

**21**

The Competition in

**Science & Research Skills**

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***Science & Research  
Test I & II  
MODEL PAPERS***

**Class : IX**



**Eduranet**

Intellectual Olympiad Foundation

(Promoted by Eduranet Educational Society (Regd. 309/09))

**Hyderabad | India**

## **Eduranet Intellectual Olympiad Foundation**

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**SYLLABUS****I) Physics**

1. Light – Reflection and Refraction
2. Human Eye and Colourful World
3. Electricity
4. Magnetic Effects of Electric Current
5. Sources of Energy.

**II) Chemistry**

1. Chemical Reactions and Equations
2. Acids, Bases and Salts,
3. Metals and Non-metals Carbon and its Compounds
4. Periodic Classification of Elements.

**III) Biology**

1. Life processes
2. Control and Coordination
3. How do Organisms Reproduce?
4. Heredity and Evolution
5. Our Environment
6. Management of Natural Resources.

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# SCIENCE & RESEARCH TEST-I

CODE: 2191

## PRELIMS

**Max. Marks : 75**

**Duration : 75 Mins.**

### General Instructions :

1. Please find the Answer Sheets (OMR) with in the envelop given to you.
2. Mention your Test Code, Student ID, Name, Class, Section and School Name on the OMR Sheet as per Question Paper and Hall Ticket.
3. This question paper contains 75 Questions, duration is 75 minutes.
4. Do rough work in the empty sheet provided along with this question paper.
5. Answer questions in OMR sheet only.
6. Don't write or tick anything on the question paper.
7. Use only Black or Blue Ball Point Pen or Dark Pencil to answer the question in OMR sheet.
8. Indicate the correct answer by darkening one of the 4 or 5 responses provided.
9. Submit only OMR sheet to the invigilator

**1. Multiply 107.88 by 0.610 and express the result with correct number of significant figures**

- |            |           |
|------------|-----------|
| a) 65,8068 | b) 65,807 |
| c) 65.81   | d) 65.8   |

**2. The radius of a thin wire is 0.16mm, The area of cross section of the wire in sq. mm with correct number of significant figures is**

- |           |            |
|-----------|------------|
| a) 0.08   | b) 0.080   |
| c) 0.0804 | d) 0.80384 |

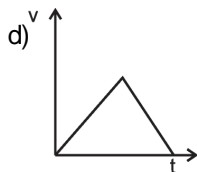
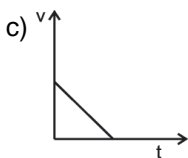
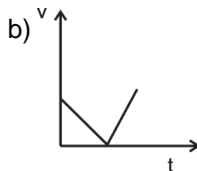
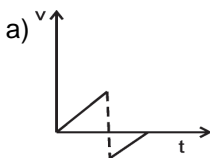
3. **A ball is dropped downwards; after 1 sec another ball is dropped downwards from the same point. What is the distance between them after 3 sec?**
- a) 25 m      b) 20 m      c) 50 m      d) 9.8 m
4. **The velocity of a particle at an instant is 10m/s. After 5 sec, the velocity of the particle is 20m/s. The velocity at 3 seconds before from the instant when velocity of a particle is 10m/s.**
- a) 8 m/s      b) 4 m/s      c) 6 m/s      d) 7 m/s
5. **The numerical ratio of displacement to distance for a moving object is**
- a) always less than 1      b) always equal to 1  
c) always more than 1      d) equal or less than 1
6. **A space shuttle is launched into space. During the first 8 minutes of its launch the average acceleration of the shutter is  $17.5\text{m/s}^2$ . What is its speed after 8 minutes?**
- a)  $8000\text{ ms}^{-1}$       b)  $8400\text{ ms}^{-1}$   
c)  $1200\text{ ms}^{-1}$       d)  $1500\text{ ms}^{-1}$
7. **A frictionless wagon is pushed from rest, with a force of 60 newtons for 14 seconds. If it then strikes a wall and comes to rest in 0.15 second, how much average force does the wall exert on it?**
- a) 6000 N      b) 5600 N      c) 4500 N      d) 4000 N
8. **A man is at rest in the middle of a pond on perfectly smooth ice. He can get himself to the shore by making use of Newton's**
- a) first law      b) second law  
c) third law      d) all the laws

9. The coin remains at rest in the figure shown.

This is due to



- a) Inertia of rest
  - b) Two forces act on the coin which balance each other.
  - c) No unbalanced force acts on it
  - d) All of these
10. A freely falling body strikes a surface and rebounds. The velocity of the body with respect to time during its fall and rebound is best represented by:



