This Question Paper consists of 43 questions and 12 printed pages.

Roll No. 2 1 0 2 7 3 2 5 2 0 3 4

Code No. 71/S/212

Set – A1

SCIENCE AND TECHNOLOGY
(212-E)

Day and Date of Examination _____

Signature of Invigilators 1. _____

2. _____

General Instructions :

1. Candidate must write his/her Roll Number on the first page of the Question Paper.
2. Please check the Question Paper to verify that the total pages and the total number of questions contained in the Question Paper are the same as those printed on the top of the first page. Also check to see that the questions are in sequential order.
3. For the objective type of questions, you have to choose any **one** of the four alternatives given in the question i.e. (A), (B), (C) or (D) and indicate your correct answer in the Answer-Book given to you.
4. All the questions including objective type questions are to be answered within the allotted time and no separate time limit is fixed for answering objective type questions.
5. Making any identification mark in the Answer-Book or writing Roll Number anywhere other than the specified places will lead to disqualification of the candidate.
6. Candidate will not be allowed to take Calculator, Mobile Phone, Bluetooth, Earphone or any such electronic devices in the Examination Hall.
7. In case of any doubt or confusion in the question paper, the English Version will prevail.
8. Write your Question Paper code No. **71/S/212, Set – A1** on the Answer-Book.
9. (a) The Question Paper is in English/Hindi medium only. However, if you wish, you can answer in any one of the languages listed below :
   English, Hindi, Urdu, Punjabi, Bengali, Tamil, Malayalam, Kannada, Telugu, Marathi, Odia, Gujarati, Konkani, Manipuri, Assamese, Nepali, Kashmiri, Sanskrit and Sindhi.
   You are required to indicate the language you have chosen to answer in the box provided in the Answer-Book.
   (b) If you choose to write the answer in the language other than Hindi and English, the responsibility for any errors/mistakes in understanding the question will be yours only.

SCIENCE AND TECHNOLOGY
(212-E)

Time : $2\frac{1}{2}$ Hours] [Maximum Marks : **85**

Note : (i) This Question Paper consists of **43** questions in all.

(ii) **All** questions are compulsory.

(iii) Marks are given against each question.

(iv) **Section A consists of -**

(a) Q. No. **1** to **17** - Multiple Choice type Questions (MCQs) carrying **1** mark each. Select and write the most appropriate option out of the four options given in each of these questions.

(b) Q. No. **18** to **28** - Objective type questions. Q. No. **18** to **27** carry **02** marks each (with **2** sub-parts of **1** mark each) and **Q. No. 28** carries **5** marks (with **5** sub-parts of **1** mark each). Attempt these questions as per the instructions given for each question.

(v) **Section B consists of -**

(a) Q. No. **29** to **34** - Very Short Answer type questions carrying **2** marks each to be answered in the range of **30** to **50** words.

(b) Q. No. **35** to **41** - Short Answer type questions carrying **3** marks each to be answered in the range of **50** to **80** words.

(c) Q. No. **42** and **43** - Long Answer type questions carrying **5** marks each to be answered in the range of **80** to **120** words.

NOTE :

(1) Answers of all questions are to be given in the Answer-Book given to you.

(2) 15 minutes time has been allotted to read this question paper. The question paper will be distributed at 02.15 p.m. From 02.15 p.m. to 02.30 p.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

SECTION - A

Q. No. 1-17 are the multiple choice questions carrying one mark each :

1 Balanced forces acting on an object cause 1

(A) Change in speed
(B) Change in direction of motion
(C) No change in motion
(D) Increase in weight

2 The value of g on the Moon is about : 1

(A) 9.8 m/s^2
(B) One-sixth of the value of g on Earth
(C) Double the value of g on Earth
(D) Zero

3 Which of the following is not a base physical quantity? 1

(A) Mass
(B) Electric current
(C) Work
(D) Temperature

4 Which of the following is not a system of units? 1

(A) FPS
(B) MKS
(C) CGS
(D) kWh

5 The Law of Octaves proposed by John Newlands, states that : 1

(A) Every eight element had properties similar to the first element when arranged by increasing atomic mass.
(B) Properties of elements repeat after every 7 elements when arranged by increasing atomic number.
(C) Elements are arranged in groups and periods based on valency.
(D) Only metals show periodicity.

