



MM : 720

TEST - 3

Time : 3 Hrs.

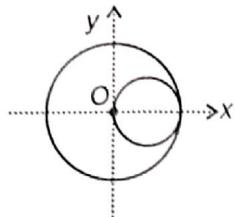
[PHYSICS]

Choose the correct answer :

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6. A thin uniform circular disc of mass 2 kg has a radius of 3 m. A circular hole of radius $\frac{3}{2}$ m is cut-off from it as shown in figure, then centre of mass of the remaining part will be at



- (1) $x = -\frac{1}{2}$ m
(2) $x = -\frac{3}{2}$ m
(3) $x = -2$ m
(4) $x = -1$ m
7. The linear mass density of a non-uniform rod of length 1 m placed along y-axis is given by $\lambda(y) = a(1 + by^2)$ and $0 \leq y \leq 1$. The centre of mass of rod will be at

- (1) $y = \frac{(2+b)}{(4+b)}$ (2) $y = \frac{4(2+b)}{3(12+b)}$
(3) $y = \frac{3(2+b)}{4(3+b)}$ (4) $y = \frac{1}{2}$
8. A satellite is moving in a circular orbit of radius R around earth with total mechanical energy E . If the satellite is now shifted to a higher circular orbit of radius $2R$, then the new total mechanical energy E' of the satellite will be

- (1) $E' = \frac{E}{2}$ (2) $E' = \frac{E}{\sqrt{2}}$
(3) $E' = \frac{E}{4}$ (4) $E' = 2E$

9. A body rotating at 40 rad/s is acted upon by a constant torque providing it a deceleration of 2 rad/s^2 . At what time will the body have final kinetic energy same as the initial, if the torque continues to act?
- (1) 20 s (2) 30 s
(3) 40 s (4) 50 s

10. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : A wire with a smaller radius of cross-section shows more elongation under the same load as compared to a wire with a larger radius, provided both are made of the same material and have same length.

Reason (R) : For same load and same material, strain is inversely proportional to cross-sectional area of wire.

In the light of the above statements, choose the correct answer from the options given below.

- (1) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(2) Both (A) and (R) are true and (R) is the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false
11. Choose the incorrect statement regarding Young's modulus among the following.
- (1) It depends on nature of material
(2) It depends on temperature
(3) It depends on both stress and strain
(4) Both (1) and (2)

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12. Match the physical quantities in column I with their corresponding expressions or definition in column II

	Column-I		Column-II
a.	Elastic potential energy per unit volume	(i)	Compressibility
b.	Longitudinal strain in a stretched wire	(ii)	$\frac{1}{2} \times \text{stress} \times \text{strain}$
c.	Ratio of volumetric strain to the hydrostatic stress	(iii)	Dimensionless quantity
d.	Breaking stress on stress-strain curve	(iv)	Stress beyond which material breaks

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

13. Consider the following statements:

Statement A: For an ideal rigid body, bulk modulus is infinite.

Statement B: Modulus of rigidity is defined only for solid material.

Choose the correct option.

- (1) Both statements A and B are correct
- (2) Both statements A and B are incorrect
- (3) Statement A is correct but statement B is incorrect
- (4) Statement A is incorrect but statement B is correct

14. Consider the given statements and choose the correct option.

Statement A: The submerged volume inside a liquid of a floating body does not depend upon variation in g though both thrust and weight depends upon g .

Statement B: The weight of a plastic bag full of air is same as that of empty plastic bag in air.

Statement C: Relative density is the ratio of volume of water and weight of water.

- (1) Both statements A and B are correct
- (2) Both statements A and B are incorrect
- (3) Only statement C is correct
- (4) All statements are correct

15. A man of mass 150 kg stands at the rim of a turntable of radius $1/5$ m, moment of inertia 3000 kg-m^2 mounted on a vertical frictionless shaft at its centre. The whole system is initially at rest and man now walks along the outer edge of the turntable with a velocity of 1 m/s relative to earth then with what angular velocity does the turntable rotate?

- (1) $\frac{1}{150} \text{ rad/s}$
- (2) $\frac{1}{25} \text{ rad/s}$
- (3) $\frac{1}{100} \text{ rad/s}$
- (4) $\frac{1}{50} \text{ rad/s}$

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16. Consider the given statements and choose the correct option.

Statement A: The virtue by which a body opposes the change in rotational motion is known as moment of inertia.

Statement B: Moment of inertia depends on angular acceleration.

Consider the given statements and choose the correct option.

- (1) Statement A is correct but statement B is incorrect
- (2) Statement A is incorrect but statement B is correct
- (3) Both statements are correct
- (4) Both statements are incorrect

17. For a body thrown with escape velocity from earth, the angle with which it should be projected is

- (1) 90°
- (2) Zero
- (3) 45°
- (4) Any angle

18. Three particles each of mass 2 kg are placed at the corners of an equilateral triangle of side 4 m. The work done on this system if the side of the triangle is changed from 4 m to 8 m, is (where G denotes universal gravitational constant)

- (1) $\frac{G}{2} J$
- (2) $\frac{3G}{2} J$
- (3) $\frac{G}{4} J$
- (4) $\frac{G}{5} J$

19. Consider the given statements:

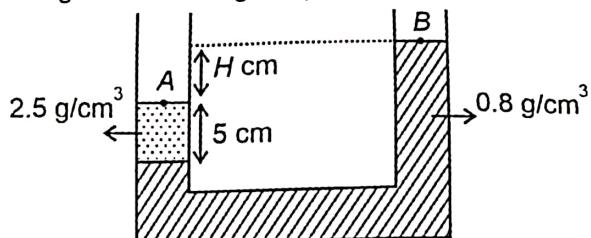
Statement A: For a satellite orbiting close to the surface of planet if its velocity is made $\frac{1}{\sqrt{2}}$ times of its orbital velocity, the body will escape.

Statement B: Angular momentum of a satellite depends on radius of orbit.

Choose the correct option.

- (1) Only statement A is correct
- (2) Only statement B is correct
- (3) Both the statements are correct
- (4) Both the statements are incorrect

20. Two liquids that do not mix are poured into a U-shaped tube as shown in figure. The difference H in the heights of these liquids is (density of liquids is 2.5 g/cm^3 and 0.8 g/cm^3)



- (1) 9.6 cm
- (2) 8.6 cm
- (3) 10.6 cm
- (4) 7.6 cm

21. Consider the statements and choose the correct option.

Statement A: A uniform spherical shell of matter attracts a particle that is outside the shell as if all of its mass were concentrated at its centre.

Statement B: The reading of a barometer on moon is zero.

- (1) Statement A is correct but statement B is incorrect
- (2) Statement B is correct but statement A is incorrect
- (3) Both statements are correct
- (4) Both statements are incorrect

22. Gravitational potential difference between a point on the surface of a planet and a point 20 m above the surface is 5 J/kg. The work done in moving a mass of 4 kg from the surface to a point 10 m above the surface is

- (1) 5 J
- (2) 4 J
- (3) 10 J
- (4) 6 J

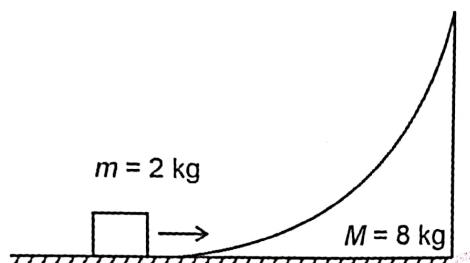
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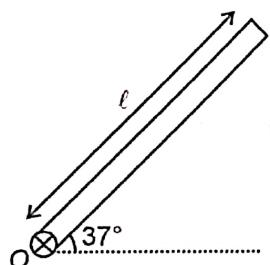


23. The earth rotates around its axis once every 24 hrs. If the earth were to shrink to half of its present radius, assuming mass remains same and no external torque acts on it, what would be the new period of rotation?

