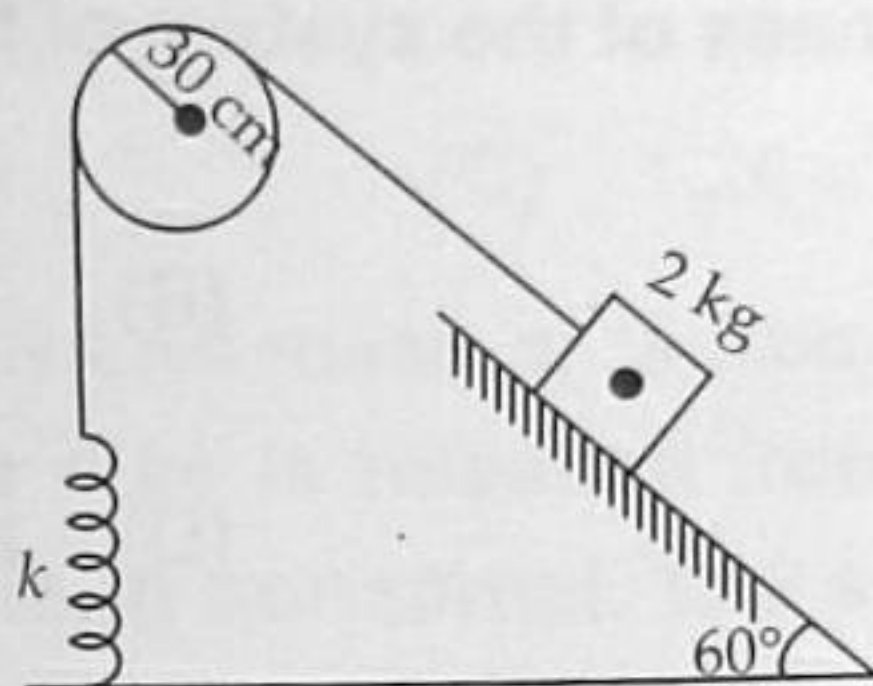1. The system shown in the figure is released from rest with the spring in the unstretched position. The spring is attached with the ground. The mass 2 kg descends a distance of 1 m on the inclined plane before it stops. The moment of inertia of the pulley is 2 kg m². There is no friction anywhere. The spring constant k of the spring is nearly (Take $g = 10$ m/s²)

(A) 35 N/m (B) 70 N/m (C) 45 N/m (D) None of these

2. A certain simple harmonic vibrator of mass 0.1 kg has a total energy of 10 J. Its displacement from the mean position is 1 cm when it has equal kinetic and potential energies. The amplitude A and frequency n of vibration of the vibrator are
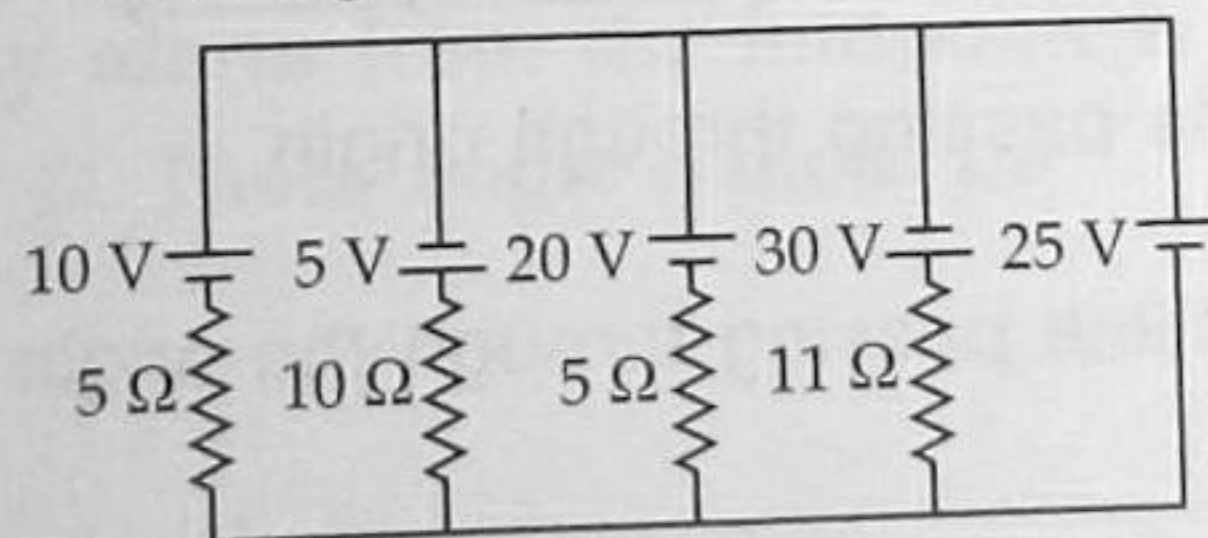
(A) $A = \sqrt{2}$ cm, $n = \dfrac{500}{\pi}$ Hz

(B) $A = \sqrt{2}$ cm, $n = \dfrac{1000}{\pi}$ Hz

(C) $A = \dfrac{1}{\sqrt{2}}$ cm, $n = \dfrac{500}{\pi}$ Hz

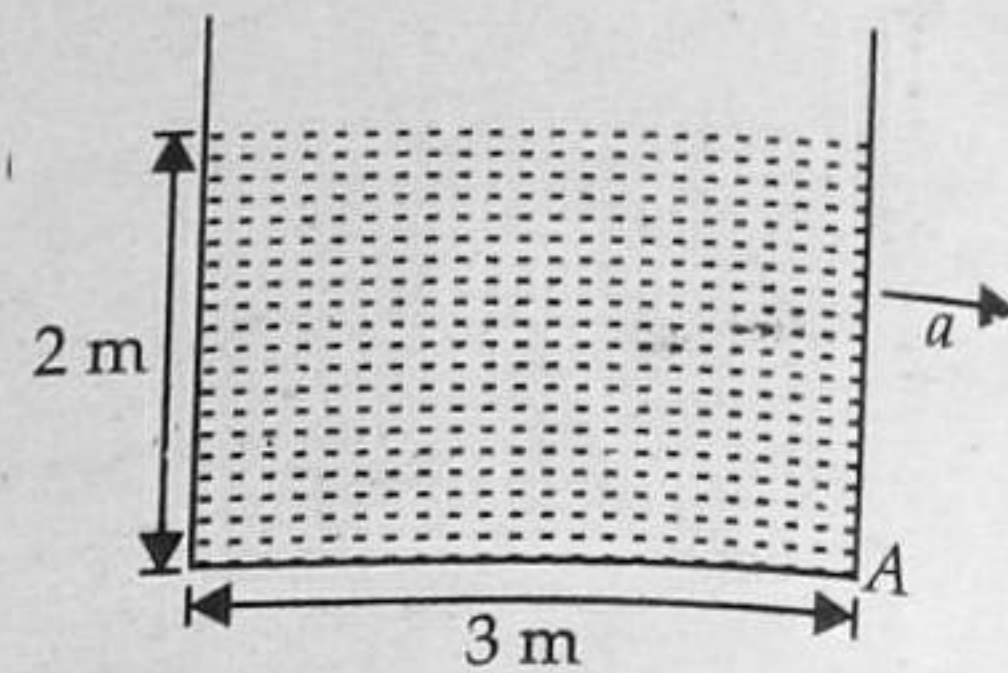(D) $A = \dfrac{1}{\sqrt{2}}$ cm, $n = \dfrac{1000}{\pi}$ Hz

3. In the circuit shown, current through 25 V cell is

(A) 7.2 A (B) 10 A
(C) 12 A (D) None of these

4. A large cylindrical container has a base diameter of 3 m. It is filled with a non viscous liquid upto a height of 2 m. The minimum horizontal acceleration of the container so that the pressure at the point A of the container becomes equal to the atmospheric pressure is


(A) $\dfrac{3}{2}g$

(B) $\dfrac{4}{3}g$

(C) g

(D) $\dfrac{3}{4}g$

5. The frequency of a sonometer wire is f, but when the weights producing the tensions are completely immersed in water the frequency becomes $f/2$ and on immersing the weights in a liquid the frequency becomes $f/3$. The specific gravity of the liquid is