11. A wire suspended vertically from one of its ends is stretched by attaching a weight of 200 N to the lower end. The weight stretches the wire by 1 mm. Then the elastic energy stored in the wire is

- a) 10 J
- b) 20 J
- c) 0.1 J
- d) 0.2 J

12. The ratio of the radii of the planets  $R_1$  and  $R_2$  is  $K$ . The ratio of the acceleration due to gravity is  $r$ . The ratio of the escape velocities from them will be

- a)  $kr$   
b)  $\sqrt{kr}$   
c)  $\sqrt{(k/r)}$   
d)  $\sqrt{(r/k)}$

13. A stone is thrown vertically upwards and caught at the point of projection after 10 seconds. The time taken by the stone to reach the highest point is

- a) 5 sec.  
b) 10 sec.  
c) 9.8 sec.  
d) 4.9 sec.

14. Two protons are kept at a separation of 1 femtometre ( 1 femtometre =  $10^{-15}$ m). The mass of a proton is  $1.67 \times 10^{-27}$  kg. The gravitational force between them is:

- a)  $1.86 \times 10^{-34}$   
b)  $5.86 \times 10^{-34}$   
c)  $2.8 \times 10^{-34}$   
d)  $4.86 \times 10^{-34}$

15. The mass of a body is 12 kg on the earth. If it is taken to the moon. its mass will be about:

- a) 12 kg  
b) 6 kg  
c) 2 kg  
d) 72 kg

16. The temperature of equal masses of three different liquids A,B and C are  $12^{\circ}\text{C}$  and  $280^{\circ}\text{C}$  respectively. The temperature when A and B are mixed is  $16^{\circ}\text{C}$  and when B and C are mixed is  $23^{\circ}\text{C}$ . The temperature when A and C are mixed is

- a)  $18.2^{\circ}\text{C}$   
b)  $22^{\circ}\text{C}$   
c)  $20.2^{\circ}\text{C}$   
d)  $25.2^{\circ}\text{C}$



17. The temperature of two bodies A and B are respectively  $727^{\circ}\text{C}$  and  $327^{\circ}\text{C}$ . The ratio of the rates of heat radiated ( $H_A : H_B$ ) by them, is

- a) 625:81
- b) 25 : 9
- c) 5 : 3
- d) 727 : 372

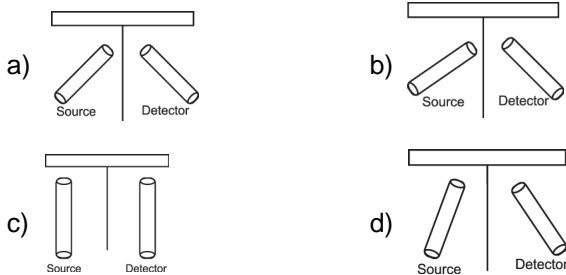
18. The ratio of fundamental frequency of an organ pipe opened at both ends to that of the organ pipe closed at one end is

- a) 1 : 1
- b) 1.5 : 1
- c) 2 : 1
- d) 3 : 1

19. An oil-tanker explodes in the sea. At that instant an aircraft and a submarine were present vertically above and below the oil-tanker respectively at equal distances from it. Find the ratio of the time taken by sound waves to reach them. (Speed of sound in air = 340 m/s. Speed of sound in sea water = 1520 m/s.)

- a) 5.40
- b) 4.47
- c) 5.57
- d) 6.40

20. For verifying the laws of reflection of sound, a student sets-up his apparatus as shown. The correct observation is :



21. What type of mirrors are preferred in searchlights and in headlights of vehicles?

- a) Concave mirror
- b) Convex mirror
- c) Parabolic mirror
- d) None of these

- 22. An electric bulb is rated 220 V – 100 W. If it is operated at 110 V then power consumed by it will be**
- a) 100 W                      b) 50 W  
c) 25 W                      d) 400 W
- 23. Two metallic wires A and B are connected in parallel. Wire A has length 'l' and radius 'r' while B has a length '2l' and radius '2r'. Then the ratio of total resistance of parallel combination and the resistance of wire A is .**
- a) 1 : 2              b) 1 : 3              c) 1 : 4              d) 1 : 5
- 24. Which of the following represent domestic power supply in India?**
- a) 220 V, 100 Hz              b) 220 V, 50 Hz  
c) 220 V, 60 Hz              d) 110 v, 60 Hz
- 25. Magnetic field lines around a straight conductor are**
- a) concentric circles              b) oval  
c) rectangular              d) straight lines
- 26. Densities of two gases are in the ratio 1 : 2 and their temperatures are in the ratio 2 : 1, then the ratio of their respective pressures is**
- a) 1 : 1              b) 1 : 2              c) 2 : 1              d) 4 : 1
- 27. Rate of diffusion of a gas is**
- a) directly proportional to its density  
b) directly proportional to its molecular mass  
c) inversely proportional to the square root of its density  
d) inversely proportional to the square root of its molecular mass