24. A small block of mass 2 kg moving horizontally with speed 10 m/s meets a smooth gradually inclined wedge of mass 8 kg placed on a smooth surface as shown in figure. The maximum rise in height of the block will be



25. A uniform rod of mass m and length ℓ is hinged at a point O (as shown). The angular acceleration of rod just after the rod is released from rest is



$$\begin{array}{ll} (1) \quad \alpha = \frac{2g}{3\ell} & (2) \quad \alpha = \frac{6g}{5\ell} \\ (3) \quad \alpha = \frac{3g}{2\ell} & (4) \quad \alpha = \frac{g}{\ell} \end{array}$$

26. The gravitation field of earth at a distance of $\frac{R}{4}$ from centre is g' . If R is the radius of earth, then the gravitational field at an altitude of $\frac{R}{4}$ from the surface of earth is

$$(1) \frac{g'}{16} \quad (2) \frac{g'}{4}$$

$$(3) \frac{64g'}{25} \quad (4) \frac{25g'}{16}$$

27. In a gravitational field, variation in gravitational potential is given by $V = -kx^3y^2$ (J/kg). The gravitational field intensity (in SI unit) at point (2, 1, 0) is

$$(1) \quad (4k\hat{i} + 4k\hat{j}) \quad (2) \quad (2k\hat{i} + 2k\hat{j})$$

$$(3) \quad (12k\hat{i} + 16k\hat{j}) \quad (4) \quad (5k\hat{i} + 5k\hat{j})$$

28. Choose the correct statement among the following.

(1) For uniform hollow sphere, field intensity inside it is zero

(2) Gravitational potential is constant inside a spherical shell

(3) If gravitational potential at surface of a solid sphere is V , then at the centre it will be $\frac{V}{4}$.

(4) Both (1) and (2)

29. The excess pressure inside a spherical drop of water is 6 times that of another water drop, then the ratio of their surface area is

(1) 25 : 1

(2) 1 : 20

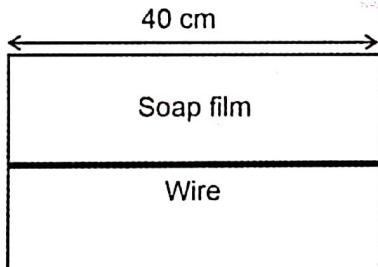
(3) 6 : 1

(4) 1 : 36

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30. Choose the statement that is true according to Bernoulli's theorem.
- (1) Bernoulli's theorem is only applied to viscous fluids
(2) In the steady flow of incompressible and non-viscous fluid, the sum of pressure energy, kinetic energy and potential energy per unit volume is constant
(3) In a horizontal tube of non-uniform cross-section, fluid speed is maximum where pressure is maximum
(4) Bernoulli's equation violates conservation of energy
31. The potential energy of the soap film formed on a frame of area $8 \times 10^{-3} \text{ m}^2$ is (Surface tension = $40 \times 10^{-3} \text{ N/m}$)
- (1) $35 \times 10^{-4} \text{ J}$ (2) $32 \times 10^{-6} \text{ J}$
(3) $64 \times 10^{-5} \text{ J}$ (4) $45 \times 10^{-5} \text{ J}$
32. Two vertical glass plates 2 mm apart are dipped into water. The height to which water will rise between the plates if surface tension of water is 22.3 dyne/cm, is nearly equal to (Assume that contact angle between glass and water is zero)
- (1) 2.2 mm (2) 4.2 mm
(3) 6.4 mm (4) 5.6 mm
33. A soap film formed in a rectangular frame, can support a wire as shown in the figure. Then the mass of the wire is (surface tension = $6 \times 10^{-2} \text{ N/m}$, $g = 10 \text{ m/s}^2$)



- (1) 15 g (2) 16 g
(3) 4.8 g (4) 6.2 g

34. Two spherical bubbles of soap of radius 2 cm and 4 cm in vacuum combine under isothermal conditions. The resulting bubble has radius of

- (1) $\sqrt{40} \text{ cm}$ (2) $\sqrt{20} \text{ cm}$
(3) $\sqrt{10} \text{ cm}$ (4) $\sqrt{5} \text{ cm}$

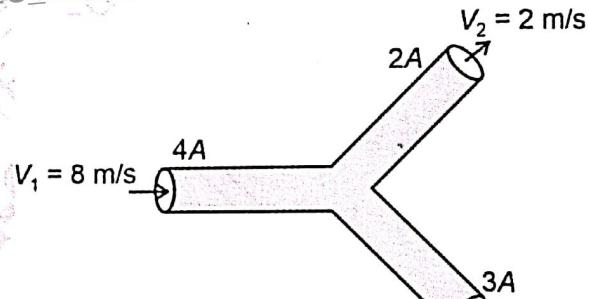
35. A body floats in water with 50% of its volume inside water. If same body floats in another liquid of relative density 1.5, then percentage of volume immersed in liquid will be

- (1) 50% (2) 20.33%
(3) 40% (4) 33.33%

36. The graph between logarithmic of time period of a planet orbiting in a circular orbit around the sun vs logarithmic of radius of orbit is

- (1) Parabolic (2) Ellipse
(3) Circular (4) Straight line

37. An ideal liquid flows through a horizontal tube as shown in figure. The velocity V of the fluid at cross-section 3A will be



- (1) 28 m/s (2) $\frac{28}{3} \text{ m/s}$
(3) 3 m/s (4) $\frac{7}{4} \text{ m/s}$

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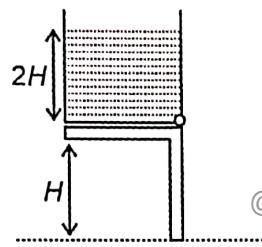
38. In a gas, as the temperature rises

 - The random motion of atoms increases
 - The coefficient of viscosity decreases
 - The coefficient of viscosity increases
 - Both (1) and (3) are correct

39. Water rises to a height of 2.0 cm in a vertical capillary tube. If the tube is inclined at an angle of 60° to the vertical, find the length of the water column in the tube.

