

Total No. of Printed Pages—16

**X/20/S & T (N)**

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**SCIENCE AND TECHNOLOGY**

( New Course )

**( 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 **35** are to be answered by all Candidates.
- (v) Question No. **36** is to be answered by **Candidates without Practical Marks.**
- (vi) Questions meant for Visually Impaired Students should be answered by them only.

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SECTION—A

( **PHYSICS** )

( *Marks : 26* )

Choose and write the correct answers from the following :  $1 \times 4 = 4$

1. When a newspaper is seen through a lens, its print appears smaller. The nature of the lens is
  - (A) convex
  - (B) concave
  - (C) double convex
  - (D) concavo-convex
  
2. During sunset or sunrise, the sun appears reddish because
  - (A) at this time sun is not very hot
  - (B) sun produces red light at this time
  - (C) due to longer passage in atmosphere even red light in the sunlight scatters
  - (D) None of the above
  
3. Electrical resistivity of a given metallic wire depends upon
  - (A) its length
  - (B) its thickness
  - (C) its shape
  - (D) nature of the material

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

- (A) electric motor
- (B) electric generator
- (C) dynamo
- (D) transformer

Answer the following short answer-type questions : 2×4=8

5. Distinguish between the inverted image and laterally inverted image. 2

6. Why is fuse wire always placed in a live circuit? 2

7. An eye specialist prescribes a power +4.5 D to a person for his glasses. What is the nature of the lens and the focal length of the lens? 1+1=2

8. Give two practical applications of electromagnet. 1+1=2

( 4 )

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

Answer *either* Part—A or Part—B

Part—A

9. (a) An electric bulb of resistance  $80\ \Omega$  draws a current of  $0.75\ \text{A}$ . Find the line voltage.  $\frac{1}{2} + \frac{1}{2} = 1$
- (b) Distinguish between the terms 'overloading' and 'short circuiting' as used in domestic circuits. 2

Part—B

- (c) A convex lens of focal length  $40\ \text{cm}$  and a concave lens of focal length  $50\ \text{cm}$  are placed in contact with each other. Calculate (i) the power of the combination and (ii) focal length of the combination.  $1\frac{1}{2} + 1\frac{1}{2} = 3$
10. Give three characteristics of a series circuit. 3
11. What is an electromagnet? Draw a circuit diagram to show how a soft iron piece can be transformed into electromagnet.  $\frac{1}{2} + 2\frac{1}{2} = 3$

**[ For Visually Impaired Candidates only ]**

11. State the differences between electromagnet and permanent magnet. (Give any *three* points). 3

( 5 )

Answer the following long answer-type questions :

5

Answer *either* Part—A or Part—B

Part—A

12. (a) How can a continuous flow of current be obtained? What are the sources of energy and name of the devices required for continuous flow of current? 1+2=3
- (b) Give any four characteristics when the object is at the centre of curvature of concave mirror.  $\frac{1}{2} \times 4 = 2$

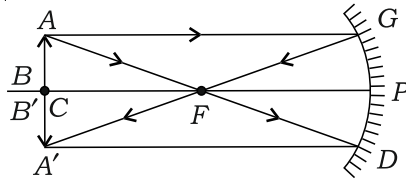


Fig. 1

[ For Visually Impaired Candidates only ]

- (b) State two characteristics of image formed in a plane mirror. 2

Part—B

- (c) How can the power of an electric motor be increased? Explain with any three points. 3
- (d) Why is red-coloured light used as universal signal for danger? 2

( 6 )

SECTION—B  
( CHEMISTRY )

( Marks : 26 )

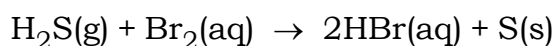
Choose and write the correct answer from the following :  $1 \times 3 = 3$

- 13.** Which one of the following processes involves a chemical reaction?
- (A) Storing of oxygen gas under pressure in a gas cylinder
  - (B) Liquefaction of air
  - (C) Keeping petrol in a china dish in the open
  - (D) Heating copper wire in presence of air at high temperature
- 14.** An aqueous solution turns red litmus blue. Excess addition of which of the following solutions would reverse the change?
- (A) Baking powder
  - (B) Lime
  - (C) Ammonium hydroxide
  - (D) Hydrochloric acid
- 15.** Classification of elements helps us to
- (A) study elements better in a systematic way
  - (B) correlate the properties of elements with some fundamental properties of matter
  - (C) reveal relationship of various elements with each other
  - (D) All of the above

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Answer the following short answer-type questions : 2×3=6