(A) $\dfrac{4}{3}$

(B) $\dfrac{16}{9}$

(C) $\dfrac{15}{12}$

(D) $\dfrac{32}{27}$

6. Blocks shown in figure have equal masses m each. The system is released from rest with the spring unstretched. The string between A and ground is cut when there is maximum extension in the spring. The acceleration of centre of mass of the system of two blocks immediately after the string is cut is
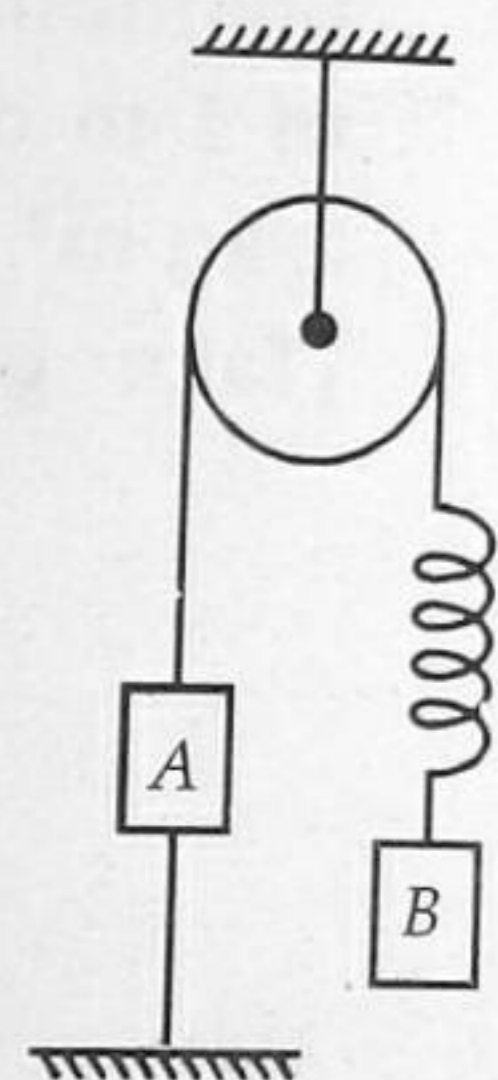

(A) g

(B) $\dfrac{g}{2}$

(C) $2g$

(D) zero

7. Two particles 1 and 2 are projected with same speed u as shown in figure. Particle 2 is on the ground and moves without friction on the horizontal surface. Particle 1 is initially at a height h from the ground and at a horizontal distance S from particle 2. If a graph is plotted between u and S for the condition of collision of the two then (u on y-axis and S on x-axis)
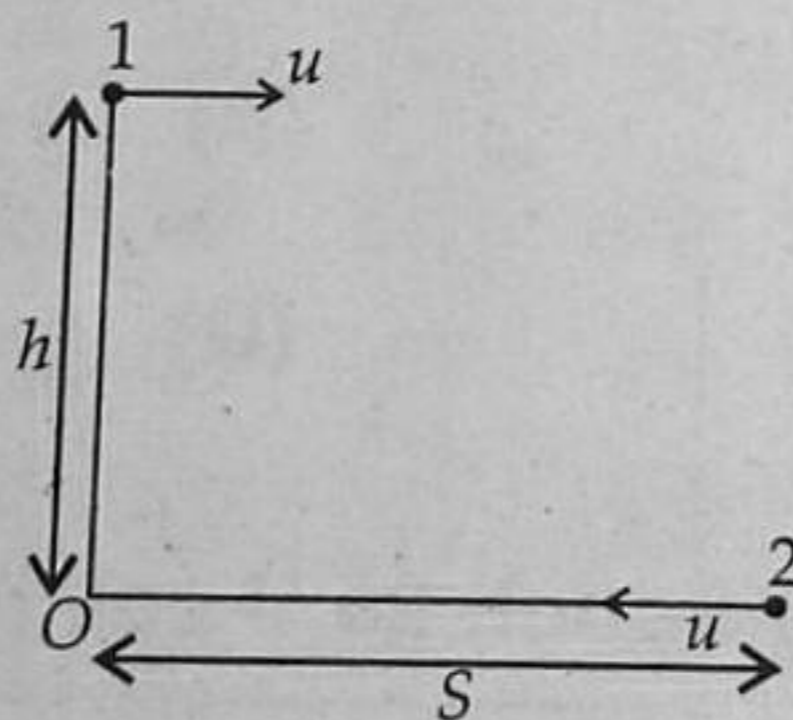
(A) It will be a parabola passing through origin

(B) It will be a straight line passing through the origin and having a slope of $\sqrt{\dfrac{g}{8h}}$.

(C) It will be a straight line passing through the origin and having a slope of $\sqrt{\dfrac{g}{4h}}$.

(D) It will be a parabola not passing through the origin.

8. A thermodynamical process is shown in figure with $P_A = 3$ atm, $V_A = 200$ cc, $P_B = 8$ atm, $V_C = 500$ cc. In the process AB and BC, 600 J and 200 J heat are added to the system respectively. Find the change in internal energy of the system in the process CA.
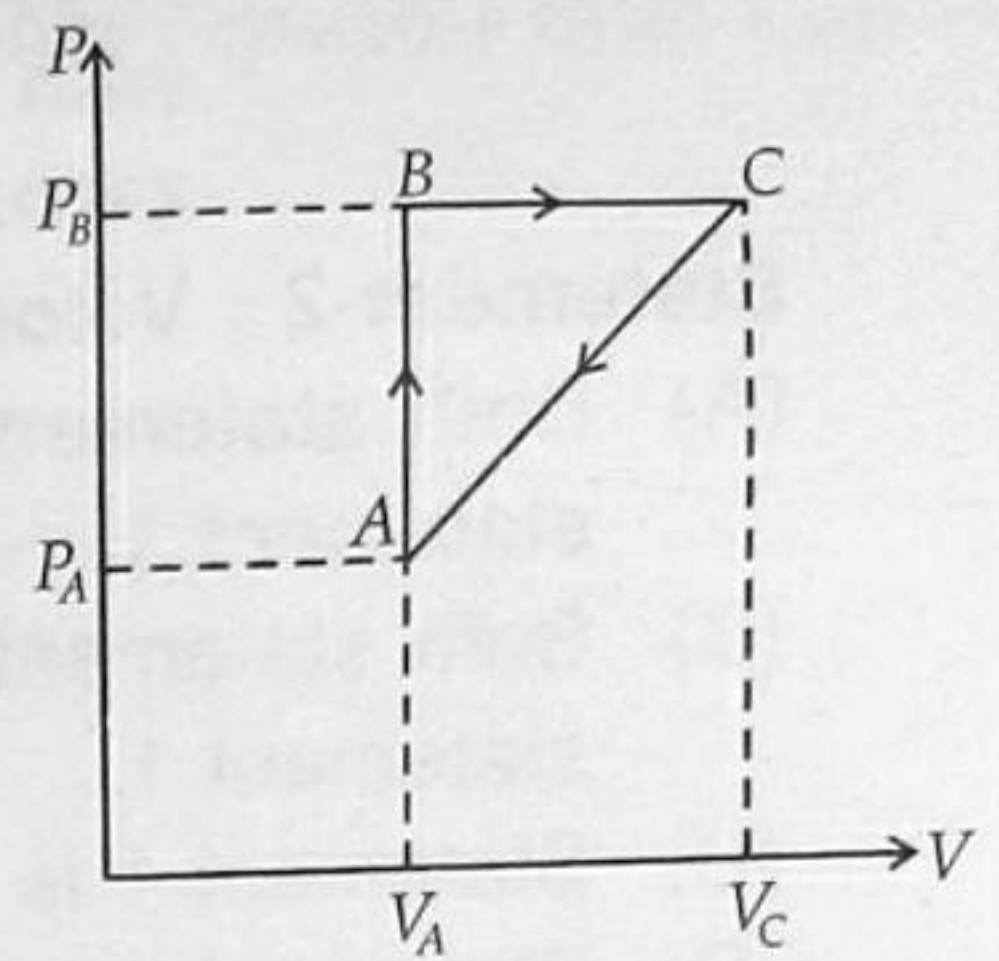
   (1 atm = 10^5 N/m²)

   (A) 560 J

   (B) − 560 J

   (C) − 40 J

   (D) + 40 J

9. Vectors $\vec{a}$ and $\vec{b}$ include an angle θ between them. If $(\vec{a}+\vec{b})$ and $(\vec{a}-\vec{b})$ respectively subtend angles α and β with $\vec{a}$, then $(\tan\alpha + \tan\beta)$ is

   (A) $\dfrac{(ab\sin\theta)}{(a^2 + b^2 \cos^2 \theta)}$

   (B) $\dfrac{(2ab\sin\theta)}{(a^2 - b^2 \cos^2 \theta)}$

   (C) $\dfrac{(a^2 \sin^2 \theta)}{(a^2 + b^2 \cos^2 \theta)}$

   (D) $\dfrac{(b^2 \sin^2 \theta)}{(a^2 - b^2 \cos^2 \theta)}$

10. A disc of radius $R = 10$ cm oscillates as a physical pendulum about an axis perpendicular to the plane of the disc at a distance r from its centre. If $r = \dfrac{R}{4}$, the approximate period of oscillation is (Take $g = 10$ ms^{-2})

    (A) 0.84 s

    (B) 0.94 s

    (C) 1.26 s

    (D) 1.42 s

11. A uniform solid disc of radius R and mass m is free to rotate on a frictionless pivot through a point on its rim. The disc is released from rest in the position where the diameter through the pivot is along horizontal. The speed of its centre of mass when the diameter through the pivot is vertical is

    (A) $\dfrac{2}{3}(gR)^{1/2}$

    (B) $(gR)^{1/2}$

    (C) $(2gR)^{1/2}$

    (D) $2\left(\dfrac{gR}{3}\right)^{1/2}$

12. Sound of frequency 1000 Hz from a stationary source is reflected from an object approaching the source at 30 ms^{-1}, back to a stationary observer located at the source. The speed of sound in air is 330 ms^{-1}. The frequency of the sound heard by the observer is

    (A) 1200 Hz

    (B) 1000 Hz

    (C) 1090 Hz

    (D) 1100 Hz

13. Four identical mirrors are made to stand vertically to form a square arrangement as shown in a top view. A ray starts from the midpoint M of mirror AD and after two reflections reaches corner D. Then, angle θ must be

    (A) $\tan^{-1}(0.75)$

    (B) $\cot^{-1}(0.75)$

    (C) $\sin^{-1}(0.75)$

    (D) $\cos^{-1}(0.75)$
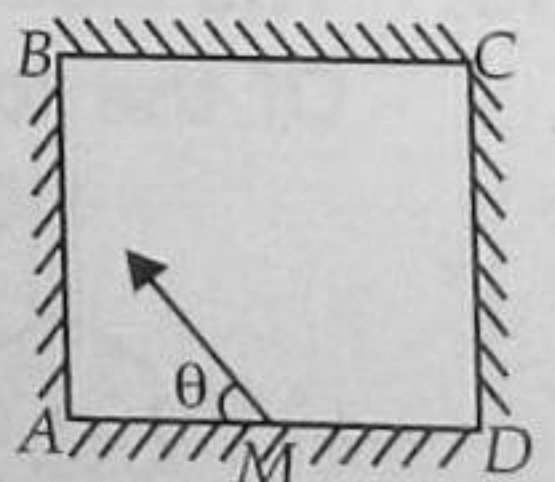
14. **Statement-1** : A sphere is performing pure rolling on a rough horizontal surface with constant angular velocity, frictional force acting on the sphere is zero.