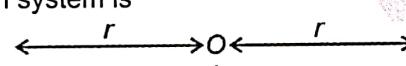
 - 2.0 cm
 - 4.0 cm
 - $\frac{4}{\sqrt{3}}$ cm
 - $2\sqrt{2}$ cm

40. A tank is filled upto a height $2H$ with a liquid and it is placed on a platform of height H from the ground. A small hole is made at the bottom of the tank, then the velocity with which water will come out of the hole will be

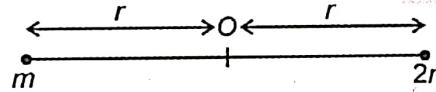


- (1) $\sqrt{2gH}$ (2) $\sqrt{6gH}$
 (3) $\sqrt{4gH}$ (4) $\sqrt{3gH}$

41. The net gravitational field intensity at point O for the given system is



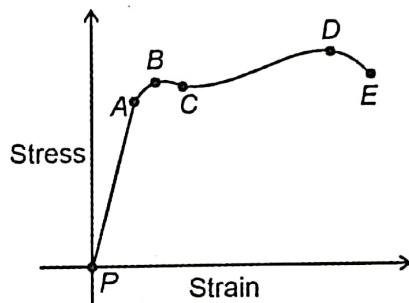
(1) $\frac{2Gm}{r^2}$ (2) $\frac{Gm}{4r^2}$
 (3) $\frac{Gm}{r^2}$ (4) $\frac{Gm}{2r^2}$



42. A manometer connected to a closed tap shows a pressure of $3.5 \times 10^5 \text{ N/m}^2$. When the valve is opened, the manometer reading drops to $3.0 \times 10^5 \text{ N/m}^2$, then the velocity of flow of water will be

(1) 100 m/s (2) 10 m/s
(3) 1 m/s (4) $10\sqrt{10}$ m/s

43. A graph is shown between stress and strain for a metal. The region in which Hooke's law holds good will be



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[CHEMISTRY]

46. Consider the following reaction at equilibrium



If the equilibrium concentrations of A, B and C are 0.4 M, 0.4 M and 0.2 M at 300 K, then ΔG° of the reaction will be

- (1) 0.4 kJ mol⁻¹ (2) 6.3 kJ mol⁻¹
(3) 8.1 kJ mol⁻¹ (4) 9.6 kJ mol⁻¹

47. The molar conductivity of a 0.2 mol/dm³ solution of KBr with electrolytic conductivity 2.8×10^{-2} S cm⁻¹ at 298 K is

- (1) 140 S cm² mol⁻¹ (2) 120 S cm² mol⁻¹
(3) 100 S cm² mol⁻¹ (4) 160 S cm² mol⁻¹

48. An aqueous solution of copper sulphate is electrolysed for 60 minutes with a current of 1.158 amperes using inert electrodes, the mass of copper deposited at cathode is

(Atomic mass of copper = 63.5 u)

- (1) 2.86 g (2) 4.35 g
(3) 6.35 g (4) 1.37 g

49. Consider the following statements.

- a. In Leclanche cell, the cathode used is a carbon (graphite) rod surrounded by powdered manganese dioxide and carbon.
b. In mercury cell, the electrolyte used is a paste of KOH and ZnO.
c. A primary cell after use can be recharged by passing current through it in the opposite direction.

The correct statements are

- (1) a and b only (2) b and c only
(3) a and c only (4) a, b and c

50. Which of the following reactions are disproportionation reaction?

- a. $4H_3PO_3 \rightarrow 3H_3PO_4 + PH_3$
b. $2NO_2 + 2OH^- \rightarrow NO_2^- + NO_3^- + H_2O$
c. $2H_2O_2 \rightarrow 2H_2O + O_2$
d. $2F_2 + 2OH^- \rightarrow 2F^- + OF_2 + H_2O$

Select the correct option among the following.

- (1) b and d only
(2) a, b and c only
(3) a and c only
(4) a, b, c and d

51. Two moles of an ideal gas is expanded isothermally and reversibly from 5 litre to 20 litre at 27°C. Work done by the gas and enthalpy change for the process respectively are

- (1) -3.25 kJ and +3.25 kJ
(2) -3.44 kJ and 0
(3) -4.25 kJ and -6.12 kJ
(4) -6.89 kJ and 0

52. Oxidation states of S in $H_2S_2O_4$, $H_2S_2O_6$ and H_2SO_5 respectively are

- (1) +3, +5 and +8
(2) +3, +5 and +5
(3) +3, +5 and +6
(4) +2, +5 and +6

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53. Match column-I with column-II

	Column-I		Column-II
a.	$C(s) + O_2(g) \xrightarrow{\Delta} CO_2(g)$	(i)	Metal displacement reaction
b.	$2KClO_3(s) \xrightarrow{\Delta} 2KCl(s) + 3O_2(g)$	(ii)	Combination reaction
c.	$2Fe(s) + 3H_2O(l) \xrightarrow{\Delta} Fe_2O_3(s) + 3H_2(g)$	(iii)	Decomposition reaction
d.	$Cr_2O_3(s) + 2Al(s) \xrightarrow{\Delta} Al_2O_3(s) + 2Cr(s)$	(iv)	Non-metal displacement reaction

Choose the correct answer from the options given below.

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

54. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): H_2S is stronger acid than H_2O .

Reason (R): H–S bond is weaker than O–H bond.

In the light of above statements, choose the correct option.

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (3) (A) is true but (R) is false
 (4) (A) is false but (R) is true

55. Consider the aqueous solution of the given salts

- a. Sodium benzoate b. Ammonium bromide
 c. Sodium phenoxide d. Pyridinium chloride

The solutions which will be basic in nature are

- (1) a, b and c only (2) a and c only
 (3) b and d only (4) b, c and d only

56. The solubility of $AgBr(s)$ with solubility product 5×10^{-13} in 0.1 M sodium bromide solution would be

- (1) 7.07×10^{-7} M (2) 5×10^{-10} M
 (3) 7.07×10^{-6} M (4) 5×10^{-12} M

57. pH of the resultant solution obtained by mixing 40 mL of 0.1 M CH_3COOH with 10 mL of 0.4 M NaOH solution will be (pK_a of $CH_3COOH = 4.76$)

- (1) 8.83 (2) 9.12
 (3) 6.12 (4) 7.25

58. Given below are the two statements

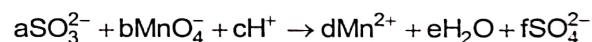
Statement-I : Iodine gives an intense green colour with starch.

Statement-II : Iodine oxidises thiosulphate ions to tetrathionate ions and itself gets reduced to iodide ions.

In light of above statements, choose the correct answer.

- (1) Statement I is correct but statement II is incorrect
 (2) Statement I is incorrect but statement II is correct
 (3) Both statement I and statement II are correct
 (4) Both statement I and statement II are incorrect

59. For balanced chemical reaction, coefficients a, b and c respectively are

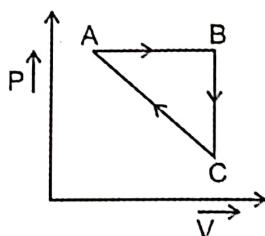


- (1) 4, 2 and 7 (2) 3, 1 and 8
 (3) 5, 1 and 16 (4) 5, 2 and 6

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60. An ideal gas undergoes a cyclic process as shown in the diagram.



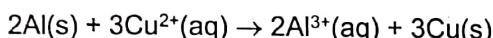
$$\begin{aligned}\Delta U_{BC} &= -7 \text{ kJ mol}^{-1} \\ q_{AB} &= 4 \text{ kJ mol}^{-1} \\ W_{AB} &= -8 \text{ kJ mol}^{-1} \\ W_{CA} &= 2 \text{ kJ mol}^{-1}\end{aligned}$$

Heat absorbed by the system during the process CA will be

- (1) 18 kJ mol^{-1} (2) 9 kJ mol^{-1}
 (3) 6 kJ mol^{-1} (4) 15 kJ mol^{-1}

61. Standard Gibbs energy change for the given cell reaction will be

(Given: $E_{\text{Al}^{3+}/\text{Al}}^\circ = -1.66 \text{ V}$; $E_{\text{Cu}^{2+}/\text{Cu}}^\circ = 0.34 \text{ V}$)



- (1) $-1158 \text{ kJ mol}^{-1}$ (2) -386 kJ mol^{-1}
 (3) -579 kJ mol^{-1} (4) $-764.28 \text{ kJ mol}^{-1}$

62. Match column-I with column-II

	Column-I (Ion)		Column-II $\lambda^\circ (\text{S cm}^2 \text{ mol}^{-1})$ in water at 298 K
a.	OH^-	(i)	106
b.	SO_4^{2-}	(ii)	119
c.	Mg^{2+}	(iii)	160
d.	Ca^{2+}	(iv)	199.1

Choose the correct answer from the options given below.

