8121

Register Number | | | | | | |

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.

SECTION – A

PHYSICS

(Marks : 50)

I. Choose the correct alternative and write it against the question number in your answer-book : $10 \times 1 = 10$

1. The unit of angular acceleration is

   a) ms^{-2} b) $rad.s^{-1}$

   c) $rad.s^{-2}$ d) $kg\ m^2s^{-1}$.

2. The energy released when a mass of 1 gm is completely converted into energy is

   a) 9×10^{13} J b) $6{\cdot}625 \times 10^{17}$ J

   c) 3×10^{8} J d) $4{\cdot}969 \times 10^{19}$ J.

3. Loudspeaker works on the principle of

   a) Fleming's right hand rule b) Faraday's I law

   c) Lenz's rule d) Fleming's left hand rule.

4. The turns ratio of a transformer in a tubelight which changes 240 V AC from the main voltage to 12 kV is

a) 50 b) 10

c) 0·01 d) 20.

5. The force that holds the cement particles with sand and brick is

a) force of cohesion b) force of adhesion

c) elastic force d) frictional force.

6. The radius of an atom is about

a) 10^{-14} m b) 10^{-12} m

c) 10^{-10} m d) 10^{-15} m.

7. A controlled chain reaction takes place in

a) atom bomb b) nuclear reactor

c) hydrogen bomb d) all of these.

8. When a β-particle is emitted from the nucleus of an element, its mass number

a) increases by one and the atomic number remains the same

b) remains the same but the atomic number increases by one

c) decreases by four and the atomic number decreases by two

d) decreases by two and the atomic number increases by one.

9. Geostationary satellites have the time period of

a) 12 hours b) 7 days

c) 24 hours d) 48 hours.

10. ..... is the primary agency under the department of space for executing space programmes in India.

a) DOS b) IRS

c) ISRO d) SROSS.

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

11. Define the term 'centre of gravity'.
12. What is the use of Raman shift ?
13. Find the e.m.f. induced in a coil of 50 turns if the flux linked with the coil changes from 0·5 Wb to 1·5 Wb in 0·02 seconds.
14. State Fleming's Left hand rule.
15. State Bernoulli's principle.
16. What would be the maximum speed of water flowing in a pipe of diameter 10 cm, so that the flow is streamlined ? (coefficient of viscosity of water is 1×10^{-3} Ns m^{-2}).
17. Find the radius of a nucleus of mass number 64.
18. What is the principle involved in the production of *X*-rays ?
19. State Kepler's law of period.

III. Answer any *five* of the following questions : $5 \times 3 = 15$

20. Define a projectile. Give an example.
21. Derive the relation between linear velocity and angular velocity.
22. What is pure spectrum ? State any two conditions for producing a pure spectrum.
23. What is the wavelength associated with an electron moving with a velocity of 10^6 ms^{-1} ?
24. An immersion heater works on 230 V and draws a current of 4 A. Find the cost of running it for 15 minutes everyday for a month of 30 days at the cost of Rs. 2/- per unit.
25. Explain any three illustrations of capillarity.
26. Explain the following parts of a nuclear reactor :
    i) Moderator
    ii) Control rods.
27. Write the uses of *X*-rays in industry.
28. What is called remote sensing ? Write its application in various fields.

IV. Answer any *three* of the following questions : $3 \times 5 = 15$

29. Calculate the centripetal acceleration and hence the centripetal force when a seat of four children having total mass of 150 kg of a giant wheel rotates at a speed of 5 ms^{-1} with a radius of 8 m.

30. Mention the properties of $u - v$ rays.

31. Describe the construction and working of a D.C. generator.

32. Explain the molecular theory of surface tension.

33. Differentiate nuclear reaction and chemical reaction.

34. What are radioisotopes ? Give the applications of radioisotopes in the fields of medicine and industry.

SECTION – B

CHEMISTRY

(Marks : 50)

V. Choose the correct answer and write it against the question number in the answer-book : $10 \times 1 = 10$

35. The quantum number which gives the orientation of a given electron is .....

a) Principal quantum number b) Spin quantum number

c) Azimuthal quantum number d) Magnetic quantum number.

36. How many moles are contained in 36 gms of water ?

a) 1 b) 2

c) 3 d) 4.

37. Experimental verification for the law of multiple proportion was done by

a) Berzelius b) Dalton

c) Lavoisier d) Lomonossoff.

38. Unit for the rate of the reaction is

a) mol dm^{-3} s^{-1} b) mol dm^3 s^{-1}

c) mol dm^3 s d) mol^{-1} dm^{-3} s^{-1}.

39. Which among the following metals is enriched by electromagnetic separation ?

a) Copper b) Tin

c) Silver d) Iron.

40. The process of coating zinc over iron sheet is known as

a) Galvanisation b) Tinning

c) Anodizing d) Alloying.

41. ..... is the non-metal found in liquid state.

a) Fluorine b) Sulphur

c) Silicon d) Bromine.

42. Ethanol is used as an

a) Antiseptic b) Antipyretic

c) Anaesthetic d) None of these.

43. Pure anhydrous acetic acid is known as

a) Vinegar b) Glacial acetic acid

c) Acetic acid d) None of these.

44. Asbestosis is the disease which affects

a) lungs b) heart

c) eye d) blood.

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

45. Define oxidation and reduction in terms of electron transfer.

46. State the law of definite proportions.

47. What is the present day position of law of multiple proportion ?

48. Define chemical equilibrium.

49. What is liquation ?

50. Define allotropy.

51. What is azeotropic mixture ?

52. Complete the reaction $C_2H_5-O-C_2H_5+Cl_2 \xrightarrow{dark}$

53. What are the changes occurring in water due to pollutants ?

VII. Answer any *five* of the following questions in brief : $5 \times 3 = 15$

54. State Aufbau's principle.

55. Give the difference between orbit and orbital.

56. Deduce the relationship between equivalent weight and atomic weight.

57. 100 cm^3 of propane was burnt in excess oxygen to form carbon dioxide and water. Calculate the volume of oxygen used up.

$\left[\text{Hint : } C_3H_{8(g)}+5O_{2(g)} \rightarrow 3CO_{2(g)}+4H_2O\right]$

58. How does the temperature influence the rate of the reaction ?

59. Explain the three commercial forms of iron.

60. Give three uses of ether.

61. What is esterification ? Explain with an example.

62. Give the IUPAC name of the following :

a) $CH_3-CO-CH_2 \cdot CH_3$

b) $CH_3-CH_2 \cdot CHO$

c) H – COOH.

VIII. Answer any *three* of the following questions in detail with necessary diagrams and equations wherever necessary : $3 \times 5 = 15$

63. Explain oxide formation method of determining equivalent mass of an element with an example.

64. Distinguish metals and non-metals based on their physical properties (any *five*).

65. Explain the extraction of aluminium from its ore by Baeyer's process.

66. How is phosphorus extracted by the modern electrothermal process ?

67. Describe the manufacture of ethanol from molasses.

68. What measures can be taken for an effective control of noise pollution ? Give any five points.