6 Which base is present in whitewash? 1

(A) Sodium hydroxide (NaOH)
(B) Calcium hydroxide ($Ca(OH)_2$)
(C) Potassium hydroxide (KOH)
(D) Ammonium hydroxide (NH_4OH)

7 The distribution of electrons of phosphorus (atomic number 15) in K, L and M shells is 1

(A) K = 2, L = 8, M = 5
(B) K = 2, L = 7, M = 6
(C) K = 2, L = 8, M = 6
(D) K = 2, L = 6, M = 7

8 Thermal inversion occurs when : 1

(A) Warm air rises above cold air
(B) Cold air rises above warm air
(C) Warm air lies above cold air, trapping pollutants
(D) There is no temperature difference in air layers

9 Nitrogen fixation is the process of converting : 1

(A) Ammonia into nitrates
(B) Atmospheric nitrogen into usable nitrogen compounds
(C) Nitrates into nitrogen gas
(D) Nitrites into proteins

10 Two point charges are doubled while keeping the same distance between them. How does the electrostatic force change? 1

(A) Becomes half
(B) Becomes double
(C) Becomes four times
(D) Remains the same

11 In a series circuit, the current passing through each resistor is : 1

(A) Different for each resistor
(B) Same through all resistors
(C) Zero
(D) Depending on the potential difference across each resistor

12 A stone at the top of a hill has maximum potential energy. This energy is converted to kinetic energy when : 1

(A) Stone is at rest (B) Stone is falling

(C) Stone is tied to a tree (D) Stone is placed on ground

13 Work done by a force is zero when : 1

(A) Force is applied in the direction of motion

(B) Force is applied in the opposite direction to motion

(C) Force applied is perpendicular to the displacement

(D) Displacement is along the force

14 One major problem with non-biodegradable waste is that it 1

(A) Decays quickly (B) Does not decompose easily

(C) Adds nutrients to soil (D) Is always harmless

15 Eutrophication often results in the excessive growth of 1

(A) Zooplankton (B) Algae

(C) Fungi (D) Fish

16 Rickets is primarily caused by a deficiency of : 1

(A) Vitamin C (B) Vitamin D

(C) Calcium (D) Iron

17 A heart attack occurs due to : 1

(A) Blockage of artery (B) Weak heart muscles

(C) Low blood pressure (D) High white blood cell count

Q. No. 18 to 27 are the objective questions of 2 marks.

18 Fill in the blanks : **2**

The CGS system is based on three fundamental units : _____ for length, _____ for mass, and second for time.

19 Match the substances in Column A with their correct acids in Column B : **2**

Column A (Substances)	**Column B (Acids)**
(1) Vinegar	(A) Acetic acid
(2) Lemon juice	(B) Citric acid
	(C) Hydrochloric acid
	(D) Sulphuric acid

20 State True (T) for correct statement and False (F) for incorrect statement : **2**

(1) Ionic bonds are formed by the transfer of electrons.

(2) Covalent compounds usually conduct electricity in water.

21 Understand the concept and answer the questions that follow it : **2**

Archimedes' Principle states that when an object is fully or partially immersed in a fluid, it experiences an upward force called buoyant force. This force is equal to the weight of the fluid displaced by the object. Whether an object sinks or floats depends on how its weight compares to the buoyant force acting on it.

(1) A stone sinks when placed in water. Which statement best explains this using Archimedes' Principle?

(a) The stone displaces less water than its own weight

(b) The buoyant force is greater than the stone's weight

(c) The water pushes the stone upward strongly

(d) The stone weighs the same as the displaced water

(2) A wooden block floats on water. What does this tell you about the buoyant force acting on it?

(a) It is less than the weight of the block

(b) It is equal to the weight of the block

(c) It is greater than the weight of the block

(d) It has no relation with the weight of the block

22 State True (T) for correct statement and False (F) for incorrect statement : **2**

(1) The image formed by a plane mirror is real and inverted.

(2) The image formed by a plane mirror is behind the mirror at a distance equal to the distance of the object from the mirror.

23 Fill in the blanks : **2**

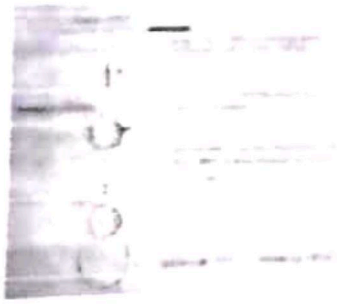
In a concave lens, the image distance is always _____ and the image formed is _____.

24 Match the devices given in column A with appropriate types of energy conversions given in column B : **2**

Column A (Device)	**Column B (Conversion of Energy)**
(1) Solar panel	(a) Mechanical → Electrical
(2) Bicycle dynamo	(b) Electrical → Light and Heat
	(c) Solar → Electrical
	(d) Chemical → Mechanical

25 Fill in the blanks : **2**

Bats have an extension of _____ between fingers of _____ which help them to fly.

26 

(1) What is the first step in genetic engineering?