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

63. Given below are the two statements.

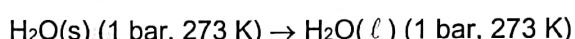
Statement-I : Conductivity of sodium is higher than that of copper at 298.15 K.

Statement-II : Conductivity of strong electrolytes decreases with decrease in concentration while conductivity of weak electrolytes increases with decrease in concentration.

In light of above statements, choose the correct answer.

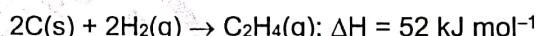
- (1) Statement I is correct but statement II is incorrect
 (2) Statement I is incorrect but statement II is correct
 (3) Both statement I and statement II are correct
 (4) Both statement I and statement II are incorrect

64. For the process



- (1) $\Delta G = -\text{ve}$, $\Delta S = -\text{ve}$ (2) $\Delta G = +\text{ve}$, $\Delta S = +\text{ve}$
 (3) $\Delta G = 0$, $\Delta S = 0$ (4) $\Delta G = 0$, $\Delta S = +\text{ve}$

65. Based on the given data, the multiple bond energy (in kJ mol^{-1}) of a $\text{C}=\text{C}$ bond in C_2H_4 will be (Given: C-H bond energy = 350 kJ mol^{-1})



Choose the correct option.

- (1) 524 kJ mol^{-1} (2) 482 kJ mol^{-1}
 (3) 618 kJ mol^{-1} (4) 396 kJ mol^{-1}

66. Heat released on mixing 400 mL of 0.4 M NaOH with 300 mL of 0.4 M H_2SO_4 solution is

- (1) 57.1 kJ (2) 9.1 kJ
 (3) 12.4 kJ (4) 25.6 kJ

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67. If the standard reduction potential of Cu^{2+}/Cu and $\text{Cu}^{2+}/\text{Cu}^+$ are x V and y V respectively then the standard electrode potential of Cu^+/Cu couple will be
 (1) $(2x - y)$ V (2) $(x - 2y)$ V
 (3) $\left(y - \frac{x}{2}\right)$ V (4) $(3x - y)$ V
68. If oxidation numbers of X, Y and Z are +2, +4 and -3 respectively, then the possible formula of the compound will be
 (1) $\text{X}_2(\text{YZ})_2$ (2) $\text{X}_2(\text{YZ}_2)_2$
 (3) $\text{X}(\text{YZ}_2)_2$ (4) $\text{X}_3(\text{Y}_2\text{Z}_3)_2$
69. The standard electrode potential (E°) of the given redox couples, Zn^{2+}/Zn , Mg^{2+}/Mg , Cu^{2+}/Cu and Fe^{2+}/Fe are -0.76 V, -2.36 V, 0.34 V and -0.44 V respectively. The correct order of reducing power of the metals is
 (1) Cu > Fe > Zn > Mg (2) Mg > Zn > Cu > Fe
 (3) Fe > Mg > Zn > Cu (4) Mg > Zn > Fe > Cu
70. Consider the following statements.
 a. Conjugate base of H_2O and HSO_4^- are OH^- and SO_4^{2-} respectively.
 b. AlCl_3 and Mg^{2+} can act as Lewis acids.
 c. The value of K_w depends on temperature.
 d. Strong acids have very strong conjugate bases.
- The correct statement(s) is/are
 (1) a and b only (2) c only
 (3) a, b and c only (4) a, b, c and d
71. If pH of a saturated solution of M(OH)_2 is 10 then the solubility product (K_{sp}) of M(OH)_2 at 298 K will be
 (1) 4×10^{-15} (2) 5×10^{-13}
 (3) 4×10^{-12} (4) 8×10^{-14}
72. Given below are the two statements.
Statement-I: A catalyst lowers the activation energy for the forward and reverse reactions by exactly the same amount.
Statement-II: A catalyst does not affect the equilibrium composition of a reaction mixture.
 In light of above statements, choose the correct answer.
 (1) Statement I is correct but statement II is incorrect
 (2) Both statement I and statement II are correct
 (3) Both statement I and statement II are incorrect
 (4) Statement I is incorrect but statement II is correct
73. For the reaction, $\text{A(s)} \rightarrow \text{B(g)} + 2\text{C(g)}$ if $\Delta U = 12 \text{ kJ}$, $\Delta S = 80 \text{ JK}^{-1}$ at 300 K then the value of ΔG will be
 (1) 2.25 kJ (2) -4.52 kJ
 (3) -7.21 kJ (4) 6.12 kJ
74. 100 mL of 0.2 M RNH_2 ($K_b = 4 \times 10^{-4}$) is mixed with 160 mL of 0.1 M HCl solution. The pH of the resultant solution becomes
 (1) 8.5 (2) 9.2
 (3) 10 (4) 11.5
75. Consider the following processes.
 a. Sublimation of camphor
 b. Temperature of crystalline solid lowered from 298 K to 0 K
 c. $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
 d. $\text{H}_2(\text{g}) \rightarrow 2\text{H(g)}$
- The process(es) in which entropy increases is/are
 (1) a and d only (2) c only
 (3) a, c and d only (4) a, b, c and d

Space for Rough Work



76. During electrolysis of aqueous sodium chloride solution
- Sodium is deposited at cathode.
 - Chlorine gas is liberated at anode.
 - pH of the solution increases.
- The correct statements are
- a and b only
 - b and c only
 - a and c only
 - a, b and c

77. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): For mercury cell, the cell potential approximately remains constant during its life.

Reason (R): In mercury cell, the overall reaction does not involve any ion in solution whose concentration can change during its life time.

In the light of above statements, choose the correct option.

- Both (A) and (R) are true and (R) is the correct explanation of (A)
- Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (A) is true but (R) is false
- (A) is false but (R) is true

78. If the electrical resistance of a column of 0.04 M KOH solution of diameter 0.8 cm and length 40 cm is 5×10^3 ohm then the conductivity (in S cm^{-1}) of the solution will be

- 1.6×10^{-2}
- 3.2×10^{-3}
- 7.8×10^{-2}
- 4.6×10^{-3}

79. Given below are the two statements.
- Statement I:** For every chemical reaction at equilibrium, standard Gibbs energy change of the reaction is zero.

Statement II: ΔS_{total} for a spontaneous process is greater than zero.

In light of above statements, choose the correct answer.

- Statement I is correct but statement II is incorrect
- Both statement I and statement II are correct
- Both statement I and statement II are incorrect
- Statement I is incorrect but statement II is correct

80. Match column-I with column-II

	Column-I (Reactions)		Column-II (Correct relation)
a.	$\text{CO}_2(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{CO}(\text{g}) + \text{H}_2\text{O}(\ell)$	(i)	$\Delta H = \Delta U + 2RT$
b.	$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$	(ii)	$\Delta H = \Delta U - RT$
c.	$\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightarrow 2\text{HI}(\text{g})$	(iii)	$\Delta H = \Delta U - 2RT$
d.	$\text{CCl}_4(\text{g}) + 2\text{H}_2\text{O}(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 4\text{HCl}(\text{g})$	(iv)	$\Delta H = \Delta U$

Choose the correct answer from the options given below.

