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Class-XI Science

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1.	ENGLISH
	<p><u>Level 1</u></p> <ol style="list-style-type: none">1. Who was Professor Gaitonde and what happened to him after the collision on the road?2. What difference did Professor Gaitonde notice in the history books of the new world he entered?3. How was the Battle of Panipat different in the world Gaitonde visited?4. Who helped Professor Gaitonde understand what had happened to him after his strange experience?5. How did the city of Bombay appear different when Professor Gaitonde reached there in the alternate world?6. What question does the poet ask again and again in the poem “Childhood”?7. What change does the poet feel when he starts thinking for himself?8. Why does the poet say that adults are not always truthful?9. What doubt does the poet have about God as he grows up?10. Where does the poet say his childhood now lives? <p><u>Level 2</u></p> <ol style="list-style-type: none">1. How does Professor Gaitonde realize that he has entered an alternative history of India, and what clues make him aware that the events around him do not match his own world2. What role does the Battle of Panipat play in the story, and how does its different outcome change the course of Indian history in the alternate world Gaitonde visits?3. How does Rajendra Deshpande help Professor Gaitonde understand his strange experience scientifically? Explain briefly how the concept of the ‘Catastrophe Theory’ is used in this context.4. Describe Professor Gaitonde’s reaction when he finds no mention of himself as a historian in the alternate reality. How does it affect his sense of identity?5. What was different about the public meeting that Professor Gaitonde attended in the alternate Bombay, and what does this reveal about the political system in that version of India?6. What realization marks the poet’s discovery of childhood’s end, and how does he express his loss of innocence and growing sense of reason?7. How does the poet question the difference between what adults say and what they do? What does this tell us about his understanding of hypocrisy?8. Explain the poet’s doubts about the existence of God in the poem “Childhood.” What change in thinking does this reflect in him?9. How does the poet use repetition in the line “When did my childhood go?” to emphasize his confusion and search for answers?10. Where does the poet finally conclude that childhood still exists, and what is the significance of this realization in the context of growing up? <p><u>Level 3</u></p> <ol style="list-style-type: none">1. How does Jayant Narlikar blend the concepts of history and science fiction in The Adventure to question the idea of a single, absolute reality?2. Discuss the significance of the “Catastrophe Theory” in explaining Professor Gaitonde’s experience. How does it connect science with philosophical questions about alternate realities?3. In what way does the different outcome of the Battle of Panipat reflect the theme of chance and destiny in shaping historical events?

4. Examine the character of Professor Gaitonde as a rationalist and historian. How does his scientific outlook help him accept his extraordinary experience?
5. What message does the story convey about the coexistence of multiple realities and the limits of human understanding?
6. How does Markus Natten's poem "Childhood" explore the tension between innocence and experience through the poet's introspective questioning?
7. Analyze how the poet uses rhetorical questions to express his loss of faith, innocence, and wonder in the poem.
8. Discuss the poet's realization about hypocrisy in adult behaviour. How does this realization mark the end of childhood for him?
9. How does the poem "Childhood" portray growing up as both a gain in rationality and a loss of emotional purity?
10. What is the significance of the poet locating his childhood in "some forgotten place"? How does this symbolize the irreversible nature of growing up?

2. PHYSICS

LEVEL -1:

1. The gravitational force between two bodies is 1 N if the distance between them is doubled, what will be the force between them?
2. A body of mass 5 kg is taken to the center of the earth. What will be its (i) mass, (ii) weight there.
3. Why is gravitational potential energy negative?
4. A satellite revolves close to the surface of a planet. How is its orbital velocity related with escape velocity of that planet.
5. Two satellites A and B are orbiting around the earth in circular orbits of the same radius the mass of A is 16 times that of B. What is the ratio of the period of revolution of B to that of A?
6. Why do spring balances show wrong readings after they have been used for a long time ?
7. Why do we prefer steel to copper in the manufacture of spring ?
8. Draw stress-strain curve for elastomers
9. How are we able to break a wire by repeated bending ?
10. What is elastic fatigue ?

