Total No. of Printed Pages—23

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SCIENCE AND TECHNOLOGY

(FOR CANDIDATES WITH PRACTICAL MARKS)

Full Marks : 80
Pass Marks : 24

(FOR CANDIDATES WITHOUT PRACTICAL MARKS)

Full Marks : 100
Pass Marks : 30

Time : 3 hours

(FOR ALL CATEGORIES OF CANDIDATES)

General Instructions :

(i) This question paper comprises of three Sections A, B and C.

(ii) The Candidates are advised to attempt all questions of Sections A, B and C separately.

(iii) Allocated marks are indicated against each.

(iv) Question Nos. **1** to **56** are to be answered by all Candidates.

(v) Question No. **57** is to be answered by **Candidates without Practical Marks**.

(vi) Questions meant for Visually Impaired Candidates should be answered by them only.

SECTION—A

(PHYSICS)

(*Marks* : 26)

Choose and write the correct answer from the following (any *four*) : 1×4=4

1. The perpendicular shift in the path of light while emerging from another optical medium is called

(A) displacement

(B) lateral displacement

(C) shifting

(D) scattering

2. An object is at infinity with respect to the optical centre of a converging lens. The image formed is

(A) diminished and erect

(B) magnified and inverted

(C) diminished to a point and inverted

(D) magnified and erect

3. The rate of flow of an electric charge is called

(A) electric current

(B) electric energy

(C) electric potential

(D) None of the above

4. Stars appear to twinkle due to

(A) atmospheric refraction

(B) movement of air

(C) Both (A) and (B)

(D) None of the above

5. The strength of magnetic field

(A) increases near the poles

(B) decreases near the poles

(C) remains the same

(D) None of the above

6. An electric device which converts electric energy into mechanical energy is called

(A) transformer

(B) electric generator

(C) dynamo

(D) electric motor

7. Electrical resistivity of a given metallic wire depends on

(A) its length

(B) its thickness

(C) its shape

(D) nature of the material

8. The blind spot on retina has

(A) few nerve endings

(B) high concentration of nerve endings

(C) no nerve endings

(D) None of the above

Answer the following short answer-type questions (any *four*) : 2×4=8

9. State the characteristics of image formed when the object is placed between optical centre and the first principal focus of a convex lens. ½×4=2

10. State two uses of concave mirror. 1+1=2

11. What is myopia? Name the lens used for correcting this defect. 1+1=2

12. What do you mean by monochromatic light and poly-chromatic light? 1+1=2

13. State any two characteristics of material for heating elements. 1+1=2

14. Define electric power. State the SI unit of power. 1+1=2

15. What is a solenoid? 2

16. What do you understand by the term 'earthing'? Why is it important to have earthing? 1+1=2

Answer the following short answer-type questions : 3×3=9

Answer *either* Part—A *or* Part—B from each question

Part—A

17. *(a)* State the nature of lens and the focal length if its power is +4D. 1+2=3

Part—B

(b) What do you understand by the term 'refractive index'? 1

(c) What is one dioptre? 1

(d) What is the speed of light in air or vacuum? 1

Part—A

18. *(a)* An electric heater draws a current 5 A when connected to 220 V supply mains in one minute. Calculate the energy consumed by the heater in kilojoules. 3

Part—B

(b) Three resistors of resistances 12 Ω, 6 Ω and 4 Ω are connected in parallel. Calculate the total resistance of the circuit. 2

(c) State the SI unit of resistivity. 1

Part—A

19. *(a)* Give the function of coil, commutator and brushes of an electric motor. 3

Part—B

(b) List three characteristics of magnetic field. 3

Answer the following long answer-type question : 5

Answer *either* Part—A *or* Part—B *or* Part—C

Part—A

20. *(a)* State the laws of reflection. 2

(b) How can the power of an electric motor be increased? (Give any three points.) 3

Part—B

(c) What is a spectrum? 1

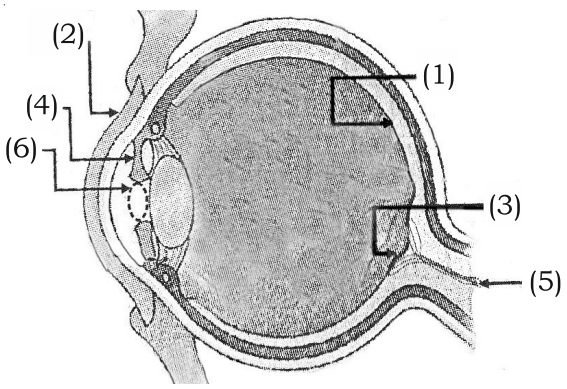
(d) Why is the sunlight reaching the earth yellowish? 2

