

SCIENCE AND TECHNOLOGY—2005 (Outside Delhi)

SECTION A

Q. 1. Biological reactions in our body depend on the presence of biocatalysts. What name is given to these catalysts? How is their activity influenced by changes in temperature? **1**

Q. 2. Name two metals both of which are very ductile as well as very malleable. **1**

Q. 3. Write the chemical equation to represent the reaction taking place when copper oxide is heated in a stream of hydrogen. **1**

Q. 4. What are the values of (z) the angle of incidence, and (if) the angle of reflection for normal incidence on a plane mirror surface? **1**

Q. 5. A wire of resistance 10 ohm is bent in the form of a closed circle. What is the effective resistance between the two points at the ends of any diameter of the circle? **1**

Q. 6. What happens when crystals of washing soda are left open in dry air? What is this change named as? Name two industries based on use of washing soda. **2**

Q. 7. "Sulphuric acid is a dibasic acid." Write two reaction equations to justify this statement and name the reaction products in the two cases. **2**

Q. 8. Explain the principle involved in the launching of artificial satellites. **2**

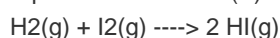
Q. 9. Light enters from air into a glass plate which has a refractive index of 1.50. Calculate the speed of light in glass. The speed of light in air is $3.0 \times 10^8 \text{ m s}^{-1}$. **2**

Q. 10. Distinguish between 'prompt', 'delayed' and 'spontaneous' fissions of nuclei. **2**

Or

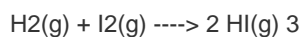
Define a 'nuclear fusion reaction'. Describe the conditions for the occurrence of a nuclear fusion reaction.

Q. 11. When does a reversible chemical reaction reach a state of equilibrium? Write the expression for the equilibrium constant (K) for the equilibrium reaction.



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How will the numerical value of equilibrium constant (K) change if the equation of the equilibrium reaction is written as:



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Q. 12. Describe the 'steam reforming process' of manufacture of hydrogen from natural gas with the help of necessary chemical equations. **3**

Q. 13. Give the name and formula of the monomer of natural rubber. Why is natural rubber vulcanised? Write two uses of vulcanized rubber. **3**

Q. 14. (a) Write the chemical equation representing the preparation reaction of ethanol from ethene.

(b) Name the product obtained when ethanol is oxidised by either chromic anhydride or alkaline potassium permanganate,

(c) Give an example of an esterification reaction. **3**

Or

Differentiate between a soap and a detergent on the basis of their chemical constitutions. For cleansing action when is a detergent preferred to a soap?

Q. 15. If a 12 V battery is connected to the arrangement of resistances given below, calculate

(i) the total effective resistance of the arrangement and

(ii) the total current flowing in the circuit. **3**

Q. 16. What is meant by the 'calorific value' of a fuel? How is it determined? Arrange the following fuels in a decreasing order of their calorific values:

Kerosene, Coal, LPG **3**

Q. 17. Write three major activities of the Indian Space Research Organisation (ISRO). **3**

Q. 18. Name an important oxide ore of iron. Describe the extraction of iron from this ore under the following heads: **5**

(ii) Reduction of the concentrated ore

(iii) Diagram of the furnace used

(iv) Chemical equations for the reactions involved.

Or

(a) What is an 'activity series' of metals? Arrange the metals Zn, Mg, Al, Cu and Fe in a decreasing order of reactivity.

(b) What would you observe when you put

(i) Some zinc pieces into blue copper sulphate solution?

(ii) Some copper pieces into green ferrous sulphate solution?

(c) Name a metal which combines with hydrogen gas. Name the compound formed.

Q. 19. What is long-sightedness? List two causes for development of long-sightedness. Describe with a ray diagram, how this defect may be corrected by using spectacles. **5**

Or

What is an astronomical telescope? Draw a labelled ray diagram showing the formation of image of a distant object by an astronomical telescope. State the magnification produced by a telescope in normal adjustment. How can the magnification power of a telescope be increased?

Q. 20. State 'Fleming's right-hand rule'. With a labelled diagram, describe the working of an AC electric generator. **5**

SECTION B

Q. 21. Write the full form of IUCD. **1**

Q. 22. What is the function of genes in an organism? **1**

Q. 23. Why is it necessary to conserve our environment? **1**

Q. 24. Define the term 'pollution'. Describe UASB method of checking water pollution. **2**

Q. 25. How are the following caused and what is the effect of each of them on our environment? **2**

(i) Depletion of ozone layer (ii) Acid rain

Or

What is meant by soil erosion? Describe two practices by which soil erosion can be prevented.

Q. 26. Name the constituents of blood. Why are white blood corpuscles called 'soldiers of the body'? **3**

Or

Draw a diagram of human heart and label the following on it:

- (i) Aorta
- (ii) Pulmonary trunk
- (iii) Superior vena cava
- (iv) Coronary arteries.

Q. 27. Draw a diagram of the nervous system in an insect. Label the following parts on it: **3**

- (i) Brain (ii) Ganglion (iii) Nerve cord.

Q. 28. Explain the terms, 'fission' and 'regeneration' as used in relation to reproduction. **3**

Q. 29. Explain the mechanism of sex determination in the zygote. **3**

Q. 30. Define the terms 'nutrition' and 'nutrients'. List two differences between 'Holozoic nutrition' and 'Saprophytic nutrition'. Give two examples of each of these two types of nutrition