — Paper I
(Physics and Chemistry)

Time Allowed : $2\frac{1}{2}$ Hours]   [Maximum Marks : 100

Instruction : Check the question paper for fairness of printing. If there is any lack

of fairness, inform the Hall Supervisor immediately.

Instructions to the Candidates :

i)   Use of logarithm table is permitted.

ii)   Use diagrams, expressions and equations, wherever necessary.

(PHYSICS)

(Marks : 50)

SECTION – A
Answer *all* the questions.

I.   Choose the correct answers : $10 \times 1 = 10$

1.   Two equal and opposite forces not acting at a point form a

    a)   power   b)   work

    c)   couple   d)   torque.

2.   For stable equilibrium of a body

    a)   C.G. must be as low as possible

    b)   It should have a broad base

    c)   The vertical line through the C.G. should fall with its base

    d)   All of these.

3.   A polished calorimeter should be placed in an insulated wooden box to

reduce heat loss by

    a)   conduction   b)   convection

    c)   radiation   d)   conduction and radiation.

[Turn over

4. The S.I unit of specific heat capacity is

   a)   J/kg   b) $Jkg^{-1} K^{-1}$

   c)   J   d)   Nm

5. IR radiation is detected by

   a)   bolometer   b)   termometer

   c)   galvanometer   d)   ammeter.

6. The fundamental frequency of a closed organ pipe is 256 hertz. The first overtone is

   a)   512 Hz   b)   768 Hz

   c)   128 Hz   d)   256 Hz.

7. A musical instrument with pipe but without reed is

   a)   trumpet   b)   clarinet

   c)   sarangi   d)   harmonium.

8. The angle between geographical meridian and magnetic meridian is

   a)   Dip   b)   Declination

   c)   Permeability   d)   Magnetic field.

9. Fleming's left hand rule is used in

   a)   Generator   b)   Galvanometer

   c)   Ammeter   d)   Microphone.

10. The particle that induces nuclear fission is

   a)   Proton   b)   Electron

   c)   Neutron   d)   Alpha particles.

II. Complete the following using appropriate word / words / expressions :   5 × 1 = 5

  11. The liquid which has the highest specific heat capacity is ....

  12. In a simple microscope the image formed is ....

  13. The water equivalent of a body is numerically equal to ....

  14. Transformer is based on the principle of ....

  15. The source of solar energy is due to ....

SECTION – B

Answer any *five* of the following in *one* or *two* sentences each : $5 \times 2 = 10$

16. Define the moment of the couple.

17. Define metacentre.

18. Calculate the wavelength in open organ pipe of fundamental frequency 256 Hz. Velocity of sound is 330 m/sec.

19. What is magnetic equator ?

Give reasons for the following :

20. A fuse is included in every electrical circuit.

21. Water should be continuously circulated around the anode in a Coolidge tube.

Give any *two* uses or practical applications of the following :

22. Specific heat

23. $U - V$ rays.

SECTION – C

Answer any *five* of the following, choosing at least *one* question from each Part :

$5 \times 5 = 25$
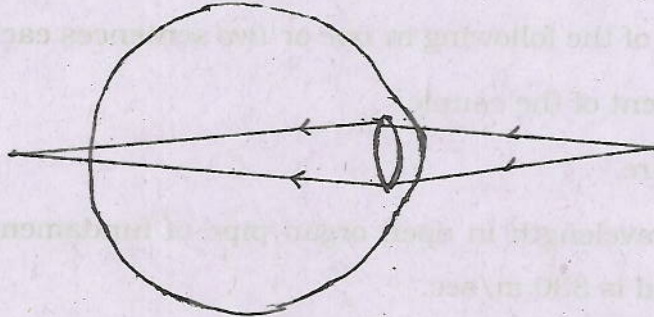
PART – I

24. Study the following diagram and answer the questions
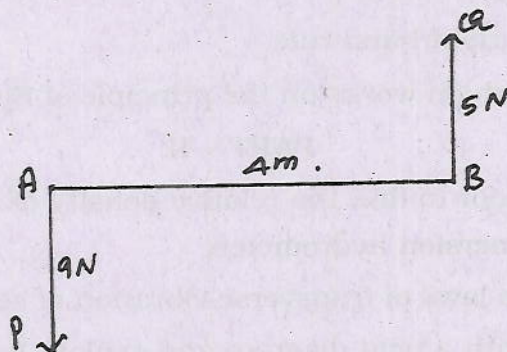
a)   What kind of parallel forces are P and Q ?   1