- 16.** (a) Identify—(i) the substance oxidised and (ii) the substance reduced in the given equation :  $\frac{1}{2} + \frac{1}{2} = 1$



- (b) Ferrous sulphate decomposes with the evolution of a gas having characteristics odour of burning sulphur. Identify the type of reaction. 1

- 17.** An element *P* belongs to the 4th period and group 17 of the long form of the periodic table. Answer the following questions :

- (a) How many valence electrons are there in element *P*?
- (b) What is the valency of *P*?
- (c) Name the element.
- (d) Write the formula of its compound, when it reacts with element *Q* having valency 3+.  $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$

- 18.** (a) What is a homologous series? 1

- (b) A special name is assigned to compounds having the same molecular formula, but different structural arrangement of atoms. What is that name?  $\frac{1}{2}$

- (c) Write the IUPAC name of  $\text{CH}_3\text{OH}$ .  $\frac{1}{2}$

( 8 )

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

- 19.** When an aqueous sodium hydroxide solution is added to aqueous copper sulphate solution, it forms a bluish white precipitate of copper hydroxide.
- (a) What type of reaction is this? 1
- (b) What is the colour of copper sulphate solution? 1
- (c) Write a balanced chemical equation to represent the above reaction. 1
- 20.** (a) Write the chemical formula for washing soda. ½
- (b) What happens when washing soda crystals are exposed to air? ½
- (c) Give any two industrial use of washing soda, other than washing clothes. 2

Answer *either* Part—A or Part—B

Part—A

- 21.** (a) Why and how are alloys made? ½+1=1½
- (b) State any three properties of alloy. 1½

Part—B

- (c) Why are covalent compounds generally poor conductors of electricity? 2
- (d) Explain how a single-covalent bond is formed between two atoms of hydrogen. (Support your answer by drawing structural diagram). 1



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**[ For Visually Impaired Candidates only  
in lieu of Question No. 21(d) ]**

(d) Allotropy is a property shown by which class of substances, elements, compounds or mixtures? Give one example of allotropes of carbon.  $\frac{1}{2} + \frac{1}{2} = 1$

**22.** Name the reaction that is commonly used in the conversion of—

(a) vegetable oils to fat;

(b) ethanol to ethane;

(c) ethanol to ethanoic.

$1 + 1 + 1 = 3$

Answer the following long answer-type questions :

5

Answer *either* Part—A or Part—B

Part—A

**23.** (a) Name the process of obtaining pure metal from an impure metal through electrolysis. If you have to refine copper using this process, mention the materials used as (i) anode, (ii) cathode and (iii) electrolyte.  $\frac{1}{2} \times 4 = 2$

(b) Give the advantages of the above process of refining.

$1 + 1 = 2$

(c) Compound X and aluminium are used to join railway tracks.

(i) Identify the compound.

(ii) Name the reaction.

$\frac{1}{2} + \frac{1}{2} = 1$

( 10 )

Part—B

- (d) What happens chemically, when quicklime is added to water? Give the chemical reaction. 1+1=2
- (e) Zinc liberates hydrogen gas when reacted with dilute hydrochloric acid, whereas copper does not. Explain why. 1
- (f) State the differences between rusting and rust. 1+1=2

SECTION—C

( **BIOLOGY** )

( Marks : 28 )

Choose and write the correct answer from the following : 1×3=3

- 24.** Artificial removal of nitrogenous waste from the blood is called
- (A) haemoparalysis
  - (B) dialysis
  - (C) haemodialysis
  - (D) haemoprotein
- 25.** Iodine is necessary for the synthesis of which hormone?
- (A) Adrenaline
  - (B) Thyroxine
  - (C) Auxin
  - (D) Insulin

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**26.** Which of the following acts as blueprint of life?

- (A) DNA
- (B) RNA
- (C) Nucleus
- (D) Chromosome

Answer the following short answer-type questions : 2×4=8

**27.** Write any two points of differences between respiration in plants and animals. 2

**28.** Draw the structure of a neuron and label the following on it : 1+½+½=2

- (a) Dendrite
- (b) Axon

**[ For Visually Impaired Candidates only ]**

**28.** What do you mean by bisexual flower? Give two examples of it. 1+½+½=2

**29.** In a complete flower, identify the following : ½×4=2

- (a) Part that produces pollen grain
- (b) Part that transfers male gametes to the female gametes
- (c) Part that is sticky to trap the pollen grain
- (d) Part that develops into a fruit

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30. Discuss the monohybrid ratio given by Mendel. 2

