INDIAN ASSOCIATION OF PHYSICS TEACHERS

National Standard Examination in Junior Science – 2024

Date of Examination November 24, 2024

Time: 2:30 PM to 4:30 PM

Question Paper Code: 52

537282

Student's Roll No:											

Write the Question Paper Code (mentioned above) on YOUR OMR Answer Sheet (in the space provided), otherwise your Answer Sheet will NOT be evaluated. Note that the same Question Paper Code appears on each page of the Question Paper.

Instructions to Candidates:

1. Use of mobile phone, smart watch, and iPad during examination is STRICTLY **PROHIBITED.**
2. In addition to this Question Paper, you are given OMR Answer Sheet along with candidate's copy.
3. On the OMR sheet, make all the entries carefully in the space provided **ONLY** in **BLOCK CAPITALS** as well as by properly darkening the appropriate bubbles.
   Incomplete/ incorrect/ carelessly filled information may disqualify your candidature.
4. On the OMR Answer Sheet, use only **BLUE or BLACK BALL POINT PEN** for making entries and filling the bubbles.
5. Your **Eleven-digit roll number and date of birth** entered on the OMR Answer Sheet shall remain your login credentials means login id and password respectively for accessing your performance / result in National Standard Examination in Junior Science 2024.
6. Question paper has two parts. In part A-1 (Q. No.1 to 48) each question has four alternatives, out of which **only one** is correct. Choose the correct alternative and fill the appropriate bubble, as shown.

   Q.No.12 (a) (●) (c) (d)

   In part A-2 (Q. No. 49 to 60) each question has four alternatives out of which any number of alternative(s) (1, 2, 3, or 4) may be correct. You have to choose **all** correct alternative(s) and fill the appropriate bubble(s), as shown

   Q.No.52 (a) (●) (c) (●)
7. Attempt all sixty questions. For **Part A-1,** each correct answer carries 3 marks whereas 1 mark will be deducted for each wrong answer. In **Part A2,** you get 6 marks if all the correct alternatives are marked and no incorrect. No negative marks in this part.
8. Rough work should be done in the space provided. There are **14** printed pages in this paper
9. Calculator is **not** allowed.
10. No candidate should leave the examination hall before the completion of the examination.
11. After submitting answer paper, take away the question paper & candidate's copy of the OMR for your future reference.

Please DO NOT make any mark other than filling the appropriate bubbles properly in the space provided on the OMR Answer Sheet.

OMR Answer Sheets are evaluated using machine, hence CHANGE OF ENTRY IS NOT ALLOWED. Scratching or overwriting may result in a wrong score.

DO NOT WRITE ON THE BACK SIDE OF THE OMR ANSWER SHEET.

Instructions to Candidates (Continued) :
You may read the following instructions after submitting the Answer Sheet.

12. **Comments/Inquiries/Grievances regarding this question paper, if any, can be shared on the Inquiry/Grievance column on www.iapt.org.in on the specified format till Dec 3, 2024**

13. **The Answers/Solutions to this Question Paper will be available on the website: www.iapt.org.in by Dec 2, 2024.** The score card may be downloaded after Dec 24, 2024

14. **CERTIFICATES and AWARDS:**
Following certificates are awarded by IAPT to students, successful in the National Standard Examination in Junior Science – 2024
(i) "CENTRE TOP 10 %" To be downloaded from iapt.org.in after 30.01.25
(ii) "STATE TOP 1 %" Will be dispatched to the examinee
(iii) "NATIONAL TOP 1 %" Will be dispatched to the examinee
(iv) "GOLD MEDAL & MERIT CERTIFICATE" to all students who attend OCSC – 2025 at HBCSE Mumbai
Certificate for centre toppers shall be uploaded on iapt.org.in

15. List of students (with centre number and roll number only) having score above **Minimum Admissible Score** will be displayed on the website: **www.iapt.org.in** by **Dec 26, 2024. See the MAS** clause on the student's brochure on the web.

16. List of students eligible to appear for Indian National Junior Science Olympiad (INJSO – 2025) shall be displayed on **www.iapt.org.in** by Dec 30, 2024.

Physical constants you may need....

Mass of electron $m_e = 9.11\times10^{-31}\,kg$	Magnitude of charge on electron $e = 1.60\times10^{-19}\,C$
Mass of proton $m_p = 1.67\times10^{-27}\,kg$	Planck's constant $h = 6.625\times10^{-34}\,Js$
Acceleration due to gravity g = 9.81 ms^{-2}	Density of water is $\rho = 1.0\times10^{3}\,kg\,m^{-3}$
Universal gravitational constant $G = 6.67\times10^{-11}\,Nm^2kg^{-2}$	$(1+x)^n \approx 1+nx$, if $\lvert x\rvert << 1$
Universal gas constant $R = 8.31\ J\,mol^{-1}\,K^{-1}$	1 eV = 1.6 × 10^{-19} J
Boltzmann constant $k = 1.38\times10^{-23}\,J\,K^{-1}$	$\sin(A\pm B) = \sin A\cos B \pm \cos A\sin B$
Avogadro's constant $A = 6.02\times10^{23}\,mol^{-1}$	$E = mc^2$ gives mass and energy equivalence.
Atmospheric pressure (at STP) = 1.013 × 10^5 Nm^{-2}	One unit of electric power = 1kWh
Speed of light in free space $c = 3.0\times10^{8}\,ms^{-1}$	