(e) How is a rainbow formed? 1

(f) Why do the insulators not conduct electricity? 1

Part—C

(g) In the given diagram of human eye, name the parts (1), (2), (3), (4), (5) and (6) : ½×6=3



Human Eye

[For Visually Impaired Candidates only in lieu of Question No. 20*(g)*]

(g) What is vitreous humour? Give two functions of vitreous humour. 1+2=3

(h) Give two differences between real and virtual images. 2

SECTION—B

(CHEMISTRY)

(*Marks* : 26)

Choose and write the correct answer from the following (any *three*) : 1×3=3

21. Zinc or aluminium does not corrode because

(A) they do not react with moist air

(B) they react with moist air to form a very thin layer of oxides which is very sticky and hard

(C) they are inactive metals

(D) they are metalloids

22. Which one of the following is not a neutral salt?

(A) NaCl

(B) $NaNO_3$

(C) Na_2SO_4

(D) Na_2CO_3

23. Which of the following forms the basis of the Modern Periodic Table?

(A) Atomic mass

(B) Atomic number

(C) Number of nucleons

(D) All of the above

24. Which of the following statements is not correct?

(A) All metal carbonates react with an acid to give salt, water and carbon dioxide.

(B) All metal oxides react with water to give salt and acid.

(C) Some metals react with acid to give salt and hydrogen.

(D) Some non-metal oxides react with water to form an acid.

25. What is the other name for Group 18 elements?

(A) Noble gases

(B) Alkali metals

(C) Alkaline earth metals

(D) Halogens

26. A chemical reaction is characterized by

(A) a change in state

(B) formation of new products

(C) evolution or absorption of energy

(D) All of the above

Answer the following short answer-type questions (any *three*) : 2×3=6

27. Balance the following chemical reactions : 1+1=2

(a) $Cu(NO_3)_2 \rightarrow CuO + NO_2 + O_2$

(b) $MnO_2 + HCl \rightarrow MnCl_2 + Cl_2 + H_2O$

28. What happens chemically, when quicklime is added to water? Give the chemical equation. 1+1=2

29. State two limitations of the Mendeleev's Periodic Table. 1+1=2

30. The atomic numbers of nitrogen and phosphorus are 7 and 15 respectively. Write the electronic configuration of each of them and state to which Period do they belong. ½+½+½+½=2

31. *(a)* What are hydrocarbons? 1

(b) Give the names of the following functional groups : ½+½=1

(i) —OH

(ii) —COOH

32. *(a)* Name the organic acid present in vinegar. Write its chemical formula. ½+½=1

(b) Name the reaction that is commonly used in the conversion of vegetable oils to fats. 1

Answer the following short answer-type questions : 3×4=12

Answer *either* Part—A *or* Part—B from each question

Part—A

33. *(a)* On adding drop of barium chloride solution to an aqueous solution of sodium sulphate, a white precipitate is obtained.

(i) Write a balanced chemical equation and specify the name of precipitate formed. 1+1=2

(ii) What other name can be given to this precipitation reaction? 1

Part—B

(b) When an aqueous sodium hydroxide solution is added to aqueous copper sulphate solution, it forms a bluish white precipitate of copper hydroxide.

(i) What is the colour of copper sulphate solution? 1

(ii) What type of reaction is this? 1

(iii) Write a balanced chemical equation to represent the above reaction. 1

Part—A

34. *(a)* *(i)* Write the chemical formula and chemical name of Plaster of Paris. 1

(ii) What happens when gypsum is heated above 100 °C? 1

(iii) Give one use of Plaster of Paris. 1

Part—B

(b) *(i)* What is meant by the term 'pH' of a solution? 1

(ii) The pH of gastric juices extracted from the stomachs of two persons *A* and *B* were found to be 1 and 3 respectively. The stomach juice of which person is more acidic? 1