- 28. The boiling points of diethyl ether, acetone, n-butyl alcohol and water are 308 K, 329 K, 391 K, 373 K respectively. Which of the following correctly represents their boiling point in Celsius scale ?**
- a) 25°C, 56°C, 118°C, 100°C
  - b) 35°C, 56°C, 118°C, 100°C
  - c) 35°C, 54°C, 116°C, 100°C
  - d) 35°C, 56°C, 118°C, 98°C
- 29. According to Kinetic theory of gases, molecules are:**
- a) perfectly inelastic particles in random motion
  - b) perfectly elastic particles in random motion
  - c) perfectly inelastic particles at rest
  - d) perfectly elastic particles at rest
- 30. Two substances A and B when brought together form a substance C with the evolution of heat. The properties of C are entirely different from those of A and B. The substance C is**
- a) a compound
  - b) an element
  - c) a mixture
  - d) none of the above
- 31. Which of the following is an example of a homogeneous substance?**
- a) Granite
  - b) Copper sulphate
  - c) M & M candy
  - d) Muddy water
- 32. White gold is used in jewelry and contains two elements gold and palladium. A jeweler had two different samples that are both identical in appearance and have a uniform**

**composition throughout. What can be said about the samples?**

- a) They are homogeneous mixtures and be classified as metallic alloys.
- b) The materials are heterogenous mixtures and can be classified by their components
- c) The samples have variable compositions and are classified as metallic solutions.
- d) The samples are heterogeneous mixtures that can be separated using magnetic properties.

**33. To prepare iron sulphide, by heating a mixture of iron filings and sulphur powder, we should use a**

- a) Copper dish
- b) Watch glass
- c) China dish
- d) Petri dish

**34. How many gm of  $\text{CH}_3\text{OH}$  would have to be added to water prepare 150 ml of a solution that is 2 M  $\text{CH}_3\text{OH}$  ?**

- a)  $9.6 \times 10^3$  gm
- b) 9.6 gm
- b)  $9.6 \times 10^2$  gm
- d) 24 gm

**35. The 5.85 g of NaCl and 1 kg of water is added to prepare a solution. What is the strength of NaCl in this solution?(mol.wt of NaCl = 58.5)**

- a) 0.1 Normal
- b) 0.1 Molal
- c) 0.1 Molal
- d) 0.1 Formal

**36. Which has least gold number?**

- a) Gelatin
- b) Starch
- c) Albumin
- d) Blood

37. The number of moles of hydroxide  $(\text{OH})^-$  ion in 0.3 litre of 0.005 M solution of  $\text{Ba}(\text{OH})_2$  is
- a) 0.0075
  - b) 0.0015
  - c) 0.0030
  - d) 0.0050
38. Aspartame, an artificial sweetener, has the molecular formula  $\text{C}_{14}\text{H}_{18}\text{N}_2\text{O}_5$ . What is the mass in grams of one molecule?(Atomic weight  $\text{C} = 12.01$ ,  $\text{H} = 1.008$ ,  $\text{N} = 14.01$ ,  $\text{O} = 16.00$ ).
- a)  $4.89 \times 10^{-21}$
  - b)  $2.24 \times 10^{-21}$
  - c)  $3.85 \times 10^{-21}$
  - d)  $4.89 \times 10^{-21}$
39. Volume of a gas at STP is  $1.12 \times 10^{-7}\text{cc}$ . Calculate the number of molecules in it-
- a)  $3.01 \times 10^{20}$
  - b)  $3.01 \times 10^{12}$
  - c)  $3.01 \times 10^{23}$
  - d)  $3.01 \times 10^{24}$
40. The acid used in lead storage battery is
- a)  $\text{HCl}$
  - b)  $\text{HNO}_3$
  - c)  $\text{H}_2\text{SO}_4(38\%)$
  - d)  $\text{H}_2\text{SO}_4(98\%)$
41. Calculate the number of atoms present in 6.4g of sulphur.
- a)  $2.4 \times 10^{23}$  atoms
  - b)  $2.4 \times 10^{-23}$  atoms
  - c)  $1.2 \times 10^{23}$  atoms
  - d)  $1.2 \times 10^{-23}$  atoms
42. The nucleus of an atom has atomic number 17 and mass number 37. There are 17 electrons outside the nucleus. Then the number of neutrons in it is :
- a) 20
  - b) 21
  - c) 17
  - d) 37