INDIAN ASSOCIATION OF PHYSICS TEACHERS
NATIONAL STANDARD EXAMINATION IN JUNIOR SCIENCE
(NSEJS – 2024)

Time: 120 minute **Max. Marks: 216**

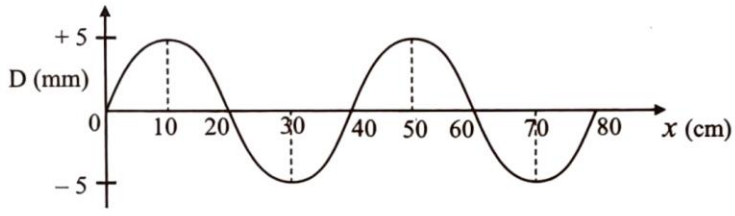
Attempt All Sixty Questions

A – 1

OUT OF THE FOUR OPTIONS ONLY ONE IS CORRECT. BUBBLE THE CORRECT OPTION.

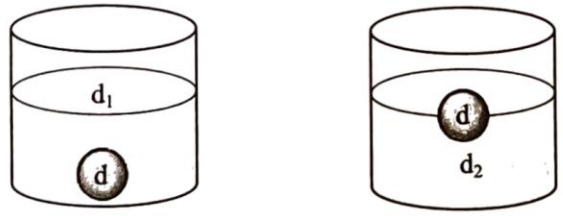
1. Which of the following motions has largest magnitude of acceleration? Assume that all objects are moving in straight line with constant acceleration.
   (a) A bus moving with an initial velocity 72 km/hr comes to rest in 2.50 s
   (b) A rock during its free fall near the earth surface
   (c) A car accelerates from rest to a velocity $v = 108$ km/hr in 4.00 s
   (d) A train, starting from rest, takes 6.00 s to cover a distance of 216 m

2. A sound wave is propagating in a medium in the $+x$ direction at a speed of 360 m/s. At a given instant, a snap shot of the plot of displacement (D) of various particles of medium from their equilibrium position (taken along y axis) vs the position (x) of particle on x axis, is shown in figure below. The incorrect option is



   (a) the amplitude of wave is 5 mm
   (b) the frequency of wave is 900 Hz
   (c) after 0.01 sec the trough of the wave will occur at $x = 20$ cm and $x = 40$ cm
   (d) this wave will travel a distance of 1.62 km along $+x$ axis in 4.5 s

3. When placed inside a liquid of density d_1, a sphere sinks, as shown in figure (i). When placed inside a liquid of density d_2, the same sphere floats with half of its volume appearing above the liquid surface, as shown in figure (ii). Given that the density of the sphere is d



(i) (ii)

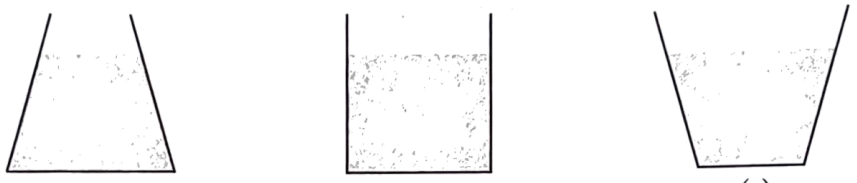
If F_1 and F_2 are buoyant forces acting on the sphere in the two situations (i) and (ii) respectively due to the two liquids, then the ratio $\frac{F_1}{F_2}$ equals

(a) $\frac{d_1}{d_2}$ (b) $\frac{d_1}{2d_2}$ (c) $\frac{d_1}{d}$ (d) $\frac{d}{d_2}$

4. A car is moving on a horizontal cement road with uniform velocity 90 km/hr. Read the following statements regarding motion of car.
S_1: The acceleration of car is zero
S_2: No force is acting on the car
S_3: Kinetic energy and linear momentum of car are constant during this motion
S_4: Engine of car is doing no work
Now choose the correct option
(a) Only the statements S_1 and S_2 are true
(b) Only the statements S_1 and S_3 are true
(c) Only the statements S_1, S_2 and S_3 are true
(d) All the statements S_1, S_2, S_3 and S_4 are true

5. A particle is moving along circular path of diameter D = 14 cm with constant speed v. It takes 0.02 second to complete an arc which subtends an angle of 45° at the center. If f is its frequency of revolution, then the correct option is
(a) $v = 5.5$ m sec^{-1}, $f = 6.25$ Hz
(b) $v = 5.5$ m sec^{-1}, $f = 12.5$ Hz
(c) $v = 2.75$ m sec^{-1}, $f = 6.25$ Hz
(d) $v = 2.75$ m sec^{-1}, $f = 12.5$ Hz

6. The same liquid is filled in vessels of three different shapes up to the same height, as shown in figures (a), (b) and (c). Each vessel has equal base area.