LEVEL -2:

1. At what height from the surface of the earth will the value of 'g' be reduced by 36% of its value at the surface of earth.
2. At what depth is the value of 'g' same as at a height of 40 km from the surface of earth.
3. The mean orbital radius of the earth around the sun is 1.5×10^8 km. Calculate mass of the sun if $G = 6.67 \times 10^{-11}$ N m²/kg⁻² ?
4. Draw graphs showing the variation of acceleration due to gravity with (i) height above earth is surface (ii) depth below the earth's surface.
5. A rocket is fired from the earth towards the sun. At what point on its path is the gravitational force on the rocket zero ? Mass of sun = 2×10^{30} kg, mass of the earth = 6×10^{24} kg. Neglect the effect of other planets etc. Orbital radius = 1.5×10^{11} m.
6. State Hooke's law. Deduce expression for Young's modulus of material of a wire of length 'l', radius of cross-section 'r' loaded with a body of mass M producing an extension Δl in it.
7. A wire of length l area of cross-section A and Young's modulus Y is stretched by an amount x. What is the work done ?
8. Prove that the elastic potential energy per unit volume is equal to $\frac{1}{2}$ stress \times strain.
9. Define the term bulk modulus. Give its SI unit. Give the relation between bulk modulus and compressibility.
10. Define shear modulus. With the help of a diagram explain how shear modulus can be calculated

LEVEL -3:

1. Define gravitational potential at a point in the gravitational field. Obtain a relation for it. What is the position at which it is (i) maximum (ii) minimum.
2. Find the potential energy of a system of four particles, each of mass m, placed at the vertices of a square of side. Also obtain the potential at the centre of the square.
3. Three mass points each of mass m are placed at the vertices of an equilateral triangle of side l. What is the gravitational field and potential at the centroid of the triangle due to the three masses.

5. Briefly explain the principle of launching an artificial satellite. Explain the use of multistage rockets in launching a satellite.

5. In a two stage launch of a satellite, the first stage brings the satellite to a height of 150 km and the 2nd stage gives it the necessary critical speed to put it in a circular orbit. Which stage requires more expenditure of fuel ? Given mass of earth = 6.0×10^{24} kg, radius of earth = 6400 km.

6. An aluminium wire 1 m in length and radius 1 mm is loaded with a mass of 40 kg hanging vertically. Young's modulus of Al is 7.0×10^{10} N/m². Calculate (a) tensile stress (b) change in length (c) tensile strain and (d) the force constant of such a wire.

7. The average depth of ocean is 2500 m. Calculate the fractional compression of water at the bottom of ocean, given that the bulk modulus of water is 2.3×10^9 N/m².

8. A force of 5×10^3 N is applied tangentially to the upper face of a cubical block of steel of side 30 cm. Find the displacement of the upper face relative to the lower one, and the angle of shear. The shear modulus of steel is 8.3×10^{10} Pa.

9. How much should the pressure on one litre of water be changed to compress it by 0.10%.

10. A brass wire 1.8 m long at 27°C is held taut with little tension between two rigid supports. If the wire is cooled to a temperature of – 39°C, what is the tension developed in the wire, if its diameter is 2.0 mm ? Coefficient of linear expansion of brass = $2.0 \times 10^{-5} \text{ }^{\circ}\text{C}^{-1}$, Young's modulus of brass = 0.91×10^{11} Pa

3. CHEMISTRY

LEVEL -1:

1. Define chemical thermodynamics and state its main objectives.
2. What is meant by “system” and “surroundings” in thermodynamics?
3. State the First Law of Thermodynamics.
4. Define dynamic equilibrium.
5. What is physical equilibrium? Give an example.
6. State Henry's law and give its significance.
7. What does the law of chemical equilibrium state?
8. Define pH and write its formula.
9. What is meant by the statement “Equilibrium is dynamic in nature”?
10. Give the expression for equilibrium constant for the reaction: $aA + bB \rightleftharpoons cC + dD$.

