SCIENCE AND TECHNOLOGY
SAMPLE QUESTION PAPER DESIGN

Marks : 85   Duration : 2½ hours

1. Weightage by Objectives

Objective	Marks	Percentage of the total marks (approx)
Knowledge	26	30%
Understanding	42	50%
Application	12	15%
Skill	5	5%
	85	100%

2. Weightage by Types of Question

Type	Number of Question	Estimated time a candidate is expected to require to solve the question
Long answer question	3×6marks = 18	3×10min = 30
Short answer question	11×4marks = 44	11×6min = 66
Very short answer questions	7×2marks = 14	7×3min = 21
Multiple choice questions	9×1marks = 9	9×2min = 18
	30 Question (85 marks)	135 min) (15 min reading/revision time)

3. Weightage by Content

Module	Marks
1. Measurement	4
2. Matter–Structure and Behaviour	12
3. Motion and Force	5
4. Energy	14
5. The Universe and Our Earth	6
6. Our Environment and Natural Resources	8
7. Manmade Resource and Environmental Problems	5
8. Life Processes	17
9. Health, Hygiene and Diseases	4
10. Agricultural Practices	4
11. Technology and Communication	6
11 modules	85 marks

SAMPLE QUESION PAPER
SCIENCE AND TECHNOLOGY
(Secondary level)

[Time : 2 ½ hours]   **[Maximum Marks : 85]**

Note: All questions are compulsory. Marks are given against each question.

Question 1-9 : Please tick (✓) mark the correct choice.
1.   The elements whose atoms have completed outermost shell, are called,
      (i)   Non-metals
      (ii)   Noble gases
      (iii) Metalloids
      (iv)   Metals   1
2.   The number of protons, neutrons and electrons in three particles (X, Y and Z) are
      given below:

Particle	Number of		
	Protons	**Neutrons**	**Electrons**
X	19	21	19
Y	19	21	17
Z	19	20	19

      Which one of the following statements is correct about the nature of the particles?
      (i)   X and Y are atoms of two different elements
      (ii)   X and Z are atoms of two different elements
      (iii) Y is an atom and Z is an ion
      (iv)   X is an atom and Y is an ion   1
3.   Which one of the following sets of three elements each is arranged in the order of
      increasing electronegativity?
      (i)   F, Cl, Br
      (ii)   F, Br, Cl
      (iii) Cl, Br, F
      (iv)   Br, Cl, F   1

4.   A 1.0kg block of ice is floating on water with its 9/10th part immersed. The weight of
      the block of ice as recorded by a spring balance in this condition will be found to be
      (i)   9.8 N
      (ii)   8.92 N
      (iii) 10.78 N
      (iv)   Zero   1

5. The treatment of cancer by radiotherapy involves
   (i) nuclear radiations
   (ii) X-rays
   (iii) ultrasound
   (iv) laser   1

6. A kind of microbes which fix free nitrogen of the atmosphere into nitrites and nitrates are found in
   (i) rotting fruits and vegetables
   (ii) milk undergoing change to forms curd
   (iii) stale bread that has developed bread mould
   (iv) root nodules of plants like peas and beans   1

7. The allotrope of carbon, which is slippery to touch and is a good conductor of electricity is
   (i) diamond
   (ii) bone charcoal
   (iii) graphite
   (iv) soot   1

8. The cell-organelle, which coordinates the activities of all other cell parts is
   (i) lysosome
   (ii) mitochondria
   (iii) nucleus
   (iv) golgi body   1

9. If you find an animal with three pairs of legs, it is likely to be a
   (i) scorpion
   (ii) spider
   (iii) cockroach
   (iv) kangaroo   1

Question 10-16 : Please answer in two - three sentences only.

10. Name the state of matter in which the molecules are closely packed and are not able to change places? Give any two examples of this state.   2

11. 4.0g of a substance A reacts with 3.0g of another substance B to give 2.5g of substance C and a certain mass of D. Calculate the mass of D produced in this reaction?   2

12. Why fast neutrons are not used in nuclear reactors to get nuclear energy?   2

13. One of the purposes of night sky watching is to know in advance the possibility of a head-on collision of a large meteoroid with earth. Suggest a way to avert such an event and mention any other purpose of night sky watching.   2

14. Name the category of components of the environment in which temperature, air and water are included. What is the importance of this component of environment?   2

15. Name the cell organelle found in an animal cell where secretion of enzymes occur. What is the function of these enzymes?   2

16. A student wrongly identified bat as a bird. Mention any one point, which may have led the student to say so. Also give any two characteristics which support that bat is not a bird.   2

Question 17-27 : Please answer in 7-8 lines.