b)   What is the direction of the resultant ?   1

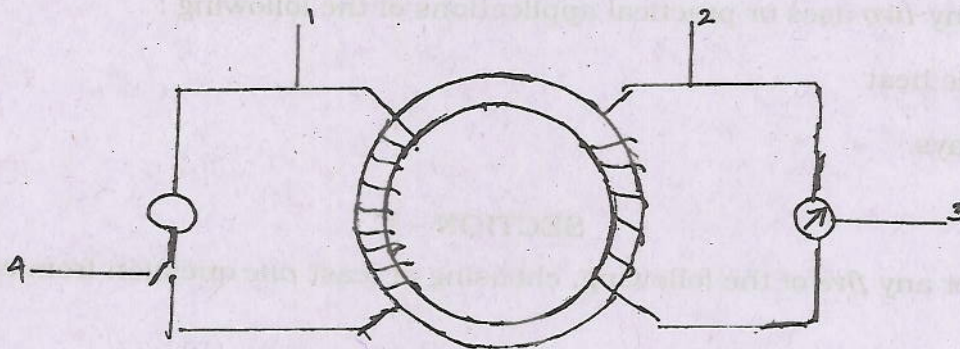c)   What is the magnitude of the resultant ?   1

d)   How far is the resultant from the force P ?   2

25.

a)   Name the defect shown in the diagram.   1

b)   State any one cause for it.   1

c)   Name the lens used to rectify the defect.   1

d)   Draw the corrected vision.   2

26.

a)   Name the experiment.   1

b)   Name the parts numbered.   1

c)   State Fleming's right hand rule.   2

d)   Name a device which works on the principle of Electromagnetic induction   1

PART – II

27. Describe an experiment to find the relative density of a liquid using the test tube float as constant immersion hydrometer.

28. State and explain the laws of transverse vibration of stretched strings.

29. Describe dip circle with a neat diagram and explain how it is used to find the dip at a place.

30. Calculate the heat absorbed when 10 gm of ice at 0°C is changed into steam at 100°C.

31. a)   State any three properties of X-rays.   3

    b)   Explain nuclear fusion with an example.   2

(CHEMISTRY)
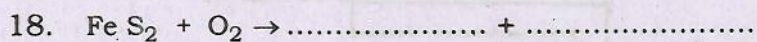
(Marks : 50)

SECTION – A

Answer *all* the questions.

I. Choose the correct answers : $10 \times 1 = 10$

1. Sulphur and oxygen combine to form SO_2 and SO_3. The ratio by weights of oxygen in these two compounds is

    a)   3 : 2   b)   2 : 3

    c)   1 : 2   d)   1 : 3.

2. I mole atom of chlorine contains ....atoms.

    a) 6.023×10^{-23} b) 602.3×10^{23}

    c) 60.23×10^{24} d) 6.023×10^{23}.

3. If an atom has six protons in the nucleus, the number of valence electrons in the valence cell is

    a)   2   b)   4

    c)   3   d)   1.

4. The pair of electrons of nitrogen which is not shared by atom is called

    a)   lone pair   b)   covalent pair

    c)   electrovalent pair   d)   co-ordinate pair.

5. Which of the following is used for treating leukemia ?

    a) I^{131} b) Co^{60}

    c) P^{32} d) C^{14}.

6. The electrolytic dissociation of electrolyte was explained by

    a)   Lavoisier   b)   Arrhenius

    c)   Dalton   d)   Henry Becquerel.

[Turn over

7. The % of concentrated H_2SO_4 in the constant boiling mixture is

    a) 93·8 %   b) 98·3%

    c) 99·9 %   d) 89·9 %.

8. Electron is an alloy of

    a) Mg 95% and Zn 5%   b) Copper 80% and Tin 20%

    c) Mg 5% and Zn 95%   d) Copper 65% and Zinc 35%.

9. An ore of magnesium is

    a) Bauxite   b) Haematite

    c) Dolomite   d) Galena.

10. Polymerisation of acetylene gives

    a) Chloroform   b) Polythene

    c) Benzene   d) Ethanol.