Statement-2 : Velocity of contact point is zero.

(A) Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.

(B) Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.

(C) Statement 1 is true but statement 2 is false

(D) Statement 1 is false and statement 2 is true.

15. **Statement-1** : A common model of a solid assumes the atoms to be points executing SHM about mean lattice positions. This model cannot explain thermal expansion of solids.

Statement-2 : The average distance over a time period of oscillation between the particles remains constant.

(A) Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.

(B) Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.

(C) Statement 1 is true but statement 2 is false

(D) Statement 1 is false and statement 2 is true.

CHEMISTRY

16. Which one of the following statements, if any, regarding hydrogen peroxide is false?

(A) It is more stable in a basic solution.　(B) It is decomposed by MnO_2.

(C) It is a strong oxidizing as well as reducing agent in acidic as well as in basic medium.

(D) It behaves as a reducing agent towards acidified $KMnO_4$.

17. An aqueous solution of a halogen salt of potassium reacts with same halogen '**X**' to give '**KX₃**', a violet coloured solution which is used in volumetric exercises (iodimetric titrations). The halogen '**X**' is
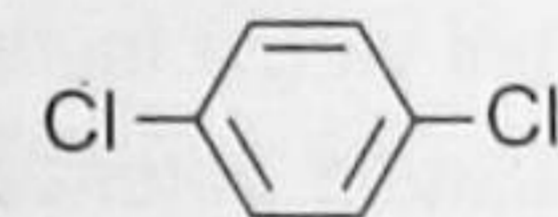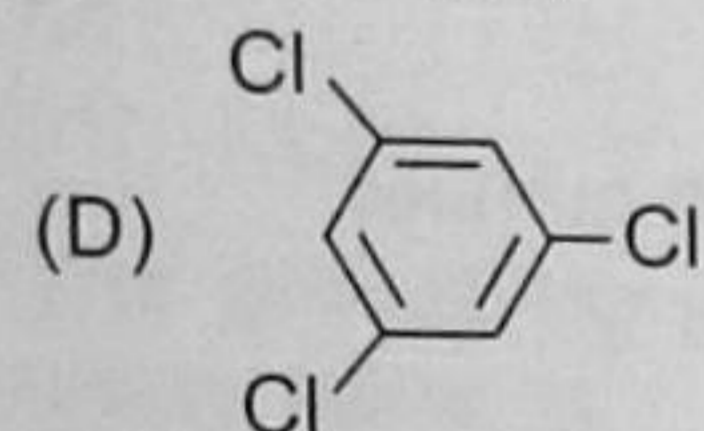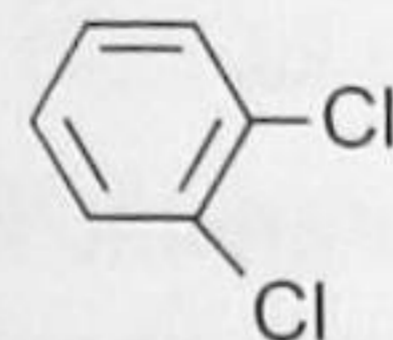
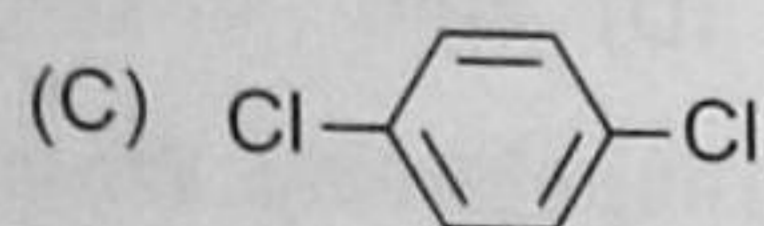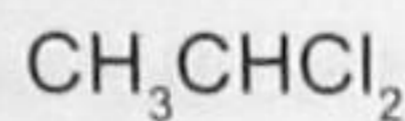(A) fluorine　　　(B) bromine　　　(C) chlorine　　　(D) iodine

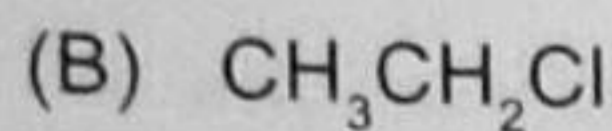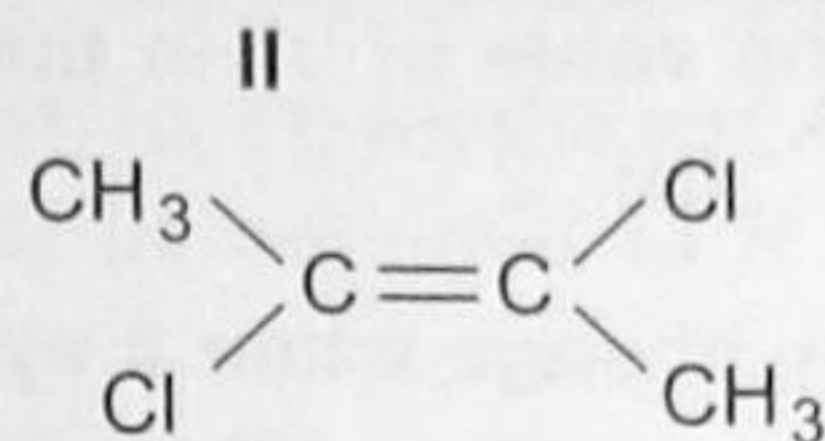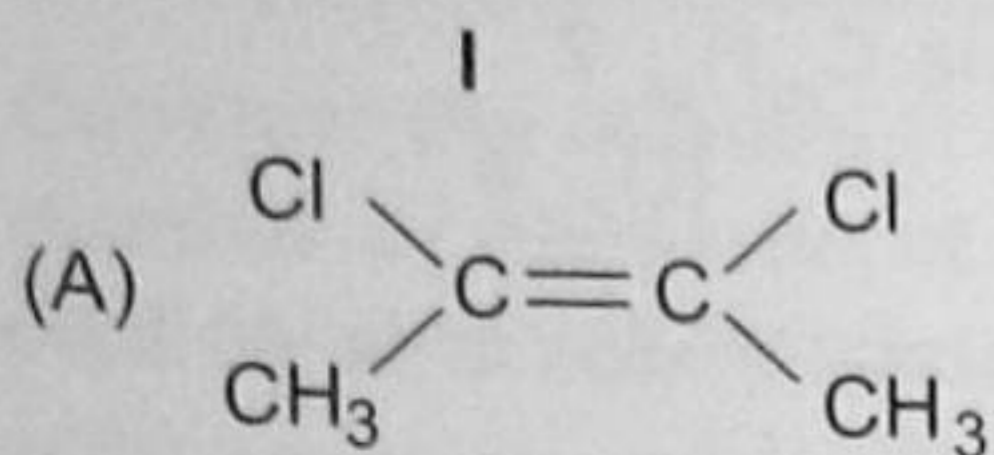18. Aluminium chloride exists as dimer, Al_2Cl_6 in solid state as well as in solution of non-polar solvents such as benzene. When dissolved in water, it gives