17. Mention any two points how a clinical thermometer is different from an ordinary mercury thermometer? What is the body temperature of a normal human adult on Celsius scale? Why can't we use Laboratory thermometre to measure the temperature of our body? **4**

18. Give the condition under which the magnitude of displacement is equal to the distance covered by the body.
    A body moves from point 'A' to point 'B' 2.0km away on a straight level road and reaches back to 'A'. What is the magnitude of displacement of the body? Also find out the distance travelled. **4**

19. State any two similarities and two differences between rusting and combustion. **4**

20. Name the three components of biosphere. Which event before the appearance of life started the evolution of these spheres? What is the proof of this event? **4**

21. How are metals generally different from non-metals with regard to the following properties:
    (i)   Electrical conductivity
    (ii) Nature of oxides
    (iii) Action of acids
    (iv) Thermal conductivity **4**

22. What is deforestation? How is deforestation related to increased incidence of soil erosion? Give any three points. **4**

23. What is the characteristic of the kingdom Fungi with regard to:
    (i)   Presence or absence of a distinct nucleus.
    (ii) Unicellular or multi-cellular.
    (iii) Mode of feeding. **4**

24. Draw a diagram of telophase of mitosis in a plant cell division and label the following parts in it: (i) cell plate, and (ii) daughter nuclei **4**

25. A child patient appears pale, he is losing weight and gets tired very soon. But, he is neither suffering from fever and nor passing yellow urine.
    (i)   Name the disease he is suffering from.
    (ii) What is the possible cause of the disease?
    (iii) Recommend any two food items for improving his condition. **4**

26. What are weeds? Give two examples. Describe any one method other than manual, by harrow or by plough, can be used for removing weeds? **4**

27. The orbit of a satellite is perpendicular to the equator. What is the inclination of its orbit? What type of satellite is it? State two of its applications? **4**

Question 28-30 : Please answer in 10-12 lines.

28. List any three differences between mixtures and compounds and give examples of each **6**

29. (a) How are work and energy related? Mention unit of work.
    (b) A stone of mass m is thrown straight up to a height h from the ground. What is its total energy at
        (i) $H = h$
        (ii) $H = h/2$
        (iii) $H = 0$
    (c) Write the inference you arrived at from the above. **6**

30. What is meant by binomial nomenclature? Taking any two examples of living organisms justify the need for using binomial nomenclature. **6**

MARKING SCHEME

1. (ii)   1
2. (iv)   1
3. (iv)   1
4. (iv)   1
5. (i)   1
6. (iv)   1
7. (iii)   1
8. (iii)   1
9. (iii)   1
10. Solid, any two examples of solid $1+\frac{1}{2}\times2$
11. Sum of the mass of reactants - Sum of the mass of products, 4.5g   1+1=2
12. The chances of the collision of fast neutrons with nuclei are few, hence they fail to sustain chain reaction and produce nuclear energy.   1+1=2
13. By creating a big explosion near the meteoroid to divert its path.   1 ⎫
    Other purpose -to study about the constellations   1 ⎭ =2
14. Abiotic   1 ⎫
    Importance of abiotic component   1 ⎭ =2
15. Golgi body   1 ⎫
    Function of the enzymes   1 ⎭ =2
16. Wings (for flight)   1 ⎫
    Two characteristics like - gives birth to babies, have backbone   1 ⎭ =2
17. (i). Clinical thermometer has a smaller range and hence measures body temperature.
    (ii) It has a small constriction in the tube to prevent mercury from running back to the bulb.
    (iii) 37^0C
    (iv) Because it does not have constriction in its tube, hence mercury drops dwon immediately after taking temperature. $1\times4 =4$
18. Magnitude of displacement is equal to the distance travelled by a body when it is moving in a straight line in the same direction.