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

Space for Rough Work



81. If Λ_m° of $\text{Ba}(\text{OH})_2$, NH_4Cl and BaCl_2 are x , y and $z \text{ S cm}^2 \text{ mol}^{-1}$ respectively then Λ_m° of NH_4OH in $\text{S cm}^2 \text{ mol}^{-1}$ will be
- $x + \frac{y}{2} - \frac{z}{2}$
 - $y + \frac{x}{2} - \frac{z}{2}$
 - $z + \frac{x}{2} - \frac{y}{2}$
 - $y + x - z$
82. The pair of species for which the value of the standard molar enthalpy of formation is zero at 298 K is
- $\text{H}_2\text{O}(\ell)$ and NO(g)
 - $\text{Br}_2(\ell)$ and $\text{H}_2(\text{g})$
 - HI(g) and $\text{N}_2(\text{g})$
 - $\text{SO}_2(\text{g})$ and C(graphite)
83. If the molar conductance of 0.05 M solution of a weak monobasic acid is $12 \text{ S cm}^2 \text{ mol}^{-1}$ and at infinite dilution is $400 \text{ S cm}^2 \text{ mol}^{-1}$ then the dissociation constant of the acid will be
- 4.5×10^{-5}
 - 7.5×10^{-6}
 - 2.5×10^{-4}
 - 1.25×10^{-7}
84. If the solubility product of three sparingly soluble salts composed of monoatomic cation and anion, AB , X_2Y and P_2Q_3 in water are 1×10^{-14} , 4×10^{-24} and 1.08×10^{-28} respectively at a given temperature then order of their solubility (mol L^{-1}) in the solution will be
- $\text{P}_2\text{Q}_3 > \text{X}_2\text{Y} > \text{AB}$
 - $\text{AB} > \text{X}_2\text{Y} > \text{P}_2\text{Q}_3$
 - $\text{X}_2\text{Y} > \text{P}_2\text{Q}_3 > \text{AB}$
 - $\text{P}_2\text{Q}_3 > \text{AB} > \text{X}_2\text{Y}$
85. The equilibrium constants of the following reaction are
- $$\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}; K_1$$
- $$\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3; K_2$$
- $$2\text{H}_2 + \text{O}_2 \rightleftharpoons 2\text{H}_2\text{O}; K_3$$
- The equilibrium constant (K) of the reaction; $4\text{NH}_3 + 5\text{O}_2 \rightleftharpoons 4\text{NO} + 6\text{H}_2\text{O}$ will be
- $\frac{K_1 K_3}{K_2^2}$
 - $\frac{K_1^2 K_3^3}{K_2^2}$
 - $\frac{K_1^3 K_3}{K_2}$
 - $\frac{K_1 K_2}{K_3^2}$
86. A gas is allowed to expand in an insulated container against a constant external pressure of 4 atm from an initial volume of 4.2 L to a final volume of 6.8 L. The change in internal energy ΔU of the gas will be
- 651.7 J
 - 1520.1 J
 - 1053.5 J
 - 575 J
87. If the enthalpies of formation for propane ($\text{C}_3\text{H}_8(\text{g})$), $\text{CO}_2(\text{g})$ and $\text{H}_2\text{O}(\ell)$ at 298 K and 1 bar pressure are -104, -394 and -286 kJ mol $^{-1}$ respectively then enthalpy of combustion of $\text{C}_3\text{H}_8(\text{g})$ will be
- 1575 kJ mol $^{-1}$
 - 2222 kJ mol $^{-1}$
 - 3215 kJ mol $^{-1}$
 - 1275 kJ mol $^{-1}$

Space for Rough Work



88. Match column-I with column-II

	Column-I (Solutions)		Column-II (pH)
a.	100 mL of 0.01 M HCl is mixed with 100 mL of 0.008 M NaOH solution	(i)	4.16
b.	0.2 M aqueous solution of formic acid (Given, $K_a = 1.8 \times 10^{-4}$ and $\log 3 = 0.477$)	(ii)	4.83
c.	0.4 M solution of ammonium chloride (Given, pK_b of $\text{NH}_4\text{OH} = 4.75$)	(iii)	3.0
d.	200 mL of 0.2 M CH_3COOH is mixed with 200 mL of 0.04 M NaOH solution (Given, pK_a of $\text{CH}_3\text{COOH} = 4.76$)	(iv)	2.22

Choose the correct answer from the options given below.

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

89. Given below are the two statements

Statement-I: For strong electrolytes, the plot of Λ_m against $C^{1/2}$ is a straight line with intercept equal to Λ_m^0 and slope equal to $-A$

Statement-II: NaCl , CaCl_2 and MgSO_4 are known as 1 – 1, 1 – 2 and 1 – 1 electrolytes respectively.

In light of above statements choose the correct answer.

- (1) Statement I is correct but statement II is incorrect
 (2) Both statement I and statement II are correct
 (3) Statement I is incorrect but statement II is correct
 (4) Both statement I and statement II are incorrect

90. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 5 and by passing hydrogen gas around the platinum wire at one atm pressure at 298 K temperature. The reduction potential of the electrode would be

- (1) -0.295 V (2) -0.148 V
 (3) -0.074 V (4) -0.591 V

[BOTANY]

91. Starch sheath is found in

- (1) Dicot stem (2) Monocot root
 (3) Monocot stem (4) Dicot root

92. Mark the **wrongly** matched pair.

- | | |
|------------------|---|
| (1) Dicot stem | – Pericycle is made up of dead cells |
| (2) Monocot stem | – Pericycle is absent |
| (3) Dicot root | – Pericycle is involved in secondary growth |
| (4) Monocot root | – Pericycle is sclerenchymatous |

93. Read the features given below and choose the **correct** once(s) for bulliform cells.

- a. Colourless
 - b. Found on adaxial epidermis
 - c. Large sized
 - d. When turgid, curl the leaf inward to minimise water loss.
- (1) a, b and c only
 (2) b and d only
 (3) a, c and d only
 (4) All a, b, c and d