(A) $[Al(OH)_6]^{3-} + 3HCl$　　　　　　(B) $Al_2O_3 + 6HCl$
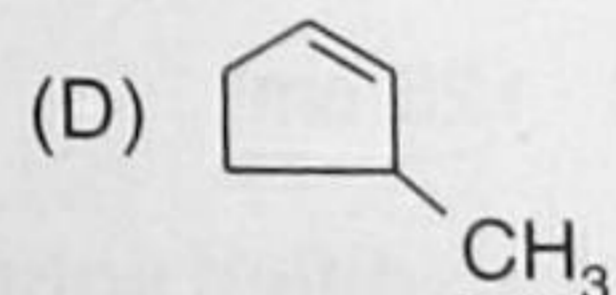
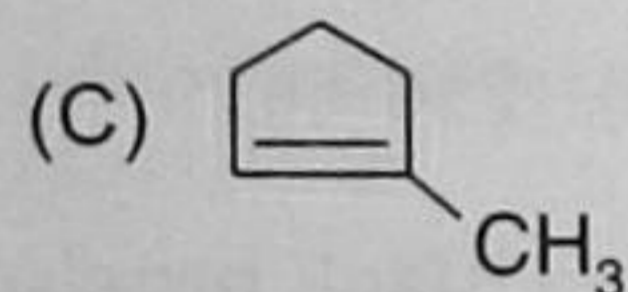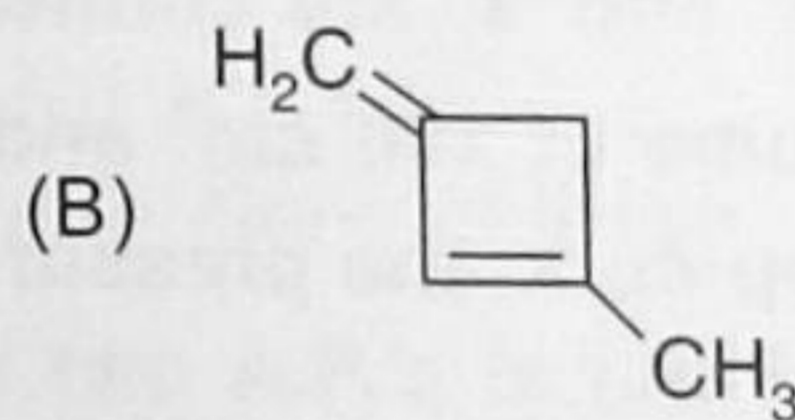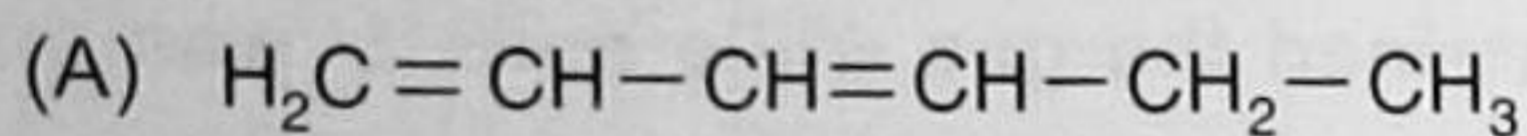(C) $Al^{3+} + 3Cl^-$　　　　　　　　　(D) $[Al(H_2O)_6]^{3+} + 3Cl^-$

19. The electrophile, $E^\oplus$ attacks the benzene ring to generate the intermediate σ-complex. Of the following, which σ-complex is of lowest energy?
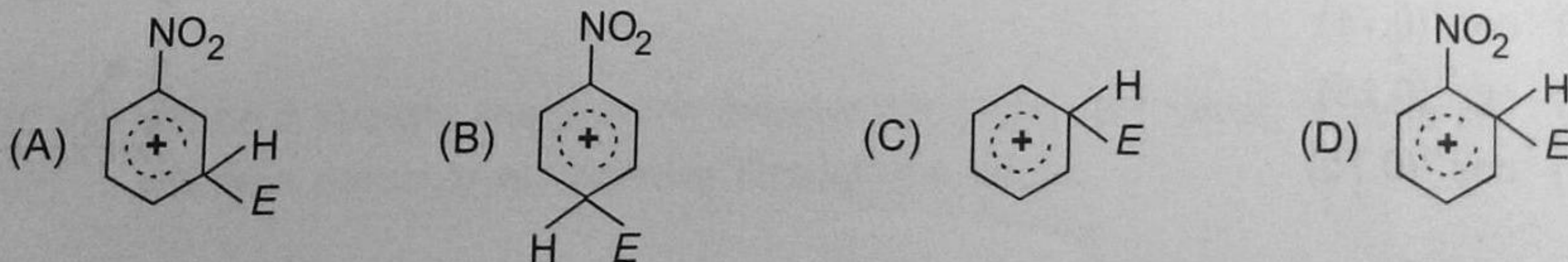
20. In which pair of molecules is the permanent dipole in molecule I greater than that in molecule II ?

I   II

(A)

$$Cl-C(CH_3)=C(Cl)-CH_3$$

$$CH_3-C(Cl)=C(Cl)-CH_3$$

(B) CH_3CH_2Cl CH_3CHCl_2

(C) $Cl-C_6H_4-Cl$ (para)

ortho-dichlorobenzene

(D) 1,3,5-trichlorobenzene

para-dichlorobenzene

21. In the reaction, 'X'(C_6H_{10}) $\xrightarrow[\text{H}_2\text{O, Zn}]{\text{O}_3}$ $CH_3COCH_2CH_2CH_2CHO$, compound 'X' is

(A) $H_2C=CH-CH=CH-CH_2-CH_3$

(B) methylenecyclobutane with CH_3

(C) methylcyclopentene

(D) methylcyclopentene

22. Which of the following statements is false?

(A) Lower the concentration of D.O., the more polluted is the water sample.

(B) The tolerable limit of lead in drinking water is 50 ppm.

(C) Water is considered pure if it has BOD less than 5 ppm.

(D) In COD determination, the pollutants resistant to microbial oxidation are not oxidised by oxidising agent like $K_2Cr_2O_7$.

23. Oxygen reacts with platinum(VI) fluoride, PtF_6 as follows:

$$O_2 + PtF_6 \rightarrow O_2^+ PtF_6^-$$
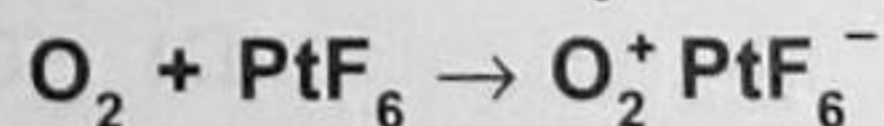
It was suggested that xenon should react similarly and, in this way, the first noble gas compound was produced.

$$Xe + PtF_6 \rightarrow Xe^+PtF_6^-$$
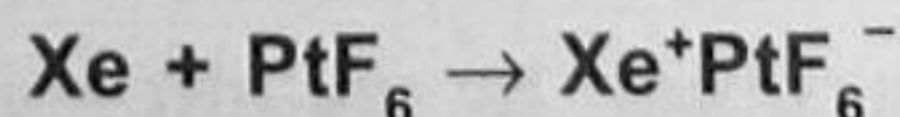
The most likely reason for the suggestion being made, is

(A) O and Xe have similar atomic radii.

(B) O and Xe have similar electron affinities.

(C) O and Xe have similar electronic configuration.

(D) O and Xe have similar first ionisation energies.

24. A certain compound containing only carbon and oxygen, has an approximate molecular weight of 290. On analysis, it is found to contain exactly 50% by weight of each element. What is the value of 'n' in the molecular formula $C_{nx}H_{ny}$?

    (A) 1   (B) 2   (C) 3   (D) 4

25. The internal energy change when a system goes from state 'P' to 'Q' is 40 kJ/mole. If the system goes from 'P' to 'Q' by a reversible path and returns to state 'P' by an irreversible path, what would be the net change in internal energy?

    (A) 40 kJ   (B) > 40 kJ   (C) < 40 kJ   (D) zero

26. Elements 'X', 'Y' and 'Z' have atomic numbers 19, 37 and 55 respectively. Which of the following statements is false about them?

    (A) Their ionization potential would increase with increasing atomic number.

    (B) 'Y' would have an ionization potential between those of 'X' and 'Z'.

    (C) 'Z' would have the highest ionization potential.

    (D) 'Y' would have the highest ionization potential.

27. Two glass bulbs 'K' and 'L' are connected by a very small tube having a stop-cork. Bulb 'K' has a volume of 100 cm³ and contained the gas while bulb 'L' was empty. On opening the stop-cork, the pressure fell down to 40%. The volume of the bulb 'L' must be

    (A) 75 cm³   (B) 125 cm³   (C) 150 cm³   (D) 250 cm³.

28. H_2S is passed through an acidified solution of copper sulphate and a black precipitate is formed. This is due to

    (A) oxidation of Cu^{2+} (B) reduction of Cu^{2+}

    (C) double decomposition   (D) reduction and oxidation.

29. Which of the following alkenes on reductive ozonolysis will give a mixture of ketones?

    (A) $CH_3CH = CHCH_3$ (B) $(CH_3)_2C = CHCH_3$

    (C) $(CH_3)_2C = C\big\langle {}^{CH_3}_{C_2H_5}$ (D) $(CH_3)_2C = CH_2$

30. Two organic compounds 'R' and 'S', both containing only C and H yield on analysis, the same percentage composition by weight.

    C = (12/13) × 100% and H = (1/13) × 100%.

    'R' decolourises Br_2-water but 'S' does not. Identify 'R' and 'S'.