(a) (b) (c)

Let P_a, P_b and P_c are the values of liquid pressure on the base of vessels in figure (a), (b) and (c) respectively. W_a, W_b and W_c are the weights of liquid contained in vessels in figure (a), (b) and (c) respectively. Choose the correct option
(a) $P_a < P_b < P_c$ and $W_a < W_b < W_c$
(b) $P_a = P_b = P_c$ and $W_a = W_b = W_c$
(c) $P_a < P_b < P_c$ and $W_a = W_b = W_c$
(d) $P_a = P_b = P_c$ and $W_a < W_b < W_c$

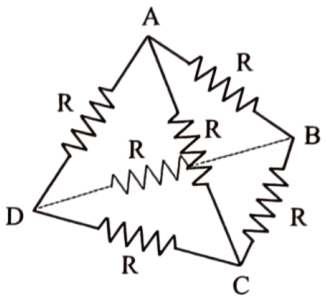
7. An ant moves at constant speed on the principal axis of concave mirror of focal length f, from a point at distance $5f$ from the pole of the mirror to the focus F of the mirror. During the motion of the ant (consider the ant as a point), its image formed by the mirror
Statement S_1: moves with constant speed
Statement S_2: has same velocity as that of the ant when the ant is at center of curvature C of the mirror
Statement S_3: moves slower in the beginning and faster towards the end
Statement S_4: moves faster in the beginning and slower towards the end
Now, choose the correct option:
(a) Only the statement S_1 is correct
(b) Statements S_2 and S_3 are correct
(c) Only the statement S_3 is correct
(d) The statements S_2 and S_4 are correct

8. Which of the following cannot be used as a unit of electric current (i)?
(a) $\frac{\text{coulomb}}{\text{second}}$
(b) $\frac{\text{joule}}{\text{coulomb - ohm}}$
(c) $\frac{\text{watt}}{\text{volt}}$
(d) $\frac{\text{volt}}{\text{coulomb - meter}}$

9. From the famous Einstein mass-energy equivalence relation, energy equivalent to one atomic mass unit (u) (given that $1u = 1.6605 \times 10^{-27}$ kg and the speed of light in vacuum $c = 2.9979 \times 10^{8}$ m/s) is close to

(a) 931 J (b) 931 eV (c) 931 MeV (d) 931 keV

10. Each resistance in the electrical network shown as a tetrahedron in the adjacent figure is R = 12 Ω. The electrical resistance between any two vertices of tetrahedron must be



(a) 2 Ω

(b) 3 Ω

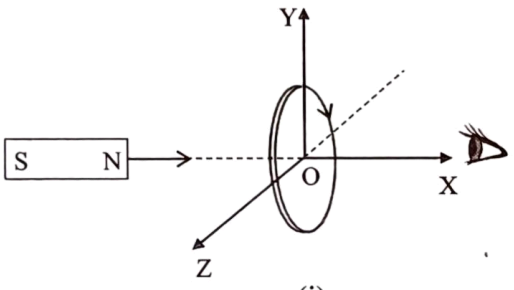
(c) 4 Ω

(d) 6 Ω

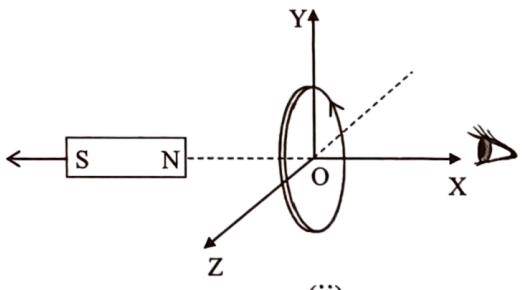
11. Two particles of mass 1 kg and 4 kg are moving with equal kinetic energy. Ratio of magnitudes of their linear momenta is (Assume nonrelativistic velocity)

(a) 1 : 4 (b) 1 : 2 (c) 2 : 1 (d) 1 : 16

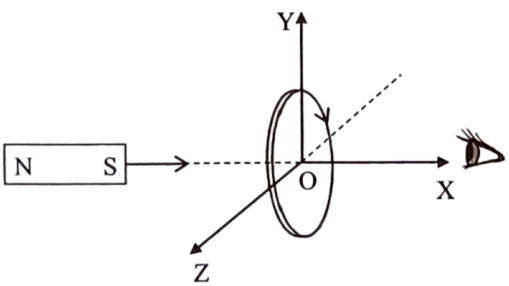
12. In the following figures, all the conducting coils are in Y-Z plane. The magnet is moved along +X axis or – X axis with a constant speed *v*. The direction of induced current in the coils has been shown, as viewed from +X axis. Identify the diagram/diagrams which show correct direction of induced current.