    Magnitude of displacement = 0, as per definitions final positions of the body in this case = 0

    The distance travelled = path length =2+2 = 4km.   4
19. Similarity: in both the processes, oxidation takes place.   1+1 ⎫ =4
    Differences: Rusting is a very slow process in comparison to combustion, 1+1 ⎭

    Moisture (and oxygen) is required for rusting while for combustion (requires oxygen) no moisture is required.

20. The three components of biosphere are –
(i) Lithosphere   (ii) Atmosphere   (iii) Hydrosphere   ½×3=1½

Differentiation of earth was the event (which initiated
the evolution of biosphere).   1

The meteorites falling on earth are found to be 4.5 billion
years old, where as the oldest rock on earth is only 3.8 billion
years old. This leads us to the conclusion that differentiation
was taking place during this period.   1½

    =4

21. (i) Metals are good conductors of electrical conductivity while non-metals are poor conductors.

(ii) Metals form basic oxides while non-metals form acidic oxides

(iii) Metals (generally) dissolve in mineral acids forming a salt with the evolution of a gas while non-metals do not dissolve in mineral acids or form the any acids.

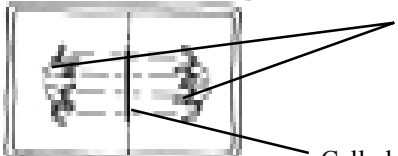(iv) Metals are good conductor of heat while non-metals are poor conductor of heat.   1×4=4

22. Cutting of trees from the forest   1

Deforestation- no roots to hold the soil particles in place, no reduction
of the force of the falling raindrops, free flow of rain water on the ground. 1×3

    =4

23. (i) eukaryote/ nucleus present
(ii) multicellular
(iii) saprophytes   4

24.

Daughter nuclei

Cell plate   [Diagram = 2]
[Labelling=2 × 1=2]

    4

25. (i) Anemia
(ii) Iron deficiency
(iii) green leafy vegetables/beans/fresh fruits (such as guava, apple, banana etc.)/ lever/meat.   4

26. Unwanted plants growing in a field. Doob, Chaulai, any other Spraying chemicals (weedicides) like 2, 4-D/MCPA/simazine   1+½×2+2=4

27. 90°   1

A polar satellite   1

Remote sensing, weather forecasting   1+1

    =4

28.   (Any three differences)

S. No	Mixtures	Compounds
1	Heterogeneous, except solutions which are homogeneous	Homogeneous
2	Composition is not fixed and can be changed	Composition is fixed.
3	Properties of a mixture are the average properties of the components	Properties are entirely different from those of the constituent elements.
4	Can be separated by simple physical methods	Cannot be separated by simple physical methods.

29.   (a) Energy is the capacity to do work. They have same unit i.e.joule   1+1=2

(b) (i) At H=h, P.E.=mg(h)=mgh

      at H=h, velocity=0

      at H=h, K.E.=$1/2 m(0)^2$=0

      Total energy=P.E+K.E=mgh+0=mgh   1

  (ii) At H=h/2, P.E=mg(h/2)=1/2mgh

       at H=h/2, velocity $=\sqrt{2g(h/2)}$ $=\sqrt{gh}$

       K.E $= \dfrac{1}{2}$ m(gh)2=1/2mgh

       at H=h/2, total energy $=1/2$ mgh+1/2mgh=mgh   1

  (iii) At H=0, P.E.=mg(0)=0

       at H=0, velocity $=\sqrt{2gh}$

       at H=0, K.E $=1/2mv^2$=1/2m(2gh)=mgh

       at H=0, total energy = 0+mgh=mgh   1

(c)   From above it is inferred that the total energy at each point is same, hence energy is conserved.   1

                                                   1+1+1+1+1+1=6

31.   Binomial nomenclature-the name consists of two parts-genus name, and species name   1

·   Common names of an organism in regional languages and in different parts of the world are different and often confusing, but in science there is need for single name for communication without confusion.   1

·   Common names of any plants and /or animals

e.g.   Pumpkin-"Sitaphal", Kumhra, Petha, Kaddu———— *Cucurbita pepo*

       Sparrow- "Chiria", "Gauraya"—————*Passer domesticus*

       Lion- "Sher", "Singh", "Babar Sher"

       Man- "Admi", "Manav"———-*Homo sapiens*

      Common names of any two   1+1 = 2

      Scientific names of the same   1 + 1 = 2

                                                    1+1+2+2=6