    (A) $R = C_2H_2$, $S = C_6H_6$ (B) $R = C_6H_6$, $S = C_2H_2$

    (C) $R = C_2H_4$, $S = C_2H_6$ (D) $R = C_2H_2$, $S = C_3H_8$

31. Consider the relation $R = \{(a, b), (a, c), (a, a), (c, c)\}$ on the set $A = \{a, b, c, d\}$. Minimum number of elements of $A \times A$ which must be adjoined to R in order to make R an equivalence relation is

(A) 4

(B) 5

(C) 6

(D) 7

32. For any complex number z, the minimum value of $|z| + |z - 1|$ is

(A) 0

(B) 1/2

(C) 3/2

(D) 1

33. Two opposite vertices of a square are $A(0, 4)$ and $C(2, 8)$ then the other vertex may be

(A) $(3, 5)$

(B) $(1, 7)$

(C) $(-3, 5)$

(D) None of these

34. The probability of drawing a white ball from a bag containing 3 black balls and 4 white balls, is

(A) 1/7

(B) 3/7

(C) 4/7

(D) None of these

35. The solution set of $\dfrac{x^2 - 3x + 4}{x + 1} > 1, x \in R$ is

(A) $(-1, 1) \cup (3, +\infty)$

(B) $(3, +\infty)$

(C) $[-1, 1] \cup (3, +\infty)$

(D) None of these

36. The ratio between the sum of n terms of two A.P.'s is $(3n + 8) : (7n + 15)$ then the ratio between their 12th terms is

(A) $5 : 7$

(B) $12 : 11$

(C) $11 : 12$

(D) $7 : 16$

37. $(r + 1)^{th}$ term in the expansion of $(1 - x)^{-4}$ will be

(A) $\dfrac{(r+1)(r+2)(r+3)}{6} x^r$

(B) $\dfrac{(r+2)(r+3)}{2} x^r$

(C) $\dfrac{x^r}{r!}$

(D) None of these

38. The directrix of the parabola $y^2 + 4y + 8x = 0$ is

(A) $x = 2$

(B) $x = 3/2$

(C) $x = 5/2$

(D) None of these

39. The variance of 6, 8, 10, 12, 14 is

(A) 16

(B) 8

(C) 12

(D) 1

40. Let $f(x) = \lim\limits_{n \to \infty} \dfrac{x^{2n} - 1}{x^{2n} + 1}$ then

(A) $f(x) = 1$, for $|x| > 1$

(B) $f(x) = -2$, for $|x| < 1$

(C) $f(x)$ is not defined for any value of x

(D) $f(x) = 1$, for $|x| = 1$

41. Negation of the Proposition : If we control population growth, we prosper _____.

(A) We control population but we do not prosper.

(B) We do not control population, but we prosper.

(C) If we do not control population growth, we prosper.

(D) If we do not control population, we do not prosper.

42. Total number of positive integral solutions of $15 < x_1 + x_2 + x_3 \leq 20$, is equal to

(A) 1245

(B) 685

(C) 1025

(D) None of these

43. The expression $\dfrac{\cos 6x + 6\cos 4x + 15\cos 2x + 10}{\cos 5x + 5\cos 3x + 10\cos x}$ is equal to

(A) $\cos 2x$

(B) $2\cos x$

(C) $\cos^2 x$

(D) $\cos x$

44. The owner of a local jewellery store hired 3 watchmen to guard his diamonds, but a thief still got in and stole some diamonds. On the way out, the thief met each watchman, one at a time. To each he gave 1/2 of the diamonds he had then, and 2 more besides. He escaped with one diamond. How many did he steel originally?

(A) 40

(B) 36

(C) 25

(D) None of these

DIRECTION (45-46) : Four sisters – Suvarna, Tara, Uma and Vibha are playing a game such that the loser doubles the money of each of the other players from her share. They played four games and each sister lost one game in alphabetical order. At the end of fourth game, each sister had ₹ 32.

45. How many rupees did Suvarna start with?

(A) ₹ 60

(B) ₹ 34

(C) ₹ 66

(D) ₹ 28

46. Who started with the lowest amount?

(A) Suvarna

(B) Tara

(C) Uma

(D) Vibha

47. Ashok started from 'A' and walked 10 km eastwards to reach 'B', then turned to north and walked 3 km to reach 'C' and then turned west and walked 12 km to reach 'D'. He then again turned south and walked 3 km to reach 'E'.
How far is Ashok from his starting point?

(A) 2 km

(B) 3 km

(C) 1 km

(D) 2.5 km

48. Following question are based on the five three-digit numbers given below :

832   719   654   967   481

If the positions of the second and the third digits within each number are interchanged, which of the following will be the sum of the first and the second digits of the third highest number?

(A) 16

(B) 10

(C) 9

(D) 15

49. Tow figures left of the sign ': :' have a certain relationship between them selves. To establish the same relationship between the figures right of the sign ': :', select a figure from four options to replace the question mark.

(A)

(B)

(C)

(D)
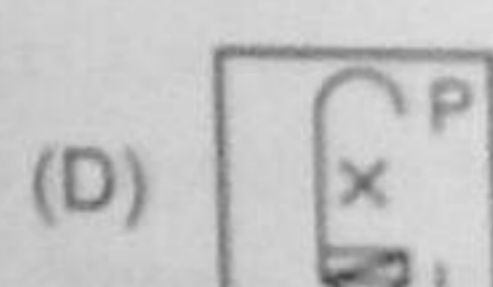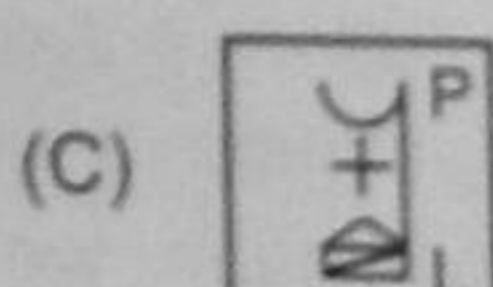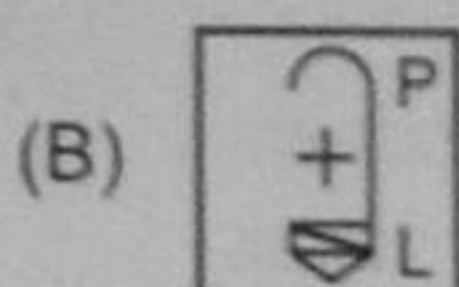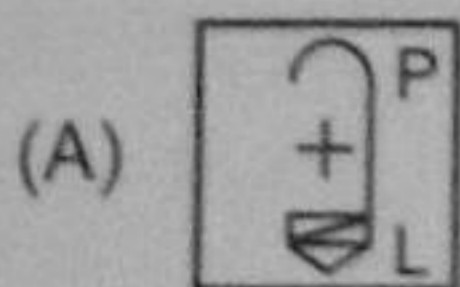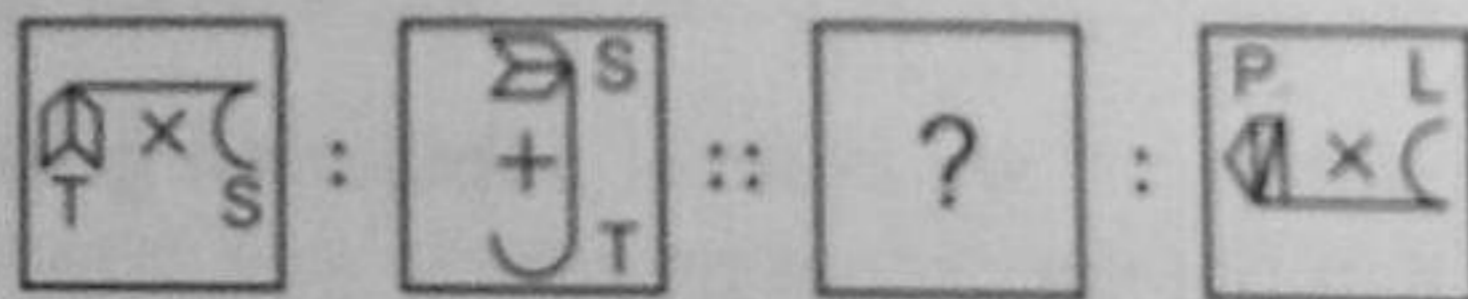
50. There are seven given figures, the first and last of which are unnumbered and the remaining are numbered as 1, 2, 3, 4 and 5. These seven figures form a series. However, one of the five numbered figures does not fit into the series. You are to think such figure. The number below that figure is your answer.