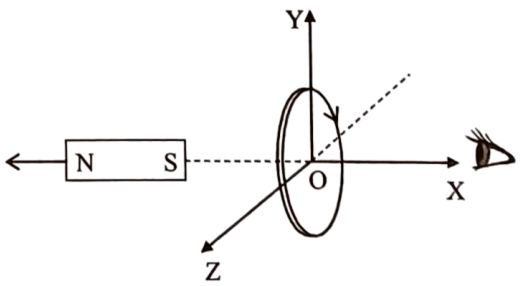
(i)



(ii)



(iii)



(iv)

(a) only (i), (ii) and (iii) (b) only (iii)

(c) only (ii), (iii) and (iv) (d) only (i), (ii) and (iv)

13. The heater filament of an electric kettle is made up of a conducting wire of length L and diameter D. When connected to a line voltage source, it takes 6 minute to raise the temperature of 500 ml of water by 40°C. If the heater filament is replaced by a new one of same material but length 2L and diameter 2D, the time taken for heating the same quantity of water through the same temperature difference will be (Assume that entire system is thermally insulated)

(a) 12 minute (b) 6 minute (c) 3 minute (d) 1.5 minute

14. On straight rails a train is moving with constant velocity v. Suddenly a wagon breaks away from train. The train continues to move with same velocity while the wagon moves with constant retardation. After breaking away from train, the wagon covers distance d_1 before coming to rest and the train covers distance d_2 in the same duration, $\frac{d_1}{d_2}$ is

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

15. A person with short-sightedness (myopia) cannot see objects clearly, beyond 2.5 meter. The power of lens required to correct his vision is

(a) + 2.5 D (b) + 0.4 D (c) – 2.5 D (d) – 0.4 D

16. The mass and radius of the planet-one are M and R respectively. The mass and radius of planet-two are 2M and 2R respectively. Assume that both the planets have spherical shape. Acceleration due to gravity on the surface of planet-one and planet-two are g_1 and g_2 respectively. $\frac{g_1}{g_2}$ must be

(a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 4 : 1

17. In bilaterally symmetrical animals, segmentation of body into a linear series of similar parts is called metamerism. In which of the following, did it appear for the first time?

(a) Platyhelminthes (b) Arthropoda (c) Vertebrata (d) Annelida

18. While discussing human evolution generally Hominid stocks, Prehistoric and species of Modern Man are described on the basis of fossil records. Select the correct option showing the pair member of a Hominid stocks and a Prehistoric man:

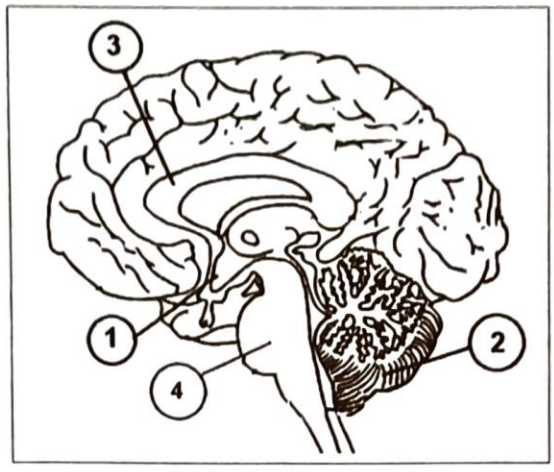
(a) *Homo erectus pekinensis* & *Homo habilis*
(b) *Homo heidelbergensis* & *Homo sapiens neanderthalensis*
(c) *Australopithecus* & *Homo habilis*
(d) *Ramapithecus* & *Homo sapiens fossilis*

19. Match the items given under Column-1 with those of Column-2:

Column-1	**Column-2**
1. Hexacanth	(i) Goose Flesh
2. Renette Cell	(ii) *Ascaris*
3. Respiratory Tree	(iii) Sea Cucumber
4. Piloerectum	(iv) *Taenia*

(a) 1- (i), 2- (iii), 3- (ii) & 4- (iv)
(b) 1- (i), 2- (ii), 3- (iv) & 4- (iii)
(c) 1- (iv), 2- (ii), 3- (iii) & 4- (i)
(d) 1- (iii), 2- (i), 3- (iv) & 4- (ii)

20. The median longitudinal section of human brain given here under is marked with important parts as **1** to **4**.



Following are the functions/disorders related to these parts:

(i) Controls the sleep cycle, manages pain signals and is the pneumotaxic center involved in breathing rhythm regulation. Double vision (diplopia) can be a consequence of damage to this part.
(ii) It maintains homeostasis by directly influencing autonomic nervous system or by managing hormones. Besides controlling hunger and thirst, it senses fullness when eating etc. It secretes feel-good hormone (Dopamine). Malfunctioning causes Prader-Willi Syndrome.
(iii) Plays an important role in controlling emotions and making decisions. Damage to this part can interfere with judging the size of or distance from objects; makes it harder to learn new words or skills; causes trouble in reaching for objects. Responsible for congenital disorder like *Chiari malformation*.
(iv) Largest structure of white matter; allows perception of depth and enables the two sides of brain to communicate. Related with coordination and complex problem-solving. Disfunction may cause Schizophrenia, dementia and other psychiatric disorders.