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

31. In the given diagram of human brain, name the part labelled A and B and write their functions. (any one for each) :  $\frac{1}{2}+\frac{1}{2}+1+1=3$

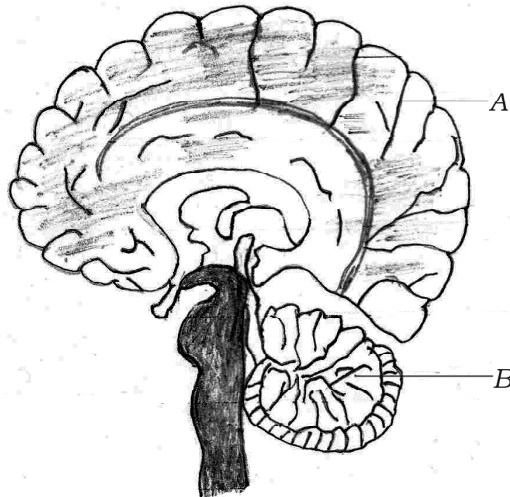


Fig. 2

[ For Visually Impaired Candidates only ]

31. (a) What is excretion? Name two excretory organs in humans.  $1+(\frac{1}{2}+\frac{1}{2})=2$

(b) Give functional units of—

(i) kidney;

(ii) nervous system. 1

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**32.** (a) Give reasons for the following : 1+1=2

(i) The lung alveoli are covered with blood capillaries

(ii) The wall of trachea is supported by cartilage rings

(b) Name any two autotrophic plants which also show heterotrophic mode of nutrition.  $\frac{1}{2}+\frac{1}{2}=1$

Answer *either* Part—A or Part—B

Part—A

**33.** (a) What is vegetative propagation? In which type of plant is it performed? Name two methods of vegetative propagation. 1+1+1=3

Part—B

(b) Explain the terms (i) implantation and (ii) placenta. 1+1=2

(c) Name two sexually transmitted diseases caused due to (i) bacterial infection and (ii) viral infection.  $\frac{1}{2}+\frac{1}{2}=1$

**34.** Enumerate (in any six points) the basis of Darwin theory of natural selection.  $\frac{1}{2}\times 6=3$

Answer the following long answer-type questions : 5

Answer *either* Part—A or Part—B

Part—A

**35.** (a) Can adrenal be called the 'stress managing glands' of the body? Justify your answer by giving four points. 1×4=4

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- (b) (i) Name the endocrine gland associated with brain.  $\frac{1}{2}$
- (ii) Name the endocrine gland associated with kidneys.  $\frac{1}{2}$

Part—B

- (c) (i) Name the pigment present in plant which can absorb solar energy.  $\frac{1}{2}$
- (ii) Name the two states of photosynthesis.  $\frac{1}{2} + \frac{1}{2} = 1$
- (iii) Name the mode of nutrition in amoeba.  $\frac{1}{2}$
- (d) State the functions of blood vessels of human circulatory system.  $1 \times 3 = 3$

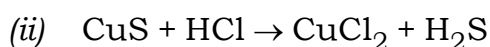
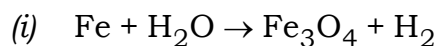
[ For Candidates without Practical Marks ]

36. I. Answer any *three* of the following questions :  $2 \times 3 = 6$
- (a) What do you understand by the term refraction of light? 2
- (b) What do you understand by the term accommodation of eye? 2
- (c) What do you understand by the term electric energy? 2
- (d) State the differences between magnetic field and magnetic field line.  $1 + 1 = 2$

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II. Answer any *three* of the following questions :  $2 \times 3 = 6$

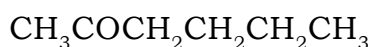
(a) Balance the following equations :  $1 + 1 = 2$



(b) (i) What is a neutralization reaction? 1

(ii) What do you mean by family of salts? 1

(c) What is functional group? Name the functional group present in the given compound :  $1 + 1 = 2$



(d) (i) What is saponification? 1

(ii) Give the general formula for soap. 1

III. Answer any *four* of the following questions :  $2 \times 4 = 8$

(a) (i) What is respiration? 1

(ii) Where do anaerobic respiration and aerobic respiration take place?  $\frac{1}{2} + \frac{1}{2} = 1$

(b) Name the four main types of heterotrophic nutrition.  $\frac{1}{2} \times 4 = 2$

(c) State two reasons why the blood of haemophilic persons clot very slowly or not at all. 2

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(d) Name the gland and give one main action of the following hormones : 1+1=2

(i) Insulin

(ii) Thyroxine

(e) Define the following : 1+1=2

(i) Gene

(ii) Synapse

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