**43. Rutherford's  $\alpha$  - scattering experiment showed that**

- i) electrons are negatively charged
- ii) the mass and positive charge of the atom is concentrated in the nucleus
- iii) neutron exists in the nucleus
- iv) most of the space in atom is empty

Which of the above statements are correct?

- a) (i) and (ii)
- b) (ii) and (iii)
- c) (i) and (iv)
- d) (ii) and (iv)

**44. The number of d-electrons in  $\text{Fe}^{2+}$  ( $Z = 26$ ) is not equal to that of**

- a) s-electrons in Mg
- b) p-electrons in Ne
- c) d- electrons in Fe
- d) p-electrons in Cl

**45. Which of the following nuclides is least likely to be stable?**

- a)  ${}_{20}\text{C}^{40}$
- b)  ${}_{13}\text{Al}^{30}$
- c)  ${}_{50}\text{Sn}^{119}$
- d)  ${}_{25}\text{Mn}^{55}$

**46. The electronegativity difference between N and F is greater than that between N and H yet the dipole moment of  $\text{NH}_3$  (1.5D) is larger than that of  $\text{NF}_3$  (0.2D). This is because**

- a) in  $\text{NH}_3$  the atomic dipole and bond dipole are in same direction whereas in  $\text{NF}_3$  these are in opposite directions
- b) in  $\text{NH}_3$  as well as  $\text{NF}_3$  the atomic dipole and bond dipole are in opposite directions
- c) in  $\text{NH}_3$  the atomic dipole and bond dipole are in opposite directions whereas in  $\text{NF}_3$  these are in the same direction
- d) in  $\text{NH}_3$  as well as in  $\text{NF}_3$  the atomic dipole and bond dipole are in the same direction

47. The values of electronegativity of atoms A and B are 1.20 and 4.0 respectively. The percentage of ionic character of A – B bond is

- a) 50%                                        b) 72.2%  
c) 55.3%                                        d) 43%

48. The molecular formula of chloride of a metal M is  $MCl_3$  the formula of its carbonate would be

- a)  $MCO_3$                                         b)  $M_2(CO_3)_3$   
c)  $M_2CO_3$                                         d)  $M(CO_3)_2$

49. Polymer obtained by condensation polymerization is

- a) Polythene                                        b) Teflon  
c) Phenol-formaldehyde                        d) Nitrile rubber

50. The linkage present in proteins and peptides is

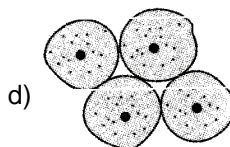
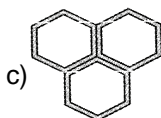
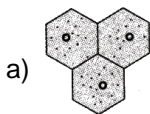
- $$\begin{array}{ccc} \text{O} & & \text{O} \\ \parallel & & \parallel \\ \text{a) } -\text{C}-\text{NH}- & \text{b) } -\text{C}-\text{O} \end{array}$$

$$\begin{array}{ccc} \text{O} & \text{O} \\ \parallel & \parallel \\ \text{c) } -\text{C}-\text{O}-\text{C}- & \text{d) } -\text{NH}- \end{array}$$

51. Neena prepared a stained mount of cheek cells but did not observe ribosomes and mitochondria because:

- a) cheek cells do not have them  
b) they do not get stained.  
c) they are very small, so cannot be observed under compound microscope.  
d) she did not stain the material properly.

52. Which of the following represents the correct observation of onion peel cells?



53. The organelle that has its own DNA and ribosomes is:

a) Golgi apparatus

b) Mitochondrion

c) Lysosome

d) Vacuole

54. The transitional cell organelle between endoplasmic reticulum and plasma membrane is:

a) lysosome

b) ribosome

c) Golgi complex

d) mitochondria

55. Carbohydrates of plasma membrane help in:

a) passive transport

b) active transport

c) cell adhesion

d) cellular recognition

56. We can identify striated muscle fibres by:

a) Long, branched and cylindrical fibres

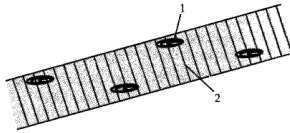
b) Branched, multinucleate with striations

c) Unbranched, cylindrical, multinucleate with striations

d) Unbranched, spindle-shaped, multinucleate.