1   2   3   4   5
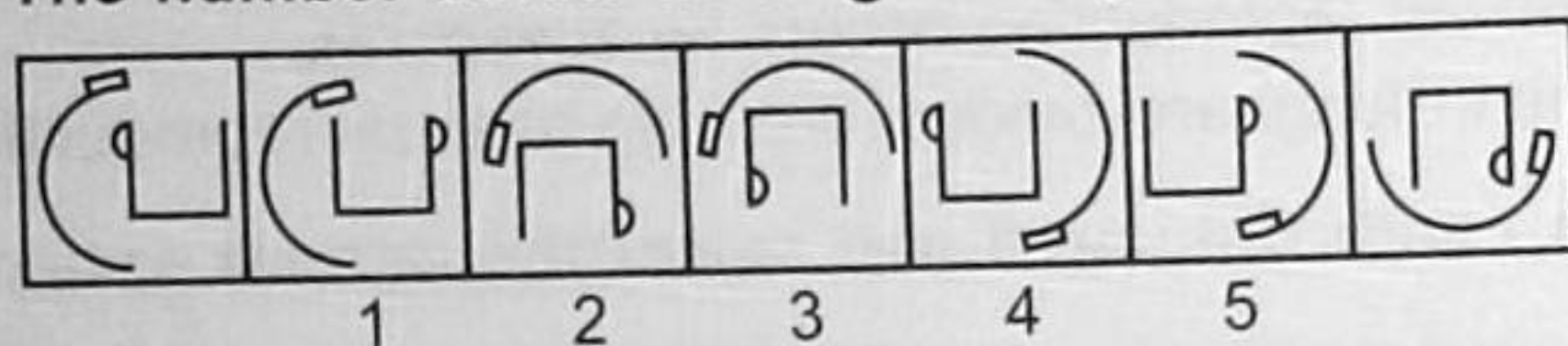
(A) 5   (B) 2   (C) 4   (D) 1

OR

BIOLOGY

31. Which of the following is an incorrect match of cell junction along with its structure and function?

Cell junction	Structure	Functions
(A) Tight junctions	Tightly bound, leak proof, fibrous protein 'belt' that surrounds cells	Organizing junction: hold cells together such that material passes through but not between the cells
(B) Desmosomes	Intermediate filaments linked to adjoining cells through cadherins cytoskeleton	Anchoring junction: "buttons" cells together
(C) Plasmodesmata	Six transmembrane connexon proteins creating a "pipe" that connects cells	Communicating junctions: allow passage of small molecules from cell to cell in a tissue
(D) Adherens junctions	Transmembrane fibrous proteins	Anchoring junction: "roots" extracellular matrix to cytoskeleton

32. Leguminous plants are able to fix atmospheric nitrogen through the process of symbiotic nitrogen fixation. Which one of the following statements is not correct for this process of nitrogen fixation?

(A) Leghaemoglobin scavenges oxygen and is pinkish in colour.

(B) Nodules act as sites for nitrogen fixation.

(C) The enzyme nitrogenase catalyses the conversion of atmospheric N_2 to NH_3.

(D) Nitrogenase is insensitive to oxygen.

33. Which of the following is most appropriately correct?
    (A) In Ascomycetes, the sexual reproduction involves a phase called dikaryophase.
    (B) In Ascomycetes, fusion of two haploid cells immediately results in diploid cells without any intervening dikaryotic stage.
    (C) In Fungi sexual reproduction occurs by zoospores.
    (D) Ascospores in fungi are produced during asexual reproduction.

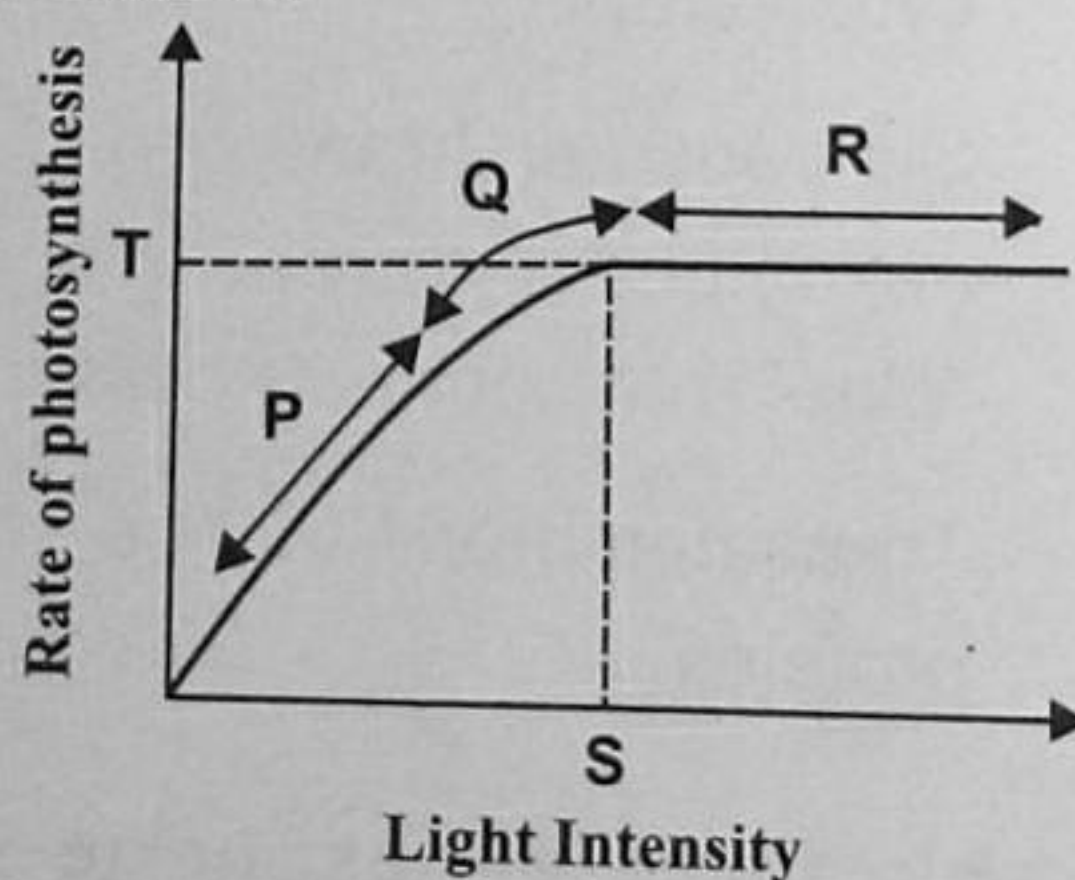34. Match Column I with Column II and select the correct option from the codes given below.

Column I (Deficient elements)	Column II (Deficiency symptoms)
(a) Calcium	(i) Chlorosis and necrosis appearing first in young leaves
(b) Magnesium	(ii) Bronze colour in leaves
(c) Chlorine	(iii) Delay in flowering, premature fall of flower buds
(d) Phosphorus	(iv) Interveinal chlorosis with purple anthocyanin pigmentation

    (A) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)
    (B) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)
    (C) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)
    (D) (a) - (i), (b) - (iv), (c) - (ii), (d) - (iii)

35. Aestivation of petals in the flower of cotton is correctly shown in

    (A)   (B)   (C)   (D)
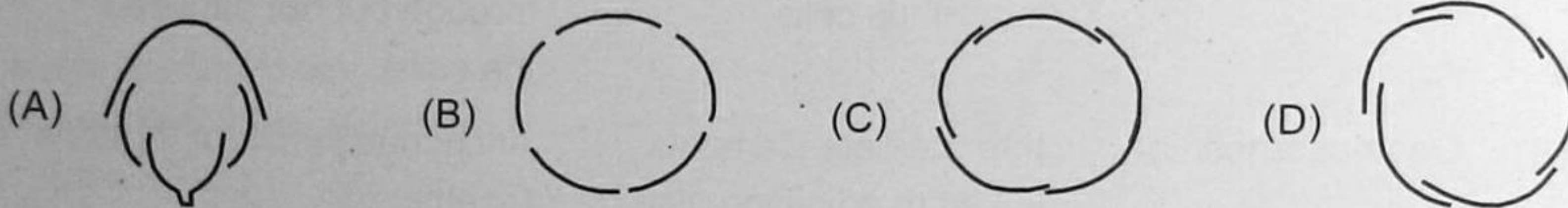
36. Match Column-I with Column-II on the basis of the given graph and select the correct option from the codes given below.

    Column-I
    (a) P represents
    (b) Q represents
    (c) R represents
    (d) S represents
    (e) T represents

    Column-II
    (i) Some factor other than light intensity is becoming the limiting factor
    (ii) Light intensity is no longer limiting factor
    (iii) Light intensity is the limiting factor
    (iv) Maximum rate of photosynthesis
    (v) Saturation point for light intensity

    (A) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv), (e)-(v)
    (B) (a)-(iii), (b)-(i), (c)-(ii), (d)-(v), (e)-(iv)
    (C) (a)-(iv), (b)-(ii), (c)-(v), (d)-(iii), (e)-(i)
    (D) (a)-(v), (b)-(iv), (c)-(iii), (d)-(ii), (e)-(i)

37. **Select the correct option with respect to mitosis.**
    (A) Chromatids separate but remain in the centre of the cell in anaphase.
    (B) Chromatids start moving towards opposite poles in telophase.
    (C) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase.
    (D) All of these
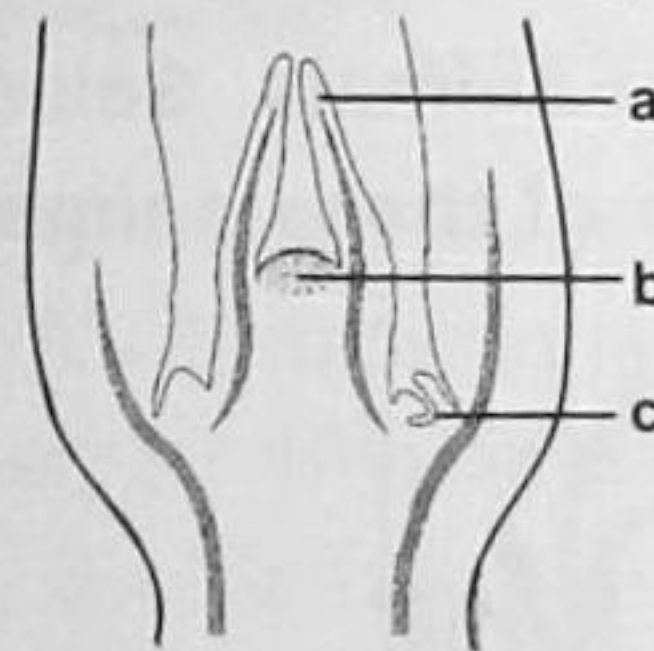
38. **Consider the following statements.**
    (i) In prokaryotic cells, a special membranous structure formed by the extension of the plasma membrane into the cell is known as polysome.
    (ii) The smooth endoplasmic reticulum is the major site for synthesis of glycoproteins.
    (iii) RuBisCO is the most abundant protein in the whole of biospshere.
    (iv) Mitochondria, chloroplasts and peroxisomes are not considered as part of endomembrane system.
    Of the above statements
    (A) (iii) and (iv) are correct.   (B) (i) and (ii) are correct.
    (C) (ii) and (iii) are correct.   (D) (i) and (iv) are correct.