Space for Rough Work



94. Isobilateral leaves
 (1) Have nearly similar sized vascular bundles
 (2) Cannot have bulliform cells
 (3) Have stomata only on adaxial epidermis
 (4) Have radial vascular bundles
95. Which one is not a component of ground tissue?
 (1) Mesophyll tissue (2) Cortex
 (3) Pith (4) Companion cells
96. Read the statements A and B and select the **correct** option.
Statement A: Conjoint vascular bundles usually have the phloem located only on the outer sides of xylem.
Statement B: Conjunctive tissue is found between two vascular bundles of stem.
 (1) Only statement A is incorrect
 (2) Only statement B is incorrect
 (3) Both statements A and B are incorrect
 (4) Both statements A and B are correct
97. Read the statements (A-E) and select the **correct** option.
 A. Parenchyma is living but collenchyma is a dead tissue.
 B. Gymnosperms lack xylem vessels, however, these are found in angiosperms.
 C. In roots, vascular cambium ring develops between xylem and phloem.
 D. In roots, vascular bundles are surrounded by bundle sheath cells.
 E. Epidermal hairs may be found in both root and shoot system.
 (1) Only A and E are correct
 (2) Only B, C and D are correct
 (3) Only B, C and E are correct
 (4) Only B, C, D and E are correct
98. Which of the given is **not** included in stele?
 (1) Pith (2) Vascular bundle
 (3) Pericycle (4) Endodermis
99. Identify the T.S. of a plant part and mark the option that **correctly** describes its label.
-
- The diagram shows a cross-section of a plant stem. Layer A is the outermost layer, labeled 'Epidermis'. Layer B is just beneath it, labeled 'Cortex'. Layer C is a thin layer of small, thick-walled cells, labeled 'Cambium'. Layer D is the innermost layer of large, thin-walled cells, labeled 'Pith'.
- (1) D – This structure has exarch protostele
 (2) B – This tissue is absent in roots
 (3) C – It lacks water containing cavities
 (4) A – It can have epidermal hairs but cannot have cuticle
100. Both sclerenchyma and collenchyma
 (1) Provide mechanical support
 (2) Are composed of dead cells
 (3) Have highly lignified cell walls
 (4) Can perform photosynthesis
101. Trichomes cannot
 (1) Help in preventing water loss
 (2) Be unbranched
 (3) Be stiff structures
 (4) Help in absorption of water from soil

Space for Rough Work



102. Read the following statements and select the correct option

Statement A: In dicot stem, endodermis forms semi-lunar patches of sclerenchyma.

Statement B: The innermost layer of cortex is pericycle in dicot stem.

- (1) Only statement A is correct
- (2) Both statements A and B are correct
- (3) Both statements A and B are incorrect
- (4) Only statement B is correct

103. Caspary strips are

- a. Made up of suberin and chitin
- b. Water impermeable
- c. Found on radial wall of endodermal cells
- d. Seen in both stems and roots
- e. Found as deposition on barrel shaped cells

Choose the correct ones.

- (1) a, b and c only (2) a, c, d and e only
- (3) b, d and e only (4) b, c and e only

104. Pith is well developed in

- (1) Monocot roots (2) Monocot stems
- (3) Monocot leaves (4) Dicot roots

105. Stomatal apparatus does not include

- (1) Stomatal aperture (2) Guard cells
- (3) Subsidiary cells (4) Mesophyll cells

106. How many of the given features are common between monocot stems and dicot leaves?

- a. Type of vascular bundles.
 - b. Presence of thick-walled bundle sheath cells around vascular bundles.
 - c. Composition of ground tissues.
 - d. Different sizes of vascular bundles.
 - e. Absence of cambium in the vascular bundles.
- (1) 3 (2) 4
 - (3) 5 (4) 2

107. Hardness of fruit wall of nuts is due to

- (1) Parenchyma (2) Collenchyma
- (3) Sclereids (4) Cork cells

108. Epidermal cells

- (1) Are parenchymatous
- (2) Have large amount of cytoplasm and a small nucleus
- (3) Are always single layered in flowering plants
- (4) Form multicellular hairs in roots

109. Mark the features that are true for guard cells.

- a. Dumb-bell shaped in grasses
 - b. Possess chloroplast
 - c. Inner wall is thin in bean shaped guard cells
- (1) a only (2) a and c only
 - (3) a and b only (4) All a, b and c

110. Hypodermis cannot be

- (1) Arranged in multiple layers
- (2) A part of ground tissue of monocot stem
- (3) Collenchymatous in nature
- (4) The part of cortex in roots

111. _____ has usually two to four xylem and phloem patches. Choose the option to fill the above blank.

- (1) Monocot root (2) Dicot root
- (3) Dicot stem (4) Monocot stem

112. In dicot leaves

- (1) Cells of palisade parenchyma are arranged vertically to the epidermis and parallel to each other
- (2) Lower surface lacks cuticle
- (3) Adaxial surface bears more stomata than abaxial surface
- (4) Spongy mesophyll lack air cavity

Space for Rough Work



113. Which one is made up of dead cells?
 (1) Xylem parenchyma (2) Sieve tubes
 (3) Companion cells (4) Bast fibres
114. Monocots generally lack
 (1) Phloem parenchyma (2) Vessels
 (3) Companion cells (4) Xylem parenchyma
115. How many of the given features are common between red and brown algae?
 a. Have chlorophyll
 b. Food stored as complex carbohydrates
 c. Primarily found in marine habitat
 d. Produce biflagellate zoospores
 e. Show oogamy
 (1) 5 (2) 4
 (3) 2 (4) 3
116. Frond is **not** found in
 (1) *Dictyota* (2) *Laminaria*
 (3) *Porphyra* (4) *Ulothrix*
117. Red algae are **not** found in
 (1) Well-lighted regions
 (2) Brackish water
 (3) Area where relatively little light penetrates
 (4) Abundance in colder aquatic areas
118. Match the column-I with column-II and select the correct option:
- | Column-I | Column-II |
|---|--------------------------|
| a. Carrageen | (i) <i>Sargassum</i> |
| b. Filamentous form | (ii) <i>Polysiphonia</i> |
| c. Algin | (iii) <i>Gracilaria</i> |
| d. Body has branches arising from main axis | (iv) <i>Ectocarpus</i> |
- (1) a(ii), b(iv), c(iii), d(i) (2) a(iii), b(iv), c(i), d(ii)
 (3) a(iv), b(ii), c(iii), d(i) (4) a(i), b(iv), c(ii), d(iii)
119. Select the structures of mosses that contain haploid set of chromosomes.
 a. Antherozoids b. Capsule
 c. Rhizoids d. Protonema
 e. Seta
 (1) a and c only (2) b, c and d only
 (3) a, c and d only (4) a, d and e only
120. In all of the following plants, main plant body is gametophyte, **except**
 (1) *Salvinia* (2) *Sphagnum*
 (3) *Riccia* (4) *Spirogyra*
121. In mosses, protonema
 (1) Is produced by an embryo
 (2) Is capable of vegetative reproduction
 (3) Is a non-green branched structure
 (4) Has spirally coiled leaves and sex organs
122. Identify the feature which is **not** true w.r.t. prothallus.
 (1) Free-living (2) Photosynthetic
 (3) Multicellular (4) Diploid
123. Read the given events of life cycle of *Selaginella* and arrange them in chronological order of their occurrence.
 a. Zygote forms embryo
 b. Meiosis in spore mother cells
 c. Male gamete swim and reaches to archegonia
 d. Formation of female gametophyte
 e. Formation of microspore and megaspore
 (1) a → e → b → d → c
 (2) c → e → b → a → d
 (3) b → e → d → c → a
 (4) b → e → d → a → c
124. Archegonia is absent in
 (1) *Polytrichum* (2) *Pinus*
 (3) *Eudorina* (4) *Pteris*

Space for Rough Work



125. Female gametophytes of those plant which have naked seeds
- Are retained within megasporangium
 - Contain two or more archegonia
 - Are diploid structures
 - Are multicellular
 - Are independent structures having sex organs

The **correct** ones are

- (1) a, b and d only (2) a, c and d only
(3) b, c and e only (4) a, c, d and e only

126. Choose the **odd** one for heterospory.

- (1) *Salvinia* (2) *Cycas*
(3) *Cedrus* (4) *Dryopteris*

127. Read the following Assertion (A) and Reason (R) and select the **correct** option.

Assertion (A): Each megasporangium of gymnosperms has more than one archegonium.

Reason (R): In each megasporangium, megaspore mother cell divides meiotically and all the resultant megaspores develop into archegonia.