57. The parts of a striated muscle fibre marked 1 and 2 are:



- a) Cell membrane and cell wall respectively
- b) Nucleus and dark band respectively
- c) Nucleus and light band respectively
- d) Nucleus and cytoplasm respectively

58. Companion cell is associated with:

- a) sclerenchyma
- b) tracheid
- c) tracheae
- d) sieve tube

59. Nonmyelinated neurons are found in:

- a) invertebrates
- b) sympathetic nerves
- c) parasympathetic nerves
- d) all of the above

60. A fish and a bird are placed in the same phylum. The feature that places them is:

- a) Pointed head
- b) Bulky thorax
- c) Presence of scales
- d) Post anal tails.

61. The structure present in male cockroach as well as in female cockroach is:

- a) Brood pouch
- b) Compound eye
- c) Anal style
- d) Anal cerci

**62. The distinguishing features of a nematode are:**

- a) pseudocoelom and flame cells
- b) pseudocoelom and longitudinal muscle in the body wall
- c) flame cells and longitudinal muscle in the body wall
- d) syncytial epidermis and diploblastic nature

**63. Water vascular system is a distinctive feature of:**

- a) Echinodermata
- b) Annelida
- c) Chordata
- d) Mollusca

**64. Four students P,Q,R and S were given samples of Arhar dal to test the presence of adulterant in them. They added the chemicals as given below. Which of the pairs in the following table is showing correct matching:**

Set A	Set B
P Added water	Pink colour
Q Added water and then dil. Hcl	Pink colour
R Added water and then NaOH	Yellow colour
S Added water and then dil.Hcl	Green colour

- a) P
- b) Q
- c) R
- d) S

**65. Which organ of our body is affected when we suffer from jaundice?**

- a) Small intestine
- b) Liver
- c) Kidneys
- d) Heart

66. Match the following and select the correct answer.

I Measles	a.protozoa
II Cholera	b.Virus
III Kala azar	c.bacteria

- a) I - a, II - c, iii - b                      b) I - a, II - b, iii - c  
c) i - b, ii - a, iii - c                      d) i - b, ii - c, iii - a

67. Which of the following is a genetic disease?

- a) Cretinism                                      b) Diabetes  
c) Haemophilia                                 d) Marasmus

68. pH value of acid rain is :

- a) 11 - 12                                        b) 3 - 6  
c) 7 - 8    d) 10 - 11

69. Over the last 100 years global sea level has risen by about:

- a) 20 – 25 cm                                 b) 10 – 12.5 cm  
c) 25 – 50 cm                                 d) None of the above

70. The conversion of nitrogen gas to nitrates by bacteria is called:

- a) nitrification                                 b) nitrogen fixation  
c) denitrification                              d) decay

**71. Why is it difficult to integrate nitrogen gas from the atmosphere into the nitrogen cycle of the biosphere?**

- a) Nitrogen is not very abundant in the atmosphere
- b) Few organisms can directly utilise atmospheric nitrogen gas
- c) Oceans quickly absorb nitrogen gas
- d) Living organisms quickly absorb nitrogen gas

**72. Exotic breeds of cows are:**

- a) jersey and red sindhi
- b) Red sindhi and sahiwal
- c) Jersey and brown swiss
- d) Brown swiss and sahiwal

**73. Pasturage is related to**

- a) Cattle
- b) Fishery
- c) Apiculture
- d) Poultry

**74. Which of the following is a micro nutrient?**

- a) Potassium
- b) Zinc
- c) Calcium
- d) Magnesium

**75. When soil pH is low, which of the following elements can become toxic to plants?**

- a) Oxygen
- b) Carbon
- c) Nitrogen
- d) Aluminium

**KEY TO MODEL PAPER - I**

- |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| 1. d  | 2. b  | 3. a  | 4. b  | 5. b  | 6. b  |
| 7. b  | 8. c  | 9. d  | 10. a | 11. c | 12. b |
| 13. a | 14. a | 15. c | 16. c | 17. a | 18. c |
| 19. b | 20. a | 21. c | 22. c | 23. b | 24. b |
| 25. a | 26. a | 27. d | 28. b | 29. b | 30. a |
| 31. b | 32. a | 33. c | 34. b | 35. b | 36. a |
| 37. c | 38. d | 39. b | 40. c | 41. c | 42. a |
| 43. d | 44. b | 45. b | 46. a | 47. b | 48. b |
| 49. c | 50. a | 51. c | 52. a | 53. b | 54. c |
| 55. d | 56. b | 57. b | 58. d | 59. a | 60. d |
| 61. c | 62. b | 63. a | 64. b | 65. b | 66. d |
| 67. c | 68. b | 69. b | 70. b | 71. b | 72. c |
| 73. c | 74. b | 75. d |       |       |       |