(A) Plasmid taken up by bacteria

(B) DNA segment is inserted into plasmid

(C) Human DNA is cut by a restriction enzyme from cell

(D) Bacteria make the protein

(2) What is used to cut the human DNA at a specific place in cell?

(A) Ligase

(B) Restriction enzyme

(C) DNA polymerase

(D) Ribosome

27 Read the passage and answer the questions that follow it : 2

A pond is a small water body where plants, animals, and microorganisms live together. Sunlight, water, and air are the abiotic components that help to sustain life in the pond. Green plants and algae make food, while fish and frogs depend on them for energy. Bacteria and fungi recycle nutrients by breaking down dead plants and animals.

(1) If decomposers are absent in a pond, which long-term changes will occur?

(A) Nutrients will not recycle, reducing plant growth

(B) Fish population will increase rapidly

(C) Sunlight will increase in water

(D) Frogs will produce more offspring

(2) A student observes that algae in a pond grow faster after a few sunny days. Which abiotic factor is responsible for this?

(A) Temperature of water

(B) Sunlight availability

(C) Dissolved oxygen in water

(D) Presence of decomposers

28 Read the passage and answer the questions that follow it : 1×5

During a physics lab, students performed experiments with two types of generators. One generator had a rotating coil connected to slip rings, while the other had a rotating coil connected to a commutator.

The students measured the current using an ammeter and noted that the frequency of current reversal in the first generator depended on the rotation speed of the coil. The instructor explained that the first type is called an AC (alternating current) generator, and the second type is called a DC (direct current) generator.

(1) Why does the generator with slip rings result in an alternating current output?

(A) The coil is stationary
(B) Slip rings reverse the direction of current periodically
(C) Slip rings maintain continuous current in one direction
(D) The battery inside reverses the current

(2) A commutator in a DC generator

(A) allows the coil to rotate
(B) reverses the current periodically
(C) maintains the current in a single direction
(D) measures the current

(3) Which generator would be more suitable for charging a battery?

(A) AC generator
(B) DC generator
(C) Either AC or DC
(D) None of these

(4) The frequency of reversal of current in the AC generator depends on :

(A) Number of turns in the coil
(B) Rotation speed of the coil
(C) Resistance of the coil
(D) Type of commutator used

(5) Why are AC generators preferred in power plants?

(A) AC voltage cannot be stepped up or down
(B) AC voltage can be easily increased or decreased using transformers
(C) AC current never changes direction
(D) AC generators are smaller in size than DC generators

SECTION - B

29 How many covalent bonds a carbon atom can make and why? 2

OR

Mention one property of graphite and state its one use due to this property. 2

30 Give two properties of gold because of which ornaments can be made from it. 2

31 (a) Describe J.J. Thomson's Plum Pudding Model of the atom. 2

(b) Give one limitation of this model.

OR

Mention any two limitations of Mendeleev's Periodic Table.

32 What are indicators? Name one natural indicator and the source from which it is extracted? 2

33 Mention two adaptations found in desert animals to reduce water loss. 2

34 Give two points of differences between grazing and detritus food chain. 2

OR

What is grazing food chain? Give one example.

35 Element X has atomic number 11 and element Y has atomic number 17. 3

(a) Write the electronic configuration of both elements.

(b) Which type of bond will be formed between X and Y?

(c) Write the formula of the compound formed.

OR

How does the tendency to lose electrons changes in a group of alkali metals and why?

36 A bullet of mass 20 g is fired horizontally from a gun of mass 5 kg with a velocity of 400 m/s. Calculate the recoil velocity of the gun. 3

37 (a) Mention the nature of non-metal oxides. 3

(b) Write the balanced chemical equation of the reaction of sulphur trioxide with water.

OR

Name the ore from which Hg is extracted. Write the balanced chemical equations for the same.

38 (a) How is ethanol produced from glucose? Give balanced chemical equation of the reaction. 3

(b) Mention one use of ethanol.

39 What is meant by galvanization? State its one use. 3

40 Define the terms oviparous, viviparous and hermaphrodite along the one example each. 3

41 A patient's kidneys stop working properly. Explain how dialysis helps in such a situation and why it is important. 3

OR

Name the 3 types of neurons and their functions.

42 Answer the following questions about washing soda : 5

(a) What is washing soda? Write its chemical formula.

(b) How is washing soda prepared from baking soda?

(c) Mention any two important uses of washing soda.

OR

Answer the following questions based on Bleaching Power :

(a) What is bleaching power? Write its chemical formula.

(b) How is bleaching power prepared? Give the chemical equation.

(c) Mention two uses of bleaching power.

43 Define spinal reflex. Draw a labelled diagram of it. 5

OR

What is photosynthesis? Explain the raw materials required for photosynthesis and how plants obtain them.