Correlate the above referred characteristics **(i) – (iv)** with the parts labeled **(1 – 4)**in the diagram above and choose the correct option:

(a) (i)-2; (ii)-3; (iii)-1 and (iv)-4
(b) (i)-4; (ii)-1; (iii)-2 and (iv)-3
(c) (i)-3; (ii)-2; (iii)-4 and (iv)-1
(d) (i)-4; (ii)-2; (iii)-1 and (iv)-4

21. Many insects are serious pests of crop plants. Sap-sucking insects can be controlled by spraying systemic insecticides, like:

(a) Chloropyriphos (b) Malathion (c) Metasystox (d) Chlorantraniliprole

22. What kind of joint is found between the odontoid process of the 2nd vertebra of mammals and the atlas vertebra?

(a) Pivotal Joint (b) Saddle Joint (c) Sliding Joint (d) Hinge Joint

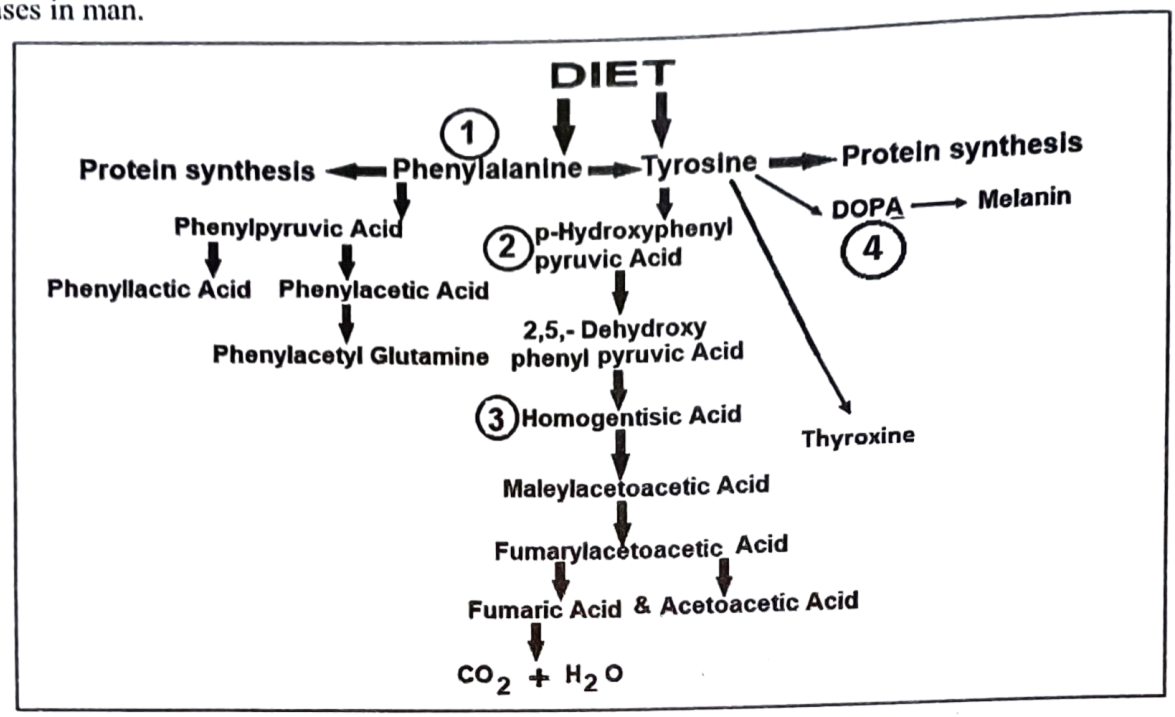
23. The tympanic cavity is connected with the auditory capsule through very fine openings. Choose the correct option for such openings:

(a) Fossa ovalis and Fenestra ovalis
(b) Fenestra rotundus and Fossa ovalis
(c) Foramen ovale and Fenestra ovalis
(d) Fenestra ovalis and Fenestra rotundus

24. Currently, all new vehicles sold and registered in India should be compliant with which of the following versions of emission standards?

(a) BS-VI (b) BS-IV (c) BS-V (d) BS-VII

25. In the flow chart given below, accumulation of various products (marked **1** to **4**) results in some inborn diseases in man.



Give the correct sequence of diseases caused by accumulation of products marked as **1** to **4**:

(a) Phenylketonuria, Tyrosinosis, Alkaptonuria & Albinism
(b) Alkaptonuria, Albinism, Tyrosinosis & Phenylketonuria
(c) Tyrosinosis, Alkaptonuria, Phenylketonuria & Albinism
(d) Phenylketonuria, Alkaptonuria, Albinism & Tyrosinosis

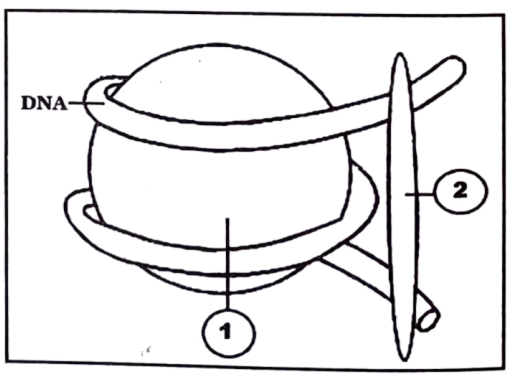
26. Match the Plants mentioned in Column-1 with their characteristics in Column-2:

Column-1	**Column-2**
1. Wheat	(i) Pseudostem and monocarpy
2. Banyan Tree	(ii) Glumes and lodicules
3. Banana	(iii) Seeds but no fruits
4. Pine Tree	(iv) Prop roots and hypanthia

Choose the correct option:

(a) 1-(iv), 2-(i), 3-(ii) & 4-(iii)
(b) 1-(ii), 2-(iii), 3-(i) & 4-(iv)
(c) 1-(ii), 2-(iv), 3-(i) & 4-(iii)
(d) 1-(i), 2-(ii), 3-(iv) & 4-(iii)

27. Under the electron microscope **'Chromatin'** appears to have a string of bead like structures, as a number of repeating units, called **'Nucleosomes'**. The adjoining diagram shows one such unit. The labeled parts **1** and **2** are its important constituents made up of a total of **5** components. Choose the correct option showing the correct sequence of the 5 component units included in the labeled parts 1 and 2:

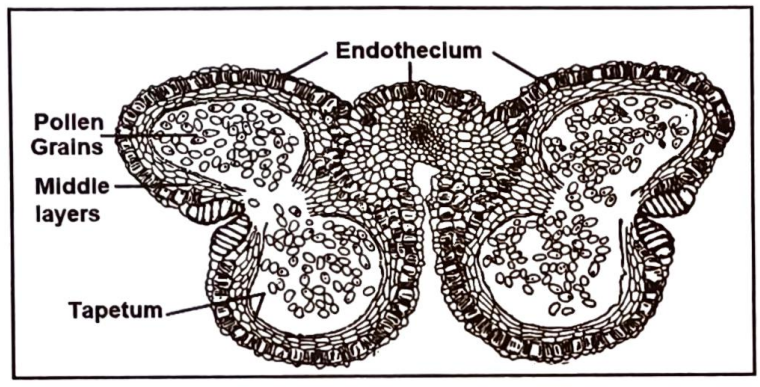


(a) H1, H2a, H2b, H3 and H4
(b) H1, H2b, H3a, H3b and H4
(c) H2a, H2b, H3, H4 and H1
(d) H1, H2, H3a, H3b and H4

28. Two statements marked as ASSERTION (A) and REASON (R) are given below. Choose the correct answer as per the given codes:
ASSERTION (A): The eyes of nocturnal, cave and deep water dwelling animals have only rods in their retina.
REASON (R): Rods provide high sensitivity to light, but with relatively low spatial discrimination and no ability to distinguish different wavelengths of light.

Choose the correct option:
(a) Both assertion **(A)** and reason **(R)** are true and the reason **(R)** is the correct explanation of the assertion **(A).**
(b) Both assertion **(A)** and reason **(R)** are true and the reason **(R)** is not the correct explanation of the assertion**(A).**
(c) Assertion **(A)** is true but reason **(R)** is false.
(d) Both assertion **(A)** and reason **(R)** are false.

29. In the diagram given below, what are the maximum kinds of ploidy levels of the various parts labeled?



(a) Only Haploid
(b) Only Diploid
(c) Haploid and Diploid
(d) Haploid, Diploid and Polyploid

30. According to Cohesion Theory for the ascent of sap in tall trees, all the forces together which create obstacle in the ascent of sap are about 50 *atm*. What is the cohesive force of water which helps continuous rise of sap in tallest trees?
(a) 350 *atm.* (b) 200 *atm.* (c) 140 *atm.* (d) 600 *atm.*

31. Some human males show hypertrichosis of ear pinna. Which of the following is the cause of this genetic characteristic?
(a) A dominant gene in male and a recessive allele in female
(b) Aneuploidy
(c) Holandric gene
(d) Trisomy of an autosome

32. Which of the following is the agreement to protect the stratospheric ozone layer by phasing-out the production and consumption of ozone-depleting substances?
(a) Kyoto Protocol (b) Montreal Protocol (c) Rio Summit (d) Stockholm Convention

33. A sample of 1.0 liter milk weighs 1.032 kg. The milk contains 4% milk fat by volume having density 865 kg/m^3. The density of fat free (skimmed) milk in kg/m^3 is
(a) 1036.95 (b) 1037.95 (c) 1038.95 (d) 1040.95

34. A research scholar requires 50 milliliter aqueous $NaNO_3$ solution containing 70.0 mg of Na^+ per milliliter. The amount of $NaNO_3$ required for this purpose is
(a) 0.350 g (b) 0.161 g (c) 29.75 g (d) 12.94 g

35. One structural isomer of $C_2H_4I_2$ contains both the Iodine (I) atoms attached to same carbon atom. The bond length of C – I bond is 2.10 Å. Assuming tetrahedral angles and additivity of covalent bond radii, the distance between two Iodine (I) atoms is (given that sin 54.75° = 0.815 and sin 109.5° = 0.94)
(a) 2.10 Å (b) 2.47 Å (c) 4.20 Å (d) 3.42 Å

36. Amongst the following, select the option in which all the oxides express acidic nature.
(a) F-oxide, S-oxide, C-oxide, In-oxide (b) Cl-oxide, P-oxide, Ga-oxide, Be-oxide
(c) At-oxide, Xe-oxide, Se-oxide, As-oxide (d) Br-oxide, Xe-oxide, Te-oxide, Sn-oxide

37. How many moles of the so called 'electron gas' weighs one kilogram?
(a) $\frac{6.02}{9.11} \times 10^{54}$ (b) $\frac{100}{6.02 \times 9.11} \times 10^{6}$ (c) 6.02×10^{23} (d) $\frac{10}{9.11} \times 10^{30}$