# SCIENCE & RESEARCH TEST-II

CODE: 2192

## FINALS

**Max. Marks : 60**

**Duration : 60 Mins.**

### General Instructions :

1. Please find the separate Answer Sheets along with the question paper.
2. Mention your Test Code, Student ID, Name, Class, Section, Contact no. and School Name on the Answer Sheet as per Question Paper and Hall Ticket.
3. This question paper contains VII sections, duration is 60 minutes.
4. Please read the instructions carefully before attempting the question.
5. Answer questions in Answer Sheet only.
6. Don't write or tick anything on the question paper.
7. Use only Black or Blue Ball Point Pen to answer the question in Answer Sheet.
8. Submit only answer sheet(s) to the invigilator.

### SECTION - I

**8 × 1 = 8m**

**DIRECTIONS : (1 - 8)** – Each question contains statements given in two columns which have to be matched. Statements in column A have to be matched with statements in column B and write in the answer sheet.

#### Column A

- 1) Slope of displacement time graph
- 2) Slope of velocity - time graph
- 3) Area under velocity time graph intercepted with time - axis.

#### Column B

- A) Acceleration
- B) Velocity
- C) Change in velocity

- |  |                                 |
|--|---------------------------------|
| 4) Area under acceleration<br>time graph intercepted with time - axis. | D) Displacement                 |
| 5) Hydrolysis  | E) Sulphur sol                  |
| 6) Reduction   | F) $\text{Fe}(\text{OH})_3$ sol |
| 7) Oxidation   | G) $\text{AgCl}$ sol            |
| 8) Double decomposition  | H) Gold sol                     |
|  | I) $\text{MgCl}$ sol            |
|  | J) Distance                     |

**SECTION - II****10 × 1 = 10m**

**DIRECTIONS : (9 - 18)** – Read the following statements and write your answer as true or false with reasons or solutions in the answer sheet.

9. A light and a heavy body, having equal momenta, have equal kinetic energies.
10. A rigid disc rolls without slipping on a fixed rough horizontal surface with uniform angular velocity. Then the acceleration of lowest point on the disc is zero.
11. Acceleration due to gravity at poles is greater than that at equator.
12. A fluid flowing out of a small hole in a vessel results in a backward thrust on the vessel.
13. If we pour liquid nitrogen ( $\text{N}_2$ ) into a glass, it will change its state to a solid.
14. In Lyophobic colloids, the dispersed phase has little affinity for the dispersion medium.
15. Molar mass of ethyne ( $\text{C}_2\text{H}_2$ ) is 26 g/mol.

16. Tuberculosis, commonly called T.B., is a viral disease common among poor people living in ill-ventilated congested societies in big cities.
17. Green house gases are the ones which allow the heat emitted by earth to pass out.
18. Chicken flesh contains about 50% protein.

**SECTION - III****10 × 1 = 10m**

**DIRECTIONS : (19 - 28)** – Complete the following statements with an appropriate word/term to be written in the answer sheet.

19. The number 1040 has \_\_\_\_\_ significant figures.
20. If a car is going northward and the driver jams on its brakes, the direction of its acceleration is \_\_\_\_\_
21. Conical shape of rockets reduce \_\_\_\_\_
22. Energy stored in an elongated rubber is \_\_\_\_\_
23. Latent heat of fusion is the amount of heat energy required to change 1 kg of solid into liquid at its \_\_\_\_\_
24. Immiscible liquids are separated by using a \_\_\_\_\_
25. Particles of \_\_\_\_\_ solution can not be seen even under powerful microscope.
26. Photosynthesis taken place in \_\_\_\_\_
27. The dense connective tissues that connect muscle to bone are called \_\_\_\_\_
28. Cell wall of fungi is made up of \_\_\_\_\_