- (1) Both (A) and (R) are true and (R) is correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not correct explanation of (A)
(3) (A) is true and (R) is false
(4) (A) is false and (R) is true

128. *Cycas* lacks

- (1) Coralloid roots (2) Female cone
(3) Pollen grains (4) Unbranched stem

129. Mark the **wrongly** matched pair.

- | | |
|-----------------------|---|
| (1) <i>Volvox</i> | — Colonial form |
| (2) <i>Marchantia</i> | — Gemmae |
| (3) <i>Funaria</i> | — Forms embryo |
| (4) <i>Fucus</i> | — Shows complex post-fertilisation development events |

130. Which one is **not** an economic importance of bryophytes?

- Provide food to birds
- Provide peat
- Used as packing materials for trans-shipment
- Prevent soil erosion

131. Male and female sex organs are produced on different plant bodies in

- Riccia* and *Pinus*
- Cycas* and *Marchantia*
- Pteris* and *Funaria*
- Selaginella* and *Sphagnum*

132. The first plant group to have vascular systems are found

- In hot and extreme temperature areas
- To have pollen grains
- To have both independent gametophyte and sporophyte stages
- To be first embryophytes

133. Leaves of conifers

- Are fan shaped as in *Ginkgo*
- Are modified to reduce surface area
- Are similar to that of *Cycas*
- Cannot withstand extreme temperature

134. Pteropsida class does not include

- | | |
|-----------------------|-----------------------|
| (1) <i>Pteris</i> | (2) <i>Adiantum</i> |
| (3) <i>Dryopteris</i> | (4) <i>Lycopodium</i> |

135. Strobili are not found in

- | | |
|------------------------|------------------------|
| (1) <i>Selaginella</i> | (2) <i>Equisetum</i> |
| (3) <i>Pinus</i> | (4) <i>Polytrichum</i> |

Space for Rough Work



[ZOOLOGY]

Space for Rough Work



147. Choose the option that includes the **correct** basis of difference(s) between cortical and juxtamedullary nephrons w.r.t. humans.
- Length of loop of Henle
 - Their number
 - Presence of peritubular network of blood capillaries
- (1) a, b and c (2) a and b only
(3) b and c only (4) a and c only
148. Consider the given statements and select the **correct** option.
- Statement A:** Aquatic adaptation necessitated the production of lesser toxic nitrogenous waste like ammonia for water conservation.
- Statement B:** Ammonia being the least toxic form requires large amount of water for its elimination.
- Both statements A and B are correct
 - Both statements A and B are incorrect
 - Only statement A is correct
 - Only statement B is correct
149. Select the **incorrect** match w.r.t. organisms and their excretory structures.
- Rotifers – Flame cells
 - Flatworms – Protonephridia
 - Cephalochordates – Green glands
 - Crustaceans – Antennal glands
150. Consider the features listed below.
- Presence of gap junctions
 - Absence of striations
 - Fusiform appearance
 - M multinucleated
 - Voluntary in nature

Select the option which does not include the features of muscle fibres located in the lining of GI tract.

- (1) b, c and d only (2) d and e only
(3) a, b and c only (4) a and c only

151. Select the **correct** match w.r.t. joints in humans.
- Between carpals – Saddle joint
 - Between carpals and metacarpals of thumb – Gliding joint
 - Between adjacent lumbar vertebrae – Pivot joint
 - Between parietal and occipital bones – Fibrous joint
152. White muscle fibres show similarity with red muscle fibres on the basis of
- Amount of sarcoplasmic reticulum
 - Amount of mitochondria
 - Presence of myoglobin
 - Their dependence on aerobic process for energy production
153. Consider the following matches w.r.t. skeletal and muscular disorders and select the option representing **incorrect** matches only.
- | | |
|-----------------------|--|
| a. Myasthenia gravis | – Progressive degeneration of visceral muscle |
| b. Osteoporosis | – One of the common cause is decreased levels of estrogen in old age women |
| c. Tetany | – Results due to low Ca^{++} in body fluid |
| d. Muscular dystrophy | – Auto-immune disorder |
- (1) a and c (2) a and d
(3) b and c (4) b and d

Space for Rough Work



154. Match list I and list II w.r.t. a healthy human.

	List I		List II
a.	Tarsals in both hind limbs	(i)	60
b.	Carpals in both fore limbs	(ii)	56
c.	Phalanges in all limbs	(iii)	16
d.	Total number of bones in both hind limbs	(iv)	14

Choose the **correct** option.

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

155. When skeletal muscle fibres are in maximally contracted state, the size of which of the following would not get affected?

- a. Sarcomere b. Anisotropic band
 c. Isotropic band

Choose the **correct** option.

- (1) a, b and c (2) b and c
 (3) a and b (4) Only b

156. At a chemical synapse, the _____ of the pre- and post-synaptic neurons are separated by a _____ called synaptic cleft.

Select the **correct** option to fill the respective blanks.

- (1) Receptors; fluid-filled space
 (2) Membranes; fluid-filled space
 (3) Synaptic vesicles; receptor
 (4) Dendrites; fluid-filled space

157. How many of the functions mentioned in the box below are controlled by the 'command and control system' of human body?

Balance of the body, thermoregulation, circadian rhythms of our body, functioning of vital involuntary organs, voluntary movements

Choose the **correct** option.

- (1) Four (2) Five
 (3) Two (4) Three

158. In human kidneys, the filtration slits are formed by

- (1) Endothelium of efferent arteriole
 (2) Endothelium of afferent arteriole
 (3) Epithelial cells of Bowman's capsule
 (4) Epithelial cells of basement substance

159. Nearly all the essential nutrients, 70-80 per cent of electrolytes and water are reabsorbed by the segment of renal tubule which possesses

- (1) Simple ciliated columnar epithelium
 (2) Compound epithelium
 (3) Glandular epithelium
 (4) Simple cuboidal brush border epithelium

160. In human kidneys, a high osmolarity in the medullary interstitium is maintained by the movement of

- (1) Glucose from medullary interstitium into collecting duct
 (2) Urea from collecting duct into medullary interstitium
 (3) K⁺ from descending limb of loop of Henle
 (4) H₂O from ascending limb of loop of Henle

161. All of the following can be the effects of angiotensin II, except

- (1) Increase in blood pressure
 (2) Vasoconstriction
 (3) Release of aldosterone
 (4) Decreased reabsorption of Na⁺ from the renal tubules

162. Which of the following does not involve ciliary movement?

- (1) Passage of ova through female reproductive tract
 (2) Swimming of human spermatozoa
 (3) Movement of food through cytopharynx in *Paramoecium*
 (4) Movement of mucus in specific direction in human respiratory tract

Space for Rough Work



163. Consider the following statements.

- Based on appearance, muscles are categorised into skeletal, visceral and cardiac muscles.
- Protists like *Euglena* exhibit movement similar to that of macrophages.
- The contractile property of muscles is effectively used for locomotion and other movements of the human beings.
- Cytoskeletal elements like microfilaments are involved in amoeboid movement.

Which of the above given statements are **not** true?

- a and c only
- b and d only
- a and b only
- a and d only

164. Muscle fatigue is caused due to accumulation of _____ in muscles, produced due to _____ breakdown of glycogen.

Select the **correct** option to fill the respective blanks.