LEVEL -2:

1. Explain the concept of enthalpy and internal energy with suitable examples.
2. List the factors affecting equilibrium constant (K_c).
3. How does dilution with water affect the pH of a buffer solution?
4. How does pressure affect chemical equilibrium in gaseous reactions? Illustrate with an example.
5. State Le Chatelier's Principle and apply it to an endothermic reaction.
6. Why does the boiling point of water decrease at high altitude?
7. A solution has a pH of 3. Is the solution acidic, basic or neutral? Explain.
8. What is the effect of temperature on the equilibrium constant for an exothermic reaction?
9. What happens to the concentrations in equilibrium when the concentration of a reactant is increased?
10. Calculate the pH of a solution with $[\text{H}^+] = 1 \times 10^{-4}$ mol/L.

LEVEL -3:

1. For the equilibrium $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$, predict the direction of the shift when pressure is increased and justify your answer.
2. Discuss the effect of adding a catalyst on the position of equilibrium and the value of equilibrium constant.
3. Design an experiment to measure the enthalpy change for the dissolution of NaCl in water and explain the principle used.
4. For a weak acid solution, construct a titration curve and explain the changes in pH during titration.
5. Justify the statement that water behaves as both an acid and a base.
6. Using Le Chatelier's Principle, predict the effect of decreasing temperature on the equilibrium

$2\text{NO}_2(\text{g}) \rightleftharpoons \text{N}_2\text{O}_4(\text{g})$ (exothermic reaction).

- Calculate the equilibrium constant (K_c) given concentrations of products and reactants for a reaction.
- For the reaction $\text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{H}^+(\text{aq}) + \text{OH}^-(\text{aq})$, explain how the value of pH changes with temperature.
- Discuss the industrial significance of chemical thermodynamics in ammonia synthesis.
- A buffer solution contains 0.10 M acetic acid and 0.10 M sodium acetate. Calculate its pH using Henderson-Hasselbalch equation.

4. MATHEMATICS

Level 1.

- If the slopes of the two lines are $\frac{1}{2}$ and 3, then find the angle between the two lines.
- Find the angle between the x-axis and the line joining the points (3, -1) and (4, -2).
- Find the equations to the line parallel to the axes and passing through the point (-3, 5).
- Find the equation of the line which is passing through the point (-2, -4) and perpendicular to the line $3x - y + 5 = 0$.
- Find the equation of the line which passes through the point (3, 4) and the sum of whose intercepts on the axes is 14.

Level 2

- Prove that the sequence $t_n = 3n + 5$ is an Arithmetic Progression. Find its common difference.
- Find the 10th term which is common between the given AP's.
 - $3+7+11+\dots$
 - $1+6+11+16$
- Is 309 a term of the AP 11, 17, 23, ...?
- The sum of 3 numbers of an arithmetic progression is 24 and their product is 44. Find the three numbers.
- If the sum of first n terms of a progression is a quadratic expression in n , show that it is an arithmetic progression.
- If the AM between the a^{th} and b^{th} terms of an AP be equal to the AM between the c^{th} and d^{th} term of it then prove that $a + b = c + d$
- Find three numbers in GP whose product is 1728 and sum is 38.

Level 3

- Find the coordinates of a point equidistant from the four points O (0,0,0), A(a, 0, 0), B(0, b, 0) and C(0,0, c). (Solution: $(a/2, b/2, c/2)$).
- Find the distance between the points P(-2,4,1) and Q(1, 2, -5). (Solution: 7 units).
- Find the locus of the point which is equidistant from the points A(0,2,3) and (2, -2, 1). (Solution: $x - 2y - z + 1 = 0$).
- Prove that the points (a,b,c), (b,c,a) and (c,a,b) are the vertices of an equilateral triangle.