## SECTION - IV

 $10 \times 1 = 10m$ 

**DIRECTIONS : (29 - 38)** – Identify the correct answer from the given options and write in the answer sheet.

29. What is the maximum speed of a car taking a turn of radius 30 m on a level road if the coefficient of friction between the tyres and the road is 0.4? ( $g = 9.8 \text{ ms}^{-2}$ )
- a)  $5.42 \text{ ms}^{-1}$                       b)  $6.27 \text{ ms}^{-1}$   
c)  $10.84 \text{ ms}^{-1}$                       d)  $21.68 \text{ ms}^{-1}$
30. If a man weight 60 kg on the surface of the earth, the height above the surface of the earth where his weight is 30 kg is
- a)  $0.41 R$                               b)  $\sqrt{2}R$   
c)  $R/\sqrt{2}$                               d)  $R/2$
31. A 20 cm long capillary tube is dipped in water. The water rises up to 8 cm. If the entire arrangement is put in a freely falling elevator the length of water column in the capillary tube will be
- a) 10 cm              b) 8 cm              c) 20 cm              d) 4 cm
32. At constant volume, temperature is increased then
- a) collision on walls will be less  
b) number of collisions per unit time will increase  
c) collisions will be in straight lines  
d) collisions will not change.
33. In colloidal state, particle size ranges from
- a) 1 to  $10 A^0$                       b) 20 to  $50 A^0$   
c) 10 to  $1000 A^0$                       d) 1 to  $280 A^0$

34. The formula of a chloride of a metal M is  $MCl_3$ , the formula of the phosphate of metal M will be
- a)  $MPO_4$       b)  $M_2PO_4$       c)  $M_3PO_4$       d)  $M_2(PO_4)_3$
35. By whom was neutron discovered?
- a) Bohr      b) Chadwick      c) Rutherford      d) Dalton
36. The first segment of earthworm, in which the mouth is situated, is called
- a) stomium      b) peistomeum  
c) protostomium      d) periosteum
37. Which of the following can be used for biological control of mosquitoes?
- a) Oil      b) Ointments      c) DDT      d) Gambusia
38. Largest amount of fresh water is found in
- a) lakes and streams      b) underground  
c) polar ice and glaciers      d) rivers

**SECTION - V****12 × 1 = 12m**

**DIRECTIONS: (39 -50)** – This section contains multiple choice questions. Each question has 4 choices (a), (b), (c) and (d) out of which ONE OR MORE may be correct. choose the correct answers and write in the answer sheet.

39. Identify the pairs having identical dimensions
- a) Strain and angle  
b) Planck constant and angular momentum  
c) Linear momentum and moment of force  
d) Pressure and modulus of elasticity

40. Average velocity can be calculated by

a)  $\frac{\text{Distance travelled along given direction}}{\text{Time taken}}$

b)  $\frac{\text{Initial velocity}}{2}$

c)  $\frac{\text{Initial velocity} + \text{Final velocity}}{2}$

d)  $\frac{\text{Final velocity}}{2}$

41. A body is moving in a circle of radius  $r$  with a uniform speed  $v$ , angular frequency  $\omega$ , time period  $T$  and frequency  $\nu$ . The centripetal acceleration is given by :

a)  $\frac{4\pi^2 r}{T}$       b)  $\omega v$       c)  $\frac{v^2}{r}$       d)  $4\pi^2 r \nu^2$

42. What force would be required to produce an acceleration of  $4 \text{ m/s}^2$  in a ball of mass  $6 \text{ kg}$ ?

- a)  $24 \text{ N}$                                       b)  $42 \text{ N}$   
c)  $42 \text{ kg m/s}^2$                               d)  $24 \text{ kg m/s}^2$

43. Which of the following sets of quantum number is/are not allowed ?

- a)  $n = 3, l = 2, m = -1$                       b)  $n = 2, l = 3, m = -1$   
c)  $n = 3, l = 0, m = 1$                       d)  $n = 6, l = 2, m = -1$

44. Which of the following is/are an electrovalent (ionic) compound(s)?

- a) Calcium chloride ( $\text{CaCl}_2$ )  
b) Sodium sulphate ( $\text{Na}_2\text{S}$ )  
c) Magnesium fluoride ( $\text{MgF}_2$ )  
d) Carbon tetrachloride ( $\text{CCl}_4$ )