II. Complete the following, using appropriate words or expressions :   5 × 1 = 5

11. Alloy of a metal with mercury is called ....

12. pH value of water is ....

13. .... is an unsaturated hydrocarbon used in the ripening of green fruits.

14. $CH_3CH_2\,OH$ and $CH_3O\,CH_3$ exhibit .... isomerism.

15. .... are soapless soaps.

SECTION – B

Answer any *five* questions in *one* or *two* sentences each :   5 × 2 = 10

16. State Gay Lussac's law of combining volume.

17. What are metalloids ? Give an example.

Complete and balance the following equations.

18. $Fe\,S_2 + O_2 \rightarrow$ .... + ...

19. $ZnSO_4 + NaOH \rightarrow$ .... + ...

Give reasons :

20. White phosphorus is stored under water. Why ?

21. Acetylene undergoes addition reaction. Why ?

Give two practical applications of the following.

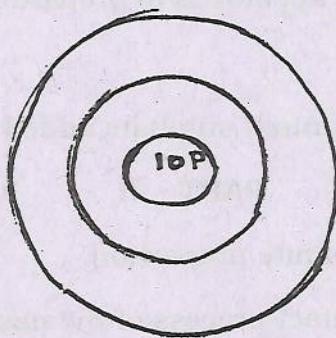22. Sodium bicarbonate.

23. Methane.

SECTION – C

Answer any *five* of the following, choosing at least *one* question from each Part :

$$5 \times 5 = 25$$
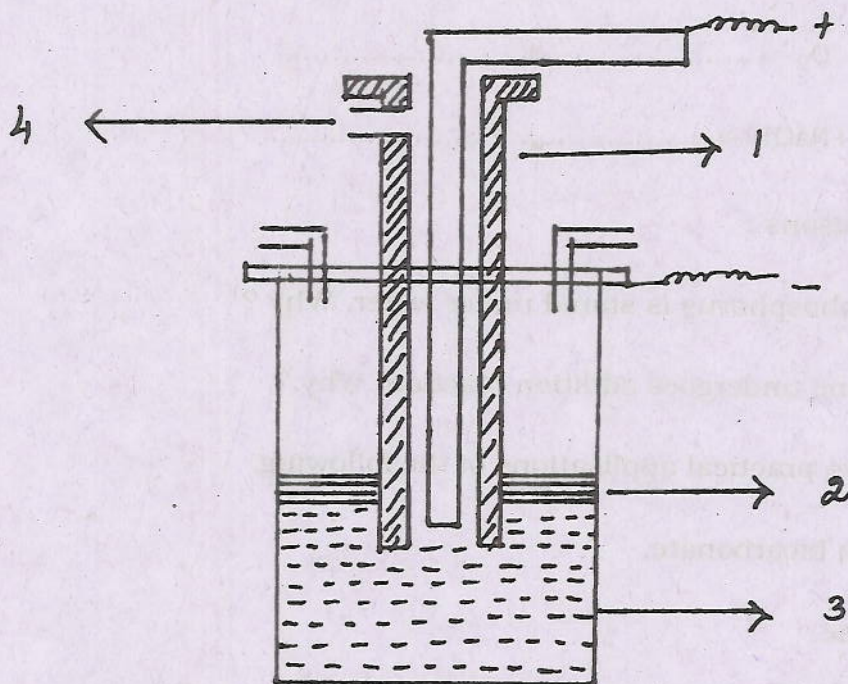
PART – I

24.

a) Name the element.   1

b) Find the mass number.   1

c) Is the atom having stable configuration ?   1

d) Complete the structure.   2

[Turn over

25.

a) Label the parts numbered.   2

b) Name the chief ore.   1

c) What is the reaction that takes place at the cathode ?   2

26. You are provided with a round bottomed flask, thermometer, delivery tube, wash bottle, beehive shelf, trough, gas jar, stand and burner.

a) How will you set up the apparatus to prepare Ethylene in the lab ?   3

b) Write the equation.   1

c) Why is anhydrous aluminium sulphate added to the reacting mixture ?   1

PART – II

27. State and verify the law of definite proportion.

28. Explain the theory of the contact process of the manufacture of sulphuric acid.

29. State any five differences between metals and non-metals.

30. What is called photocatalytic reaction ? Explain the substitution reaction of methane with chlorine.   1 + 4

31. Explain pesticides with suitable example.