5. Find the ratio in which the line joining (2,4,5) and (3,5,4) is divided by the yz -plane. (Solution: 2:3 externally)
6. Write the distance of point $P(2,3,5)$ from the xy -plane. (Solution: 5)
7. If the origin is the centroid of a triangle ABC having vertices $A(a,1,3)$, $B(-2,b,-5)$ and $C(4,7,c)$, find the values of a , b , c . (Solution: -6,5,-8).
8. Show that the lines joining the vertices of a tetrahedron to the centroids of the opposite faces are concurrent.
9. The midterms of the sides of a triangle are $(1,5,-1)$, $(0,4,-2)$ and $(2,3,4)$. Find its vertices. (Solution: $A(1,2,3)$, $b(3,4,5)$, $c(-1,6,-7)$)
10. Name the octants in which the following points lie: $(-5,-4,7)$, $(-7,2,-5)$ (Solutions – $X'YZ$, $X'Y'Z'$)
11. Show that the points $(-2, 3, 5)$, $(1, 2, 3)$ and $(7, 0, -1)$ are collinear.
12. What are the coordinates of the vertices of a cube whose edge is 2 units, one of whose vertices coincides with the origin and the three edges passing through the origin, coincide with the positive direction of the axes through the origin?
13. How far apart are the points $(2, 0, 0)$ and $(-3, 0, 0)$?
14. The point $(-2, -3, -4)$ lies in the
 - (a) First octant
 - (b) Seventh octant
 - (c) Second octant
 - (d) Eighth octant

5. BIOLOGY

LEVEL: 1

1. What is meant by the statement “aerobic respiration is more efficient”?
2. ATP produced during glycolysis is a result of substrate level phosphorylation. Explain.
3. Body cavity is the cavity present between body wall and gut wall. In some animals the body cavity is not lined by mesoderm. Such animals are called (a) Acoelomate (b) Pseudocoelomate (c) Coelomate (d) Haemocoelomate
4. Mention one example each for animals with chitinous exoskeleton and those covered by a calcareous shell.
5. Write one example each of the following in the space provided.

(a) Cold blooded animal	(b) Warm blooded animal
(c) Animal possessing dry and cornified skin	(d) Dioecious animal
6. Provide appropriate technical term in the space provided.

(a) Blood-filled cavity in arthropods _____	(b) Free-floating form of cnidaria _____
(c) Stinging organ of jelly fishes _____	(d) Lateral appendages in aquatic annelids _____
7. Distinguish between the following:
 - (a) Exarch and endarch condition of protoxylem
 - (b) Stele and vascular bundle
 - (c) Protoxylem and metaxylem
 - (d) Interfasicular cambium and intrafasicular cambium

(e) Open and closed vascular bundles
 (f) Stem hair and root hair.

LEVEL: 2

1. Write one example each of the following in the space provided.

(a) Cold blooded animal	(b) Warm blooded animal
(c) Animal possessing dry and cornified skin	(d) Dioecious animal
2. Differentiate between:

(a) Open circulatory system and closed circulatory system
(b) Oviparous and viviparous characteristic
(c) Direct development and Indirect development
3. Give the characteristic features of the following citing one example of each:

(a) Chondrichthyes and osteichthyes	(b) Urochordata and cephalochordata
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4. What part of the plant would show the following?

(a) Radial vascular bundle	(b) Polyarch xylem	(c) Well developed pith
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5. Epidermal cells are often modified to perform specialized functions in plants. Name some of them and function they perform.
6. Different substrates get oxidized during respiration. How does Respiratory Quotient (RQ) indicate which type of substrate, i.e., carbohydrate, fat or protein is getting oxidized?
 Respiration is an energy releasing and enzymatically controlled catabolic process which involves a step-wise oxidative breakdown of organic substances inside living cells. In this statement about respiration explain the meaning of
 1. Step-wise oxidative breakdown and 2. Organic substances (used as substrates).

LEVEL:3

7. RuBP carboxylase, PEPcase, Pyruvate dehydrogenase, ATPase, cytochrome oxidase, Hexokinase, Lactate dehydrogenase. Select/choose enzymes from the list above which are involved in

(a) Photosynthesis	(b) Respiration	(c) Both in photosynthesis and respiration
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8. Param went to the jungle and identified a reptile which was long and slithering with no limbs. Which organism it may be and what features he must have observed to classify it as a reptile. Write any 3 features of it.
 Give an example of any other organism belonging to the phylum. The 2 following is a diagram of vascular bundle.

