

2023
SCIENCE
(Theory)
Full Marks – 70
Time – 3 Hours

General Instructions :

- (i) All questions are compulsory.
- (ii) All diagrams should be drawn neatly.
- (iii) Write the number and sub-number of the question before attempting it.
- (iv) Figures in the margin indicate marks.

SECTION – A (PHYSICS) 24 Marks

1. Choose the correct answer from the given options :

5×1=5

(a) The refractive index is highest in –

- (i) air
- (ii) water
- (iii) diamond
- (iv) glass

(b) The beam of light enters the eye through –

- (i) pupil
- (ii) iris
- (iii) retina
- (iv) cornea

(c) Which of the following terms does not represent electrical power in a circuit ?

- (i) I^2R
- (ii) IR^2
- (iii) VI
- (iv) V^2/R

(d) Hydrogen bomb is based on the principle of –

- (i) Nuclear fusion
- (ii) Nuclear fission
- (iii) Both (i) & (ii)
- (iv) None of these

- (c) The main component of biogas is –
- (i) O_2 (ii) CO_2
 (iii) CH_4 (iv) C_2H_6
2. What is meant by the term 'near point of the eye' ? 1
3. Mention *any one* advantage of using MCB over traditional fuse. 1
4. State Ohm's Law. What does the slope of I-V graph represent ? 1+1=2
5. Give *two* reasons why biogas is considered an ideal gas. 2
6. (a) With the help of a ray diagram, determine the nature, size and position of an image formed by a concave mirror when the object is placed beyond C. $1\frac{1}{2}+1\frac{1}{2}+1\frac{1}{2}+1\frac{1}{2}=3$

OR

- (b) With the help of a ray diagram, determine the position, nature and size of the image formed by a convex lens when the object is placed between F_1 and $2F_1$. $1\frac{1}{2}+1\frac{1}{2}+1\frac{1}{2}+1\frac{1}{2}=3$
7. (a) With the help of a circuit diagram, establish the relationship for the equivalent resistance connected in series. 1+2=3

OR

- (b) Two bulbs rated 100W at 220V and 200W at 220V are connected in parallel to a 220V line. What is the total current drawn by them ? 3
8. Explain the construction of an electric generator with a suitable diagram. 2+1=3
9. (a) What is hypermetropia ? Explain the *two* causes of hypermetropia. How can it be corrected ? 1+2+1=4

OR

- (b) What is atmospheric refraction ? Why is the sun visible to us about 2 minutes before the actual sunrise and for 2 minutes after the actual sunset ? 2+2=4

SECTION – B (CHEMISTRY) 23 Marks

10. Choose the correct answer from the given options : 5×1=5
- (a) Which oxide will turn red litmus solution blue ?
- (i) MgO (ii) SO_2 (iii) CO_2 (iv) NO_2

- (b) Which of the following elements would lose an electron most easily ?
 (i) Cu (ii) Mg (iii) Na (iv) Ar
- (c) Which of the following is true ?
 (i) $\text{pH} > 7$ for an acidic solution
 (ii) $\text{pH} < 7$ for an alkaline solution
 (iii) $\text{pH} = 7$ for a neutral solution
 (iv) None of these
- (d) In the atmosphere, carbon exists in the form of –
 (i) Carbon dioxide only
 (ii) Carbon monoxide only
 (iii) Carbon dioxide and traces of carbon monoxide
 (iv) Carbon does not exist in atmosphere
- (e) Which of the following is not an allotropic form of carbon ?
 (i) Diamond (ii) Graphite (iii) Methane (iv) Fullerene
11. What is the valency of Magnesium (atomic no = 12)? 1
12. Why does dry HCl gas not change the colour of the dry litmus paper ? 1
13. What is a homologous series ? 1
14. Iron articles are shiny when new, but get coated with reddish brown powder when left for some time. Give reason. 2
15. What are amphoteric oxides ? Give *two* examples of amphoteric oxides. 2
16. How is tooth decay related to pH ? How can it be prevented ? 1+1=2
17. What are saturated hydrocarbons ? Give the general formula of alkane. 1+1=2
18. (a) Define metallurgy. Explain the following terms used in metallurgy – 1+1+1=3
 (i) Gangue
 (ii) Roasting

OR

- (b) How is baking soda prepared in a laboratory ? State *any two* important uses of baking soda. 1+2=3

19. (a) An atom X has electronic configuration 2,7.
- What is the atomic number of this element ?
 - To which group and period would it be present ?
 - What is its valency ?
 - What type of ion will it form ?

OR

- (b) What are decomposition reactions ? Define three types of decomposition reactions.

1+3=4

SECTION – C (BIOLOGY) 23 Marks

20. Choose the correct answer from the given options :

4×1=4

- (a) Which one of the endocrine glands is known as master gland ?
- | | |
|-----------------|------------------|
| (i) Adrenal | (ii) Thyroid |
| (iii) Pituitary | (iv) Parathyroid |
- (b) Grafting is not possible in monocot plants because of the –
- | | |
|-------------------------|-------------------------|
| (i) presence of cambium | (ii) absence of cambium |
| (iii) presence of xylem | (iv) None of these |
- (c) The concept of origin of species by natural selection was given by –
- | | |
|----------------|---------------|
| (i) Lamark | (ii) Darwin |
| (iii) Weismann | (iv) Linnaeus |
- (d) The name of the structural and functional unit of kidney is –
- | | |
|-------------|---------------|
| (i) cortex | (ii) medulla |
| (iii) hilum | (iv) nephrons |

21. Mention the functions of phloem in plants.

1

22. What is a food web ?

1

23. Why does impulse move in one direction in a nerve ?

2

24. Mention *any two* effects of ozone layer depletion.

2

25. (a) Explain vegetative propagation through layering. Name *one* plant that uses layering for its propagation. 2+1=3

OR

- (b) With the help of a labelled diagram, describe the different parts of a flower. 1+2=3

26. Briefly state Mendel's finding with respect to – 1+1+1=3

(a) Dominant and recessive characters

(b) Law of segregation

(c) Law of independent assortment

27. What are the disadvantages of deforestation? 3

28. (a) Describe the structure of nephron with a labelled diagram. 3+1=4

OR

(b) (i) Differentiate between autotrophs and heterotrophs. 1

(ii) Explain the structure of a chloroplast. 3