39. **Identify the given figure and select the correct option for a, b and c.**

	a	b	c
(A)	Leaf primordium	Shoot apical meristem	Apical bud
(B)	Leaf primordium	Shoot apical meristem	Axillary bud
(C)	Root primordium	Root apical meristem	Axillary bud
(D)	Root primordium	Root apical meristem	Apical bud

40. **Consider the following statements with respect to algae.**
    a. Fusion between one large, non-motile female gamete and a smaller, motile male gamete is termed as oogamous.
    b. Fusion of two gametes dissimilar in size is termed as isogamous.
    c. Fusion of two gametes similar in size is called anisogamous.
    d. In Chlorophyceae, the major photosynthetic pigments are chlorophyll a and b, and the food is stored as starch.
    e. In Rhodophyceae, the major photosynthetic pigments are chlorophyll a and d, and the food is stored as mannitol.
   **Of the above statements**
    (A) a and e are correct   (B) c and e are correct
    (C) a and b are correct   (D) a and d are correct

41. Given below are four statements (a - d) each with one or two blanks. Select the option which correctly fills up the blanks in two statements.
   (a) Thymus secretes __(i)__ which help in differentiation of __(ii)__ .
   (b) The adrenal medulla secretes __(i)__ which stimulates the breakdown of __(ii)__ to increase the blood glucose concentration during emergency situations.
   (c) The Leydig cells or __(i)__ present in the intertubular spaces in testis, produce a group of hormone called __(ii)__ .
   (d) Thyroid gland secretes __(i)__ and triiodothyronine. __(ii)__ is essential for the normal rate of hormone synthesis in the thyroid.
   (A) (a) - (i) melatonin, (ii) T-lymphocytes
       (b) - (i) adrenaline, (ii) fat
   (B) (b) - (i) mineralocorticoids, (ii) glycogen
       (c) - (i) interstitial cells, (ii) testosterone
   (C) (b) - (i) catecholamine, (ii) glycogen
       (d) - (i) thyroxine, (ii) iodine
   (D) (d) - (i) parathyroid hormone, (ii) calcium
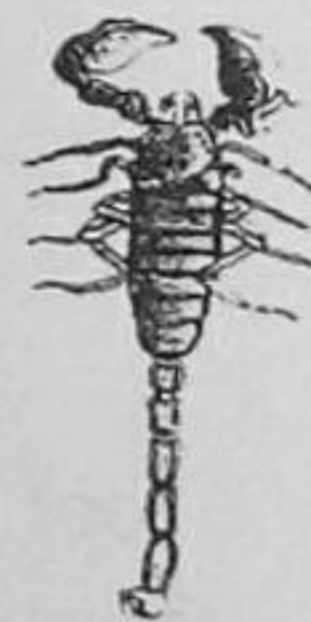   (a) - (i) thymosin, (ii) B-lymphocytes

42. The figures (P – S) show four animals. Select the correct option with respect to a common characteristic of two of these animals.
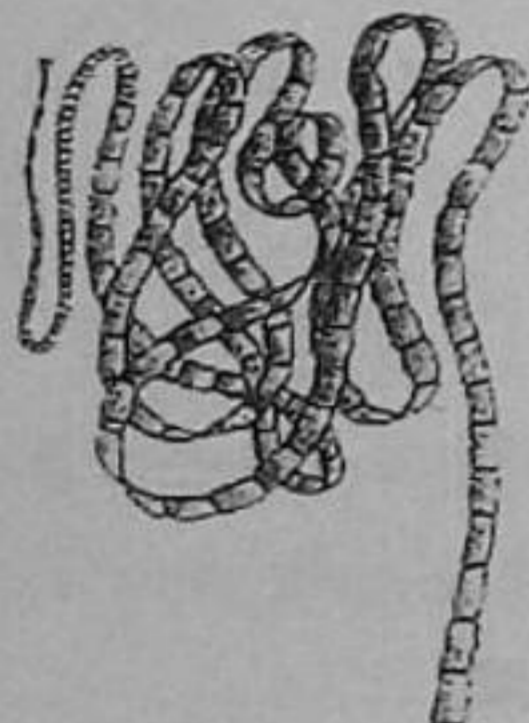
P Q R S

   (A) Regeneration is best observed in 'P' and 'S'.
   (B) 'Q' and 'R' have well developed photoreceptors.
   (C) 'R' and 'S' have nematoblasts for offence and defence.
   (D) 'P' and 'Q' exhibit polymorphism.

43. Regarding circulatory adjustments during exercise which of the following is correct?
   (A) The cardiac output increases more than tenfold in severe exercise.
   (B) The increase in cardiac output during exercise is mainly due to an increase in stroke volume.
   (C) The increase in stroke volume seen in exercise occurs despite a smaller end-diastolic volume.
   (D) In severe exercise the mean arterial pressure is unchanged because diastolic pressure falls.

44. Which of the following statements are incorrect ?

(i) When an impulse travels along a myelinated neuron, it leaps over the myelin sheath from one node to the next.

(ii) At chemical synapse there is continuity between the presynaptic and postsynaptic neurons provided by the gap junctions.

(iii) Neurotransmitters are chemicals that are released from postsynaptic neuron which interact with specific receptors of presynaptic neuron.

(iv) Neurons releasing acetylcholine are described as cholinergic neurons and those releasing noradrenaline are described as adrenergic neurons.

(v) Refractory period is the period after the transmission of an impulse in a nerve fibre in which membrane of the axon regains its ability to transmit impulses.

(A) (i), (ii) and (v)   (B) (ii) and (iv)   (C) (ii) and (iii)   (D) (i), (iii) and (v)

45. The given diagram represents posterior region of male cockroach. Select the correct combination of labelling.
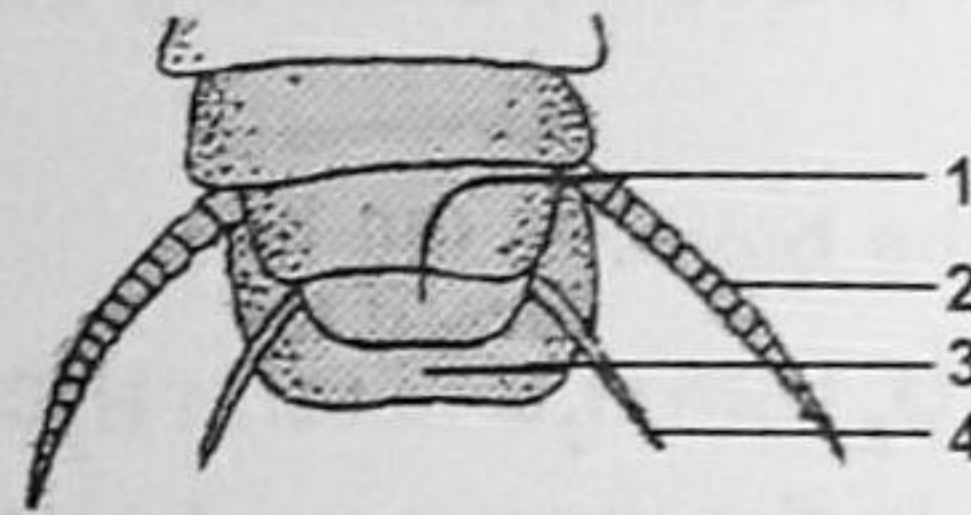
(A) 1 - 9th sternum, 2 - anal style, 3 - 10th tergum, 4 - anal circus
(B) 1 - anal style, 2 - anal cercus, 3 - 10th tergum, 4 - 9th sternum
(C) 1 - 9th sternum, 2 - anal cercus, 3 - 10th tergum, 4 - anal style
(D) 1 - 9th sternum, 2 - anal style, 3 - 10th tergum, 4 - anal circus