(iii) Give an example each of strong acid and strong base. ½+½=1

Part—A

35. *(a)* Draw a geometric diagram for the formation of $MgCl_2$ from magnesium and chlorine by transfer of electrons. 3

[For Visually Impaired Candidates only in lieu of Question No. 35*(a)*]

(a) *(i)* Why and how are alloys made? 1½

(ii) State any three properties of alloy. 1½

Part—B

(b) A solution of $CuSO_4$ was kept in an aluminium pot. After few days, the aluminium pot was found to have a number of holes in it. Explain the reason in terms of reactivity. Write the chemical equation involved. 2+1=3

Part—A

36. *(a)* *(i)* What do you understand by saturated and unsaturated carbon compounds? 1+1=2

(ii) Write two isomers of butane. ½+½=1

Part—B

(b) Acetone is the first member of ketones. Answer the following questions :

(i) What is its molecular formula? 1

(ii) What is its IUPAC name? 1

(iii) Give its structural formula. 1

Answer the following long answer-type question : 5

Answer *either* Part—A *or* Part—B *or* Part—C

Part—A

37. *(a)* Identify and name the elements out of the following elements whose electronic configurations are given below : ½×4=2

(He, Li, Na, K, Ca, Mg, Cl)

(i) 2, 8, 2

(ii) 2, 8, 1

(iii) 2, 8, 7

(iv) 2, 1

(b) What is an oxidation reaction? Identify *(i)* the substance oxidized and *(ii)* the substance reduced in the following reaction : 1+½+½=2

$$ZnO + C \rightarrow Zn + CO$$

(c) Write down the valency of *(i)* fluorine and *(ii)* aluminium. ½+½=1

Part—B

(d) What is concentration of ore? 1

(e) Explain the froth floatation process with neat labelled diagram. 2½+1½=4

[For Visually Impaired Candidates only in lieu of Question No. 37*(e)*]

(e) Define Roasting. State any three objectives achieved during roasting. 1+3=4

Part—C

(f) *(i)* What is esterification? Give chemical equation. 1+1=2

(ii) What are esters used for? ½+½=1

(iii) Differentiate between soap and synthetic detergents (any two points). 1+1=2

SECTION—C

(BIOLOGY)

(*Marks* : 28)

Choose and write the correct answer from the following (any *three*) : 1×3=3

38. During germination, a seedling develops from a/an

(A) seed

(B) embryo

(C) seed coat

(D) ovule

39. Select the mismatched pair.

(A) Adrenaline : Pituitary gland

(B) Testosterone : Testes

(C) Estrogen : Ovary

(D) Thyroxine : Thyroid gland

40. The movement of shoot towards light is called

(A) geotropism

(B) hydrotropism

(C) chemotropism

(D) phototropism

41. Platelets help in

(A) transport of oxygen

(B) transport of carbon dioxide

(C) clotting of blood

(D) pumping of blood

42. Which excretory organ stores urine?

(A) Kidney

(B) Ureter

(C) Urinary bladder

(D) Urethra

43. We can get disease-free plant by

(A) fission

(B) regeneration

(C) fragmentation

(D) micropropagation

Answer the following short answer-type questions (any *four*) : 2×4=8

44. Write any four basic requirements of photosynthesis. ½+½+½+½=2

45. What is the role of *(a)* tongue and *(b)* teeth in digestion? 1+1=2

46. What is reflex action? Give two examples. 1+½+½=2

47. Mention the mode of reproduction used by *(a)* Amoeba and *(b)* Planaria. 1+1=2

48. *(a)* Which gland is known as 'gland of emergency'? 1

(b) What causes dwarfism? 1

49. Illustrate, with the help of suitable diagram, the spore formation in Rhizopus. ½×4=2

[For Visually Impaired Candidates only in lieu of Question No. 49]

49. Name two sexually transmitted diseases each caused due to bacterial infection and viral infection. 1+1=2

50. Define heredity. Name the scientist who is referred to as 'the father of genetics'. 1+1=2

51. What is speciation? Name two types of speciation. 1+½+½=2

Answer the following short answer-type questions : 3×4=12

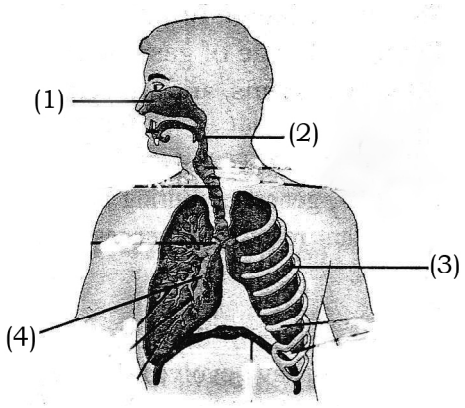
Answer *either* Part—A *or* Part—B from each question