38. The magnitude of electrostatic force between two tiny spherical balls carrying charge q_1 and q_2 separated by a distance r in free space is given by $F = K\frac{q_1 q_2}{r^2}$ where the constant $K = 9 \times 10^9$ in SI units
Two tiny spherical balls of carbon $\left({}^{12}_{6}C\right)$ weighing 1 g each are kept 1 cm apart in free space. The two spheres carry equal and opposite charges. The magnitude of electrostatic force of attraction between the two charged spheres is $F = 1.0 \times 10^{-5}$ N. The ratio of the number of excess electrons to total number of atoms in the negatively charged sphere is
(a) 4.15×10^{-14} (b) 2.08×10^{9} (c) 5.02×10^{-22} (d) 6.02×10^{-23}

39. The correct choice for the properties of the atomic species shown in the following table is

Properties	A	B	C	D	E
Smallest ionic radius	Li^+	Na^+	K^+	Be^{2+}	Mg^{2+}
Highest electronegativity	Cl	S	O	He	N
Highest electron affinity	N	Cl	F	Be	O
Highest magnetic moment	Cr^+	Fe^{2+}	Cu^{2+}	Ni^{4+}	Sc^{3+}

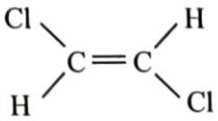
(a) D, D, B, A (b) A, D, B, D (c) D, C, B, E (d) D, C, E, A

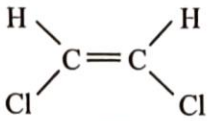
40. On Fahrenheit scale of temperature, the freezing point of water is marked as 32°F and the boiling point of water is marked as 212°F. While the freezing point and boiling point of water on the Celsius scale are marked as 0°C and 100°C respectively.
During the routine checkup of some patient, a doctor measures the temperature of the patient as 102.6°F. The temperature of patient on Celsius scale is
(a) 37.0 °C (b) 39.0 °C (c) 39.2 °C (d) 39.4 °C

41. The pH of neutral pure water at 25 °C is 7. When water is heated to 70 °C the pH value
(a) decreases and its nature turns acidic (b) increases and its nature turns basic
(c) remain constant as 7 (d) decreases but its nature remains neutral

42. The concentration (mole/liter) of hydronium ion $[H_3O^+]$ for a solution having pH 8.26 is
(a) 10^{-7} (b) 1×10^{-9} (c) 5.5×10^{-9} (d) 3.2×10^{-3}

43. The expected values of the normal boiling point of the two compounds A and B given below are T_A and T_B respectively. Then


(A)


(B)

(a) $T_A < T_B$ (b) $T_A = T_B$ (c) $T_A > T_B$ (d) Can't be predicted

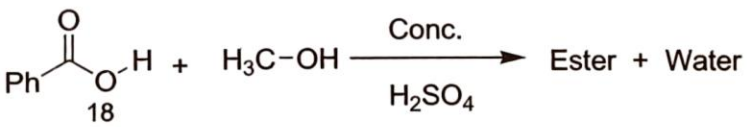
44. Which of the following is the strongest material (in terms of tensile strength)?
(a) Diamond (b) Tungsten (c) Graphene (d) Steel

45. Which pair of the following group 13 elements represents the pair of the most stable oxidation state of the pair?
(a) B^+, $T\ell^+$ (b) B^{3+}, $T\ell^{3+}$ (c) B^{3+}, $T\ell^+$ (d) B^+, $T\ell^{3+}$

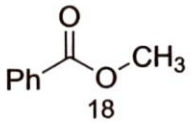
46. To have a secured and safe travel, air bags are being used in modern vehicles/automobiles for road journey. The substance most often used in the air bags in automobiles is
(a) NaN_3 (b) Na_3N (c) KO_2 (d) Acurite

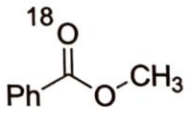
47. Most predominantly used metal in magnetic resonance imaging (MRI) contrast solutions is
(a) Lr (b) Gd (c) Pm (d) Sm

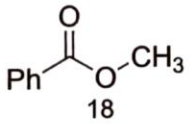
48. An esterification process has been represented by the following chemical reaction

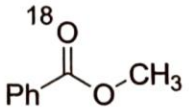


The fate of the labelled oxygen (O^{18}) atom in the product is:

(a) 

(b) 

(c) Mixture of 

and 

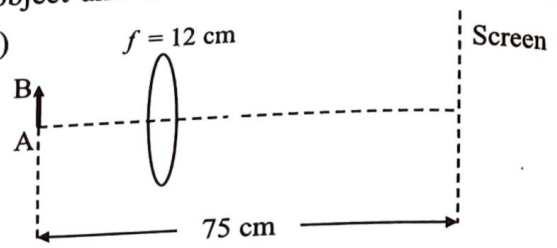
(d) H_2O^{18}

A – 2

ANY NUMBER OF OPTIONS 4, 3, 2 or 1 MAY BE CORRECT

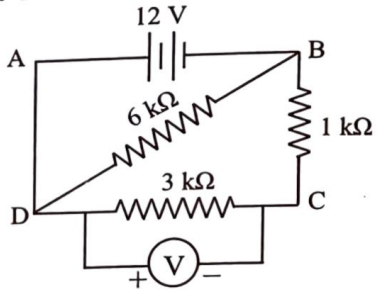
MARKS WILL BE AWARDED ONLY IF ALL THE CORRECT OPTIONS ARE BUBBLED AND NO INCORRECT.