46. Examine the figure of gastric gland given below and identify the labelled parts A to D.

Opening of Gastric Gland

Gastric Pit
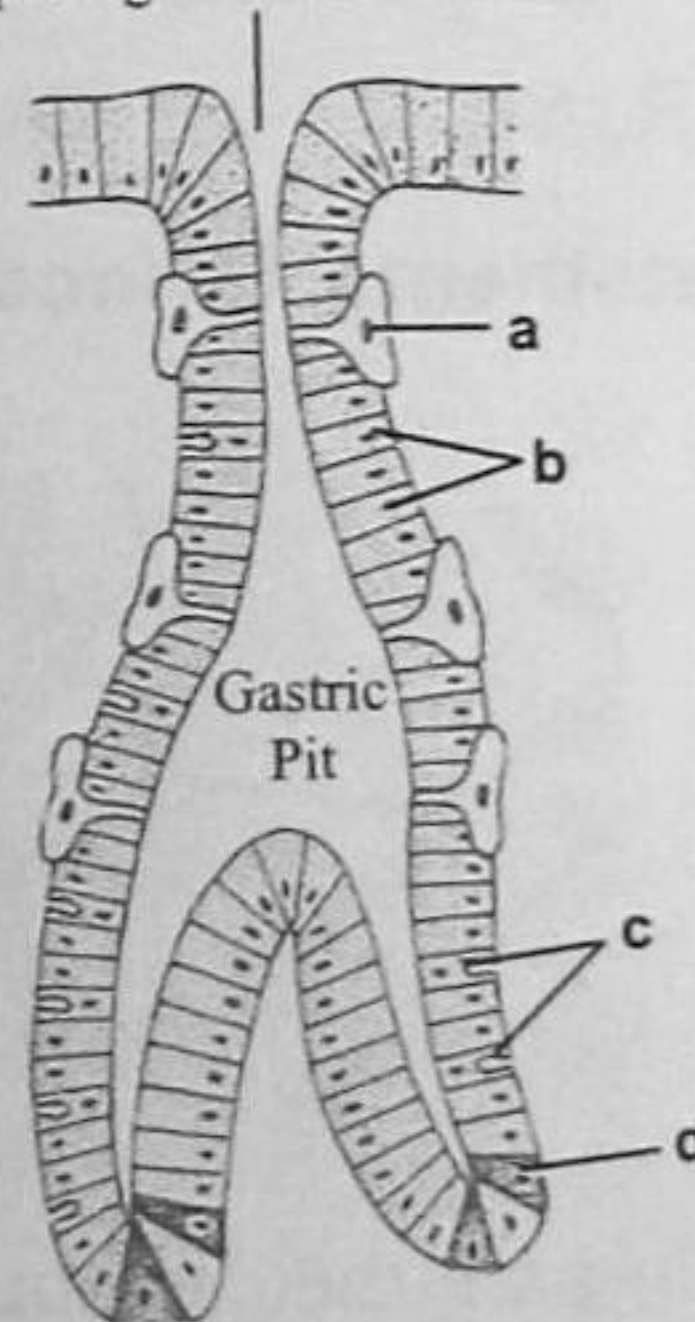
	a	b	c	d
(A)	Oxyntic cell	Chief cel	Mucous cell	Argentaffin cell
(B)	Argentaffin cell	Oxyntic cell	Mucous cell	Chief cel
(C)	G cell	Chief cel	Mucous cell	Argentaffin cell
(D)	Oxyntic cell	G cell	Mucous cell	Chief cell

47. Which of the following is correct about the given figure?

Maximally ─
Contracted ─

Two sarcomeres
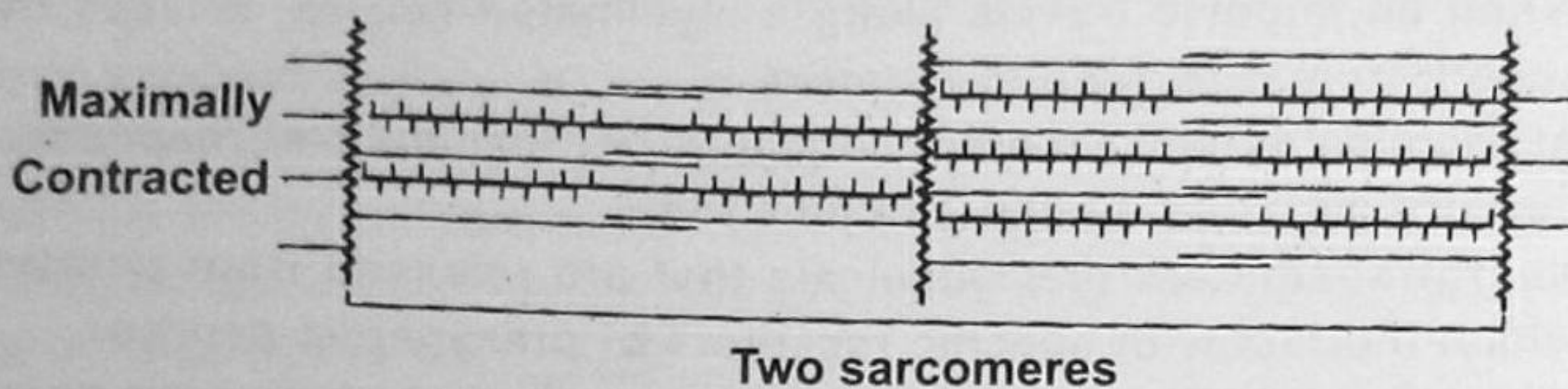
(A) The length of the thick and thin myofilaments has changed.

(B) Length of both anisotropic and isotropic band has changed.

(C) The myosin cross-bridges move on the surface of actin and the thin and thick myofilaments slide past each other.

(D) Length of the sarcomere remains same.

48. Choose the right sequential phenomena among the following during the delivery of O_2 from blood to tissue.

P : Absorption of CO_2 by the blood.

Q : Reaction of absorbed CO_2 with H_2O to form H_2CO_3 within RBC and its conversion into H^+ and HCO^{-3} ions in the presence of carbonic anhydrase enzyme.

R : Reaction of absorbed CO_2 with H_2O in plasma to form H_2CO_3 and its conversion into H^+ and HCO^{3-} ions in the presence of carbonic anhyrase enzyme.

S : Combination of H^+ with heme portion of HbO_2 to release O_2.

T : Combination of HCO^{3-} with heme portion HbO_2 to form reduced hemoglobin and release of O_2.

(A) P, Q, T   (B) P, R, S   (C) P, Q, S   (D) P, R, T

49. Which of the following statements is incorrect regarding the given figure of a tissue?
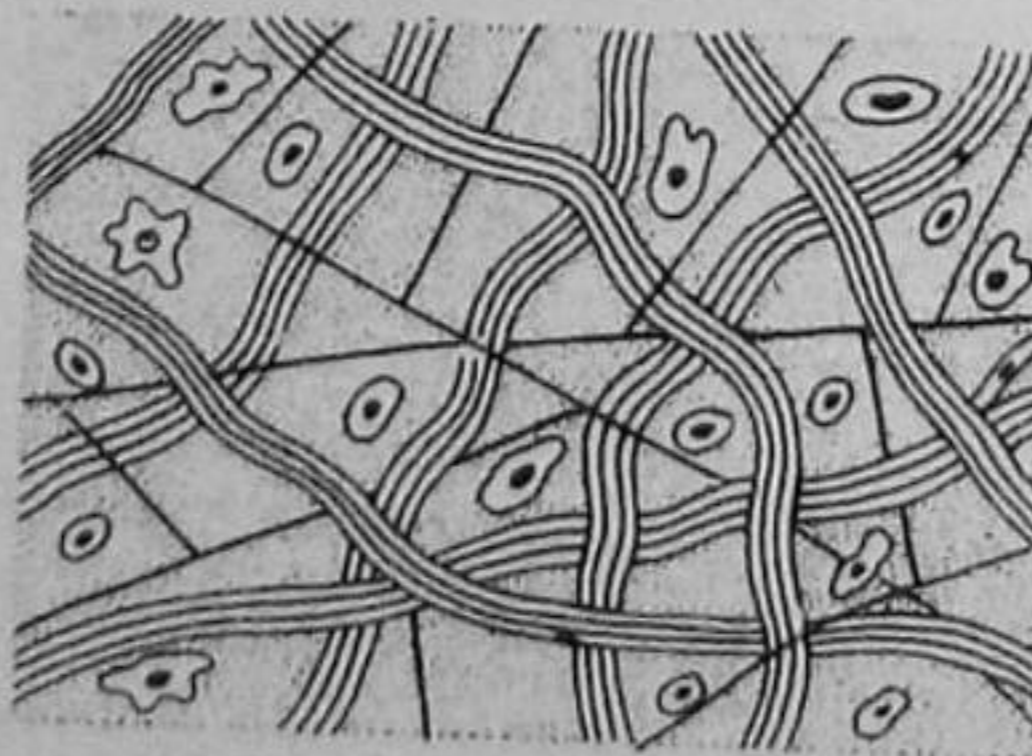
(A) It is present under the skin as subcutaneous tissue.

(B) It is a fat storing tissue.

(C) It often serves as a support framework for epithelium.

(D) It provides strength, elasticity and support to the parts where this tissue is present.

50. The given figure shows a man experiencing a sudden withdrawal of the leg that got in contact with a pointed object. Which of the following nervous pathways gives such response ?

(A) Receptor → Efferent nerve fibre → Grey matter of spinal cord → Afferent nerve fibre → Effector K

(B) Receptor → Afferent nerve fibre → Grey matter of spinal cord → Efferent nerve fibre → Effector

(C) Effector → Afferent nerve fibre → White matter of spinal cord → Efferent nerve fibre → Receptor

(D) Receptor → Efferent nerve fibre → White matter of spinal cord → Afferent nerve fibre → Effector