- Pyruvic acid; aerobic
- Lactic acid; anaerobic
- Lactic acid; aerobic
- Myoglobin; aerobic

165. Myelin sheath is produced by

- Oligodendrocytes
- Astrocytes
- Schwann cells
- Chondrocytes

Select the **correct** option.

- a, b, c and d
- a, b and c only
- b and d only
- a and c only

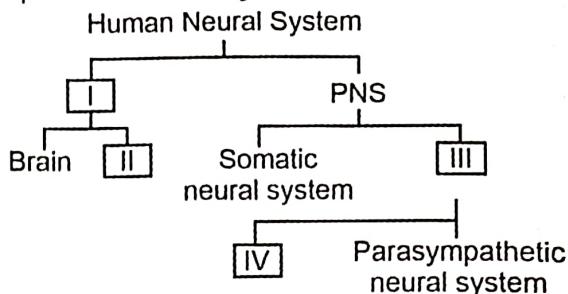
166. Consider the given statements A and B and select the **correct** option.

Statement A: The functions of lung, heart, kidney, blood vessels, muscles and other organs are coordinated while performing physical exercise.

Statement B: In our body, the neural system and endocrine system independently regulate the activities of the organs so that they function in a synchronised fashion.

- Both statements A and B are incorrect
- Only statement A is incorrect
- Only statement B is incorrect
- Both statements A and B are correct

167. Consider the flowchart given below and select the option that **correctly** identifies I, II, III and IV.



	I	II	III	IV
(1)	Spinal cord	CNS	ANS	Sympathetic neural system
(2)	CNS	ANS	Spinal cord	Sympathetic neural system
(3)	CNS	Spinal cord	ANS	Sympathetic neural system
(4)	ANS	CNS	Spinal cord	Sympathetic neural system

168. Which of the following activates the JG cells to release a chemical that converts angiotensinogen in blood to angiotensin I?

- A rise in glomerular blood flow
- A fall in glomerular blood pressure
- A rise in GFR
- A rise in glomerular blood pressure

169. Listed below are some substances.

- Cholesterol
- Vitamins
- Drugs
- Biliverdin
- Hydrocarbons
- Waxes

How many of the above substances are not present in secretion of liver?

- Six
- Four
- Five
- Two

Space for Rough Work



171. Match list I with list II and select the correct option.

	List I		List II
a.	Uremia	(i)	Inflammation of glomeruli of kidney
b.	Gout	(ii)	Insoluble mass of oxalates within kidney
c.	Glomerulo-nephritis	(iii)	Accumulation of uric acid crystals in joints
d.	Renal calculi	(iv)	Accumulation of urea in blood

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

172. Assertion (A): Ultrafiltration of blood occurs in renal corpuscles.

Reason (R): Blood is filtered so finely in renal corpuscles that except blood cells all the constituents of the plasma pass onto the lumen of Bowman's capsule.

In the light of above statements, choose the correct option.

- (1) Both (A) and (R) are true and (R) is correct explanation of (A)
 - (2) Both (A) and (R) are true but (R) is not correct explanation of (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) is false

173. In a healthy adult man under normal condition, the volume of blood filtered by each kidney per minute is about

- (1) 1100 – 1200 mL (2) 550 – 600 mL
(3) 5500 – 6000 mL (4) 2200 – 2400 mL

174. In bony fishes, the nitrogenous waste is generally excreted by diffusion through gill surface as

- (1) Uric acid (2) Urea
 (3) Ammonium ions (4) Lecithin

175. Select the **incorrect** statement w.r.t. counter current mechanism.

- (1) There is an increase in osmolarity from cortex towards medullary interstitium

- (2) The tubular fluid becomes steadily more concentrated or hyperosmotic as it travels down the thin descending limb of Henle's loop.

- (3) All absorbed solutes from renal tubules reaches to the circulatory system *via* vasa recta which surrounds the DCT.

- (4) The flow of filtrate in the two limbs of loop of Henle is in opposite direction.

176. Read the following statements.

- a. The spinal and cranial nerves are components of peripheral neural system.
 - b. All spinal nerve fibres are myelinated while all cranial nerve fibres are non-myelinated.
 - c. All afferent nerve fibres of PNS constitute spinal nerves while all efferent nerve fibres of PNS constitute cranial nerves.
 - d. The efferent nerve fibres of the PNS transmit regulatory impulses from the peripheral organs/tissue to the CNS.

Which of the above statements are **not** true w.r.t. a healthy human?

- (1) a, b, c and d (2) b, c and d only
(3) a and b only (4) a and d only

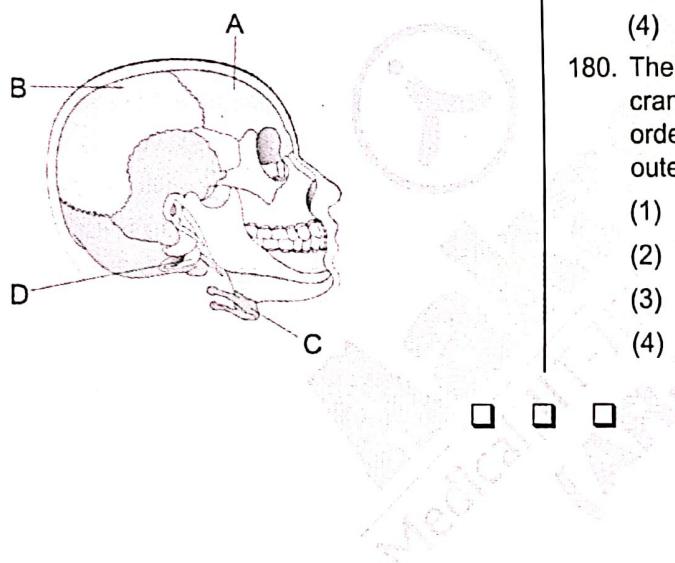
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177. Choose the **incorrect** statement w.r.t. generation and conduction of nerve impulses.

- (1) Different types of ion channels are present on the neural membrane which are equally permeable to all ions.
- (2) When a neuron is resting, the axonal membrane is comparatively more permeable to K^+ than Na^+ .
- (3) When a neuron is resting, the axonal membrane is nearly impermeable to Na^+ .
- (4) The axonal membrane is impermeable to negatively charged proteins present in the axoplasm.

178. Observe the figure given below. Identify the structures labelled as A, B, C and D and select the **correct** option w.r.t. it.



(1) A is a paired cranial bone.

(2) C is a paired bone present at the base of the buccal cavity.

(3) D is a part/extension of an unpaired cranial bone.

(4) B is an unpaired cranial bone.

179. **Assertion (A):** In humans, the 8th, 9th and 10th pairs of ribs are called vertebrochondral ribs.

Reason (R): The 8th, 9th and 10th pairs of ribs do not articulate directly with the sternum but join the seventh rib with the help of hyaline cartilage.

In the light of above statements, choose the correct option.

- (1) Both (A) and (R) are true and (R) explains (A) correctly
- (2) Both (A) and (R) are true but (R) does not explain (A) correctly
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

180. The human brain inside the skull is covered by cranial meninges. Which of the following is **correct** order of arrangement of meninges starting from outer to innermost?

- (1) Pia mater \rightarrow dura mater \rightarrow arachnoid
- (2) Pia mater \rightarrow arachnoid \rightarrow dura mater
- (3) Dura mater \rightarrow arachnoid \rightarrow pia mater
- (4) Dura mater \rightarrow pia mater \rightarrow arachnoid

Space for Rough Work