- 
45. On the basis of mode of formation, polymers can be classified?
- a) as addition polymers only
  - b) as codensation polymers only
  - c) as copolymers
  - d) as synthetic polymers
46. Fossils are generally not found in
- a) Sedimentary rocks
  - b) igneous rocks
  - c) metamorphic rocks
  - d) any type of rock
47. If an animal cell is placed into a solution whose concentration of dissolved substances is higher than that inside the cell
- a) the cell will swell
  - b) the cell will shrivel
  - c) the solution is described as hypertonic
  - d) both (b) and (c) are incorrect
48. Which of the following muscles do act involuntarily?
- a) striated muscles
  - b) smooth muscles
  - c) cardiac muscles
  - d) skeletal muscles
49. Amphibians do not have the following
- a) three chambered heart
  - b) warm - blooded
  - c) scales
  - d) mucous glands.
50. Animal cells differ from plant cell due to
- a) centrosome
  - b) Golgi body
  - c) cell - wall
  - d) plastid

**SECTION - VI****5 × 1 = 5m**

**DIRECTIONS : (51 - 55)** – Fill in the blanks in the following passage(s) from words given inside the box.

Force, simultaneously, opposite, equal, different

To every action there is an \_\_\_\_\_ (51) \_\_\_\_\_ and \_\_\_\_\_ (52) \_\_\_\_\_ reaction. Action and reaction act on two \_\_\_\_\_ (53) \_\_\_\_\_ bodies, but they act \_\_\_\_\_ (54) \_\_\_\_\_. Whenever one body exerts a \_\_\_\_\_ (55) \_\_\_\_\_ on another body, the second body exerts an equal and opposite force on the first body.

**SECTION - VII****5 × 1 = 5m**

**DIRECTIONS : (56 – 60)** – Each of these questions contains an Assertion followed by reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements. and write in the answer sheet.

- a) If both **Assertion** and **Reason** are **correct** and Reason is the **Correct explanation** of Assertion.
  - b) If both **Assertion** and **Reason** are correct, but Reason is **not the correct explanation** of Assertion.
  - c) If **Assertion** is **correct** but **Reason** is **incorrect**.
  - d) If **Assertion** is **incorrect** but **Reason** is **correct**.
56. **Assertion:** One mole of  $\text{SO}_2$  contains double the number of molecules present in one mole of  $\text{O}_2$  .

**Reason :** Molecular weight of  $\text{SO}_2$  is double to that of  $\text{O}_2$

57. **Assertion:** It is **not** possible to find an electron present in the nucleus.

**Reason:** Velocity of electron - wave is less as compared to velocity of light.

58. **Assertion:** Boron always forms covalent bond.

**Reason:** The small size of  $B^{3+}$  favours formation of covalent bond.

59. **Assertion:** Agricultural output increased several times after introduction of DDT.

**Reason:** DDT was the first insecticide use on a wide scale.

60. **Assertion:** Acquired characters are non-inheritable.

**Reason:** Acquired characters generally affect the somatic cells and it is the germ cells that are passed on to the next generation.

**SOLUTIONS TO MODEL PAPER - II****SECTION – I****Match the Following**

- 1) → B;    2) → A;    3) → D;    4) → (C);  
5) → F;    6) → H;    7) → E;    8) → (G)

**SECTION – II****True / False**

- 9) False    10) False    11) True    12) True  
13) False    14) True    15) True    16) False  
17) False    18) False

**SECTION – III****Fill in the Blanks**

- 19) 3    20) South  
21) Atmospheric friction    22) Potential energy  
23) Melting point    24) Separating funnel  
25) True    26) Chloroplasts  
27) Tendons    28) Chitin

**SECTION – IV****Multiple Choice Questions**

- 29) c    30) a    31) c    32) b  
33) c    34) a    35) b    36) b  
37) d    38) c

**SECTION – V****More than one correct answers**

- 39) a, b, d      40) a, b      41) b, c, d      42) a, d  
43) b, c      44) a, b, c      45) a, b      46) b, c, d  
47) b, c      48) a, b, c      49) b, c      50) c, d

**SECTION – VI****Fill in the Passage**

- 51) equal      52) opposite      53) different  
54) simultaneously      55) Force

**SECTION – VII****Assertion & Reason**

56. d) If **Assertion** is incorrect but **Reason** correct.
57. b) If both **Assertion** and Reason are correct, but Reason is **not the correct explanation** of Assertion.
58. a) If both **Assertion** and **Reason** are **correct** and Reason is the **correct explanation** of Assertion
59. a) If both **Assertion** and **Reason** are **correct** and Reason is the **correct explanation** of Assertion
60. a) If both **Assertion** and **Reason** are **correct** and Reason is the **correct explanation** of Assertion