(a) Which one of these two types is considered an open vascular bundle? Why?
(b) Which type of plant has an open vascular bundle- monocot or dicot?
9. If you want to study stomata in a dicot leaf,

(a) Which surface are you going to take the peel from? Why?
(b) Distinguish between dicot and monocot stomata on the basis of shape of guard cells.
10. (a) Desert plants have thick cuticle on the leaves. Give reasons for this.
 (b) Why is the cuticle absent in roots?
11. Describe various types of vascular systems observed in flowering Plant.
12. Explain how you would differentiate between aerobic and anaerobic respiration in plant tissues using an experimental setup.
13. Describe how you would measure the respiratory quotient (RQ) in different plant tissues.
14. Explain how the respiratory quotient varies with different substrates and why.
15. Explain the process of oxidative phosphorylation and its importance in ATP synthesis.

6. INFORMATICS PRACTICES

Q1. How is pop() different from popitem()?
 Q2. Discuss the working of copy() if

(i) The values are of immutable types,	(ii) The values are of mutable types.
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 Q3. The following code is giving some error. Find out the error and correct it.

$$d1 = \{"a" : 1, 1 : "a", [1, "a"] : "two"\}$$
 Q4. What is the output produced by above code:

1.

```
d3 = {"x": 10, "y": [20, 30], "z": (40, 50)}
      a. print(list(d3.keys()))
      b. print(list(d3.values()))
```
2.

```
d6 = {10: 100, 20: 200, 30: 300}
      for k, v in d6.items():
          print(k, v)
```
3.

```
d7 = {"p": [1, 2], "q": [3, 4]}
      print(d7["p"][1])
```
4.

```
d8 = {"name": "Alice", "age": 25}
      d8["city"] = "Paris"
      print(d8)
```

Q5. Consider the following dictionary

```
fruitColor = {"Apple": "Red", "Banana": "Yellow", "Grapes": "Green", "Orange": "Orange"}
```

Find the output of the following statements:

a) <pre>print(fruitColor.get("Apple"))</pre>	e) <pre>print(len(fruitColor))</pre>
b) <pre>print(fruitColor.keys())</pre>	f) <pre>print("Banana" in fruitColor)</pre>
c) <pre>print(fruitColor.values())</pre>	g) <pre>print(fruitColor.get("Mango", "Not Found"))</pre>
d) <pre>print(fruitColor.items())</pre>	h) <pre>del fruitColor["Grapes"]</pre>
	i) <pre>print(fruitColor)</pre>

Q6. Write a Python program to display all keys in a dictionary having values greater than 40.

```
D = {'A': 23, 'B': 56, 'C': 29, 'D': 42, 'E': 78}
print("Keys with values greater than 40 are:")
for k, v in D.items():
    if v > 40:
        print(k)
```

Q7. Write a NumPy program to-

- (i) Create an array of 1D containing numeric values 0 to 9
- (ii) Extract all odd numbers from NumPy array.
- (iii) Extract all even numbers from NumPy array.
- (iv) Copy the content of an array A to another array B, replacing all odd numbers of array A with
without
altering the original array A.
- (v) Replace all even numbers in NumPy array with -1.
- (vi) Perform basic arithmetic operations on 1D array.

Q8. Write a program to store student names and their percentage in a dictionary and delete a particular student

name from the dictionary. Also display the dictionary after deletion.

Q9. Write a Python program to input book details such as title, author, price, and ISBN, store them in a dictionary, and display all details in while loop.

7. PHYSICAL EDUCATION

LEVEL – 1 (Low Order Thinking Skills Questions)

1. Define the term Test in Physical Education.
2. What do you mean by Measurement?
3. Define Evaluation in the context of Physical Education.
4. Write any two importance of Test, Measurement, and Evaluation in sports.
5. What is the formula to calculate BMI?
6. Write the ideal BMI range for a healthy adult.
7. Mention the three sites used for skinfold measurement in males.
8. Name the three somatotypes according to Sheldon's classification.
9. Define Kinesiology in one sentence.

10. What is Biomechanics?

LEVEL – 2 (Mediocre Thinking Skills Questions)

1. Differentiate between Test and Measurement with suitable examples.
2. Explain how Evaluation helps in improving athletic performance.
3. State four major objectives of conducting Tests and Measurements in sports.
4. Explain the procedure to calculate BMI with an example.
5. Write short notes on:
 - a) Waist–Hip Ratio
 - b) Skinfold Measurement
6. Describe Endomorphy and Mesomorphy with physical characteristics.
7. Define Kinetics and Kinematics in the context of sports.
8. Explain any two principles of Biomechanics with examples.
9. Differentiate between Flexion and Extension.
10. Define Axis and Plane and mention one example of each in body movement.