Part—A

52. *(a)* Give three points of difference between respiration in plants and animals. 3

Part—B

(b) *(i)* In the given diagram, name the parts (1), (2), (3) and (4) : ½×4=2



[For Visually Impaired Candidates only in lieu of Question No. 52*(b)(i)*]

(i) How are acquired traits different from inherited traits? 1+1=2

(b) *(ii)* Name any two autotrophic plants which also show heterotrophic mode of nutrition. ½+½=1

Part—A

53. *(a)* *(i)* Define nerve impulse. Which structure in a neuron helps to conduct a nerve impulse—

1. towards the cell body;

2. away from the cell body? 1+½+½=2

(ii) Define synapse. 1

Part—B

(b) Write down the functions of gibberellins, cytokinins and abscisic acid (one each). 1+1+1=3

Part—A

54. *(a)* *(i)* What is vegetative propagation? 1

(ii) In which type of plant is it performed? 1

(iii) Name two methods of vegetative propagation. ½+½=1

Part—B

(b) *(i)* What do you mean by tissue culture? 1

(ii) Give any two advantages of tissue culture. 1+1=2

Part—A

55. *(a)* Enumerate the basis of Darwin's theory of natural selection (any six points). ½×6=3

Part—B

(b) Define the following : 1+1+1=3

(i) Genetics

(ii) Palaeontology

(iii) Evolution

Answer the following long answer-type question : 5

Answer *either* Part—A *or* Part—B *or* Part—C

Part—A

56. *(a)* *(i)* List three kinds of blood vessels of human circulatory system. 1½

(ii) What makes red blood corpuscles red? ½

(iii) Name the main organs of human digestive system for digestion of food. 2½

(iv) What is the mode of nutrition found in human beings? ½

Part—B

(b) Explain the following terms : 1+1+1=3

(i) Implantation

(ii) Placenta

(iii) Parturition

(c) What is puberty? When does puberty occur in human male and female? 1+1=2

Part—C

(d) State the differences between transpiration and translocation. 1+1+1+1+1=5

[For Candidates without Practical Marks]

57. I. Answer any *three* of the following questions : 2×3=6

(a) State and write the mirror formula. 1+1=2

(b) State two uses of convex mirror. 1+1=2

(c) What is presbyopia? How is this defect corrected? 1+1=2

(d) What do you understand by the term 'electric work'? State its SI unit. 1+1=2

(e) State the characteristics of magnetic field lines (two points). 1+1=2

(f) List two characteristics of an image formed in a plane mirror. 1+1=2

II. Answer any *three* of the following questions : 2×3=6

(a) Balance the following : 1+1=2

(i) $H_2 + O_2 \rightarrow H_2O$

(ii) $Mg + N_2 \rightarrow Mg_3N_2$

(b) What is chemical decomposition reaction? Give an example. 1+1=2

(c) Explain the terms 'rust' and 'rusting'. 1+1=2

(d) Name two allotropes of carbon. 1+1=2

(e) Write two uses of bleaching powder. 1+1=2

(f) *(i)* Name a molecule of an element that has one covalent bond. 1

(ii) How do valence electrons vary on going down the Group? 1

III. Answer any *four* of the following questions : 2×4=8

(a) Name the following : 1+1=2

(i) Small openings present on the leaf surface

(ii) The duct which carries urine from urinary bladder to outside the body

(b) Name the following : 1+1=2

(i) Fission in which two organisms are formed from one parent cell

(ii) Female reproductive whorl of a flower

(c) Write the full forms of the following : 1+1=2

(i) ATP

(ii) HIV

(d) Name four kinds of cells (elements) of xylem. ½×4=2

(e) Write the functions of *(i)* insulin and *(ii)* testosterone. 1+1=2

(f) Name the parts of flower which produce male and female gamete. 1+1=2

(g) What is multiple fission? Name the organism which reproduces by multiple fission. 2

(h) What is genetic drift? 2

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