49. The screen S is placed at a distance of 75 cm in front of an illuminated object AB. A thin convex lens of focal length $f = 12$ cm is placed somewhere between the object and the screen so as to obtain a real image of the object on the screen. Choose the correct option(s)



(a) Distance between lens and object may be 15 cm
(b) Distance between lens and object may be 60 cm
(c) Image size may be larger than object size
(d) Image size may be smaller than object size

50. In the circuit shown in adjacent figure, a voltmeter of resistance 6000 Ω has been connected across 3 kΩ resistor. Internal resistance of battery is negligible.
Choose the correct option(s)

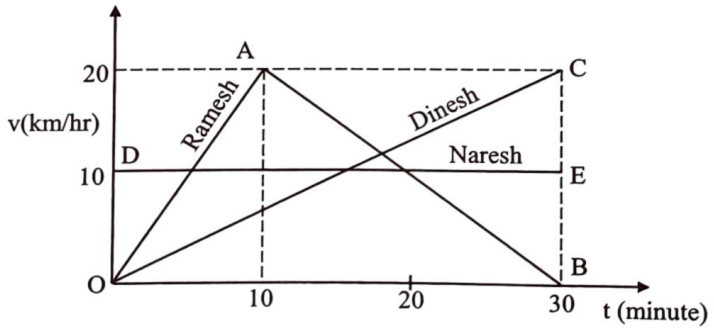


(a) Voltmeter reading is 8 volt
(b) Current passing through 1 kΩ resistor is 2 mA
(c) Current drawn from battery is 6 mA
(d) Electrical power dissipated in 6 kΩ resistor is 24 mili-watt

51. A train, moving on a straight horizontal track with constant speed of 108 km/hour, approaches a hill. When the engine of train is at distance 1200 m from hill, it produces a whistle of frequency 550 Hz. Assuming that the speed of sound in air is 330 m/s, the correct option(s) is/are

(a) the echo from hill will be heard by driver after $\frac{1}{9}$ minute
(b) the distance of engine from hill at which echo is heard by driver is 1000 m
(c) the wavelength of sound produced by whistle is 60 cm
(d) the echo from hill will be heard by driver after $\frac{20}{3}$ second

52. Velocity-time graphs of three athletes Ramesh, Naresh and Dinesh for a given duration (0-30 Minute) are given below.



Graph OAB is v-t graph for athlete Ramesh, graph DE is v-t graph for athlete Naresh and graph OC is v-t graph for athlete Dinesh. The graphs are linear. Which of the following option(s) is/are correct during given interval of time?

(a) Athlete Dinesh has travelled maximum distance
(b) Athletes Ramesh, Naresh and Dinesh each have travelled equal distance
(c) Acceleration of athlete Dinesh is 40 km/hr^2
(d) None of the athletes is in uniform motion

53. Which of the following plant(s) has/have edible **aril**?
(a) Litchi (*Litchi chinensis*)
(b) Rambutan (*Nephelium lappaceum*)
(c) Cashew (*Anacardium occidentale*)
(d) Nutmeg (*Myristica fragrans*)

54. Which of the following statement(s) regarding Viruses is/are **incorrect**?
(a) Usually potentially infectious
(b) Reproduction by genetic material only
(c) Envelope made of Glycolipids
(d) Presence of Ribosomes

55. Which of the following major Division(s) of Algae is/are characterised by **two** flagella?
(a) Rhodophyta (b) Phaeophyta (c) Chlorophyta (d) Cyanophyta

56. Which of the following statement(s) is/are true?
(a) All immunoglobulins are glycoproteins
(b) Eosinophils are not polymorphonuclear phagocytes
(c) Cilia in the windpipe are mechanical barriers
(d) Human **β** cells bear IgM and IgD immunoglobulins on their surface

57. Which of the following colloids is/are medicines?
(a) Argyrol (b) S-sol (c) Milk of Magnesia (d) Purple of Cassius

58. In which of the following process, the N-atom is reduced
(a) $NH_4^+ \rightarrow N_2$ (b) $NH_2^- \rightarrow NO$ (c) $NO_2 \rightarrow NO_2^-$ (d) $NO_3^- \rightarrow NH_4^+$

59. Which of the following statement(s) is/are true, if one mole of H_3PO_x is completely neutralized by 40 g NaOH?
(a) $x = 2$ and acid is monobasic
(b) $x = 3$ and acid is dibasic
(c) $x = 4$ and acid is tribasic
(d) $x = 2$ and acid does not form an acid salt

60. Select the correct statement(s) regarding an element having 2K, 8L, 9M and 2N electrons.
(a) It contains 1 unpaired electron
(b) It contains 1 d-electron
(c) It contains 12-p electron
(d) It is a non-metal