LEVEL – 3 (Higher Order Thinking Skills Questions)

1. Discuss the interrelationship between Test, Measurement, and Evaluation in sports training.
2. Analyze the importance of physical fitness assessment using BMI and Waist–Hip Ratio.
3. Explain the procedure and interpretation of the 3-site skinfold measurement for females.
4. How does understanding Somatotype help a coach in designing a training program?
5. Describe the role of Kinesiology and Biomechanics in improving sports techniques.
6. Evaluate how Biomechanical principles help in preventing sports injuries.
7. Compare Kinetics and Kinematics with suitable sports examples.
8. Explain the types of body movements (Flexion, Extension, Abduction, Adduction, Rotation, Circumduction, Supination & Pronation) with relevant diagrams.
9. Illustrate with examples the application of axis and planes in body movements during sports activities.
10. “A coach’s understanding of biomechanics enhances athlete performance.” — Justify this statement with examples from sports.

8. PSYCHOLOGY

LEVEL – 1

1. What is perceptual set?
2. Define signal detection.
3. What is hallucination?
4. What is conditioned emotional response?
5. What is insight learning?
6. Who proposed insight learning?
7. What is biofeedback?
8. What is preparedness in learning?
9. What is behaviors modification?
10. What is trial and error vs cognitive learning difference (in one line)?
11. What is perceptual organization?
- 12.. Define binocular cues.
13. Give one example of illusion.
14. What is shaping in learning?
15. What is cognitive learning?

LEVEL – 2

1. Explain perceptual errors due to stereotypes.
2. What is perceptual defense? Give example.
3. Explain insight learning with Kohler's experiment.
4. Describe law of effect.
5. Explain preparedness in learning (Seligman).
6. What is behaviors modification? Give one method.
7. Explain the difference between punishment and negative reinforcement.
8. Explain aversive conditioning with example.
9. What is biofeedback? How does it help in learning?
10. Discuss any two real-life applications of conditioning in education.
11. Explain punishment as a method of learning.
12. What is generalization in classical conditioning?
13. Explain learned helplessness.
14. How is cognitive learning different from trial-and-error learning?
15. Explain the concept of a cognitive map (Tolman).

LEVEL – 3

1. Evaluate the role of past experience, culture and motivation in perception.
2. Discuss perceptual errors and illusions (Müller-Lyer, Ponzo & Moon illusion).
3. Explain signal detection theory and its application in real-life decision-making.
4. Compare classical, operant, observational, cognitive and insight learning.
5. Explain behaviors modification using operant conditioning techniques.
6. Discuss the relevance of perceptual processes in driving, sports or daily life.
7. Explain the influence of motivation and expectations on perception.
8. Analyze affective and emotional learning in classical conditioning (e.g., phobias).
9. Discuss the application of reinforcement schedules in shaping behaviors.
10. Explain the role of learning and perception in real-life problem solving.
11. Discuss cognitive learning theory with examples.
12. Explain Tolman's latent learning experiment.
13. Describe observational learning with reference to Bandura's Bobo Doll experiment.
14. How does attention influence perception? Explain with examples.
15. Discuss perceptual constancies in detail.

9. ARTIFICIAL INTELLIGENCE

1. Write a Python program that takes two numbers as input and prints their sum.
2. Take a number as input and print its square.
3. Read a number and print its cube using the exponent operator.
4. Take radius as input and print the area of a circle (πr^2). Use 3.14 for π .
5. Input two strings and print them joined together with a space.
6. Take a string as input and print the number of characters in it.
7. Read a string and print it in uppercase.
8. Input two numbers and swap their values. Print the result.
9. Take a single character as input and print its ASCII value using `ord()`
10. Input a string and print its first three characters using slicing.
11. To input a student's marks in three subjects (out of 100) and print the Percentage.
12. To calculate the Simple Interest