

MOTION

Question Paper [CODE - 25449]

NEET PATTERN TEST Brahmastra Semi Major Test-02

13th NEET - Phase 12

KOTA

8

Date: 19-Jan-2025

Duration: 3 Hours 20 Mins

Max Marks: 720

IMPORTANT INSTRUCTIONS

- The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple-choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. 50 questions in each subject are divided into two Sections (**A** and **B**) as per details given below :
 - Section A** shall consist of **35 (Thirty-five)** Questions in each subject (**Question Nos – 1 to 35, 51 to 85, 101 to 135 and 151 to 185**). All questions are compulsory.
 - Section B** shall consist of **15 (Fifteen)** questions in each subject (**Question Nos – 36 to 50, 86 to 100, 136 to 150 and 186 to 200**). In Section B, a candidate needs to attempt any **10 (Ten)** questions out of **15 (Fifteen)** in each subject.

Candidates are advised to read all 15 questions in each subject of Section B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, the first ten questions answered by the candidate shall be evaluated.
- Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, one mark will be deducted from the total score. **The maximum marks are 720**.
- Use **Blue/Black Ball Point Pen** only for marking responses on Answer Sheet (OMR sheet).
- Rough work is to be done in the space provided for this purpose in the Test Booklet only.
- Blank papers, Clipboards, Log tables, Slide Rule, Calculators, Cellular Phones, Pagers and Electronic Gadgets in any form are **not** allowed to be carried inside the examination hall.

महत्वपूर्णनिर्देश

- परीक्षा अवधि **3 घंटा 20 मिनट** है एवं परीक्षा पुस्तिका में भौतिकी, रसायनशास्त्र एवं जीव विज्ञान (वनस्पति विज्ञान एवं प्राणि विज्ञान) विषयों से **200** बहुविकल्पीय प्रश्न हैं (4 विकल्पों में से एक सही उत्तर है)। प्रत्येक विषय में **50** प्रश्न हैं जिनको निम्न वर्णनसार दो अनुभाग (**A** तथा **B**) में विभाजित किया गया है :
 - अनुभाग **A** के प्रत्येक विषय में **35 (पैंतीस)** (प्रश्न संख्या **1 से 35, 51 से 85, 101 से 135 एवं 151 से 185**) प्रश्न हैं। सभी प्रश्न अनिवार्य हैं।
 - अनुभाग **B** के प्रत्येक विषय में **15 (पंद्रह)** (प्रश्न संख्या **36 से 50, 86 से 100, 136 से 150 एवं 186 से 200**) प्रश्न हैं। अनुभाग **B** से परीक्षार्थियों को प्रत्येक विषय से **15 (पंद्रह)** में से कोई **10 (दस)** प्रश्न करने होंगे। परीक्षार्थियों को सुझाव है कि प्रश्नों के उत्तर देने के पूर्व अनुभाग **B** में प्रत्येक विषय के सभी **15** प्रश्नों को पढ़ें। यदि कोई परीक्षार्थी प्रश्नों का उत्तर देता है तो उसके द्वारा उत्तरित प्रथम **10** प्रश्नों का ही मूल्यांकन किया जाएगा।
- प्रत्येक प्रश्न **4** अंक का है। प्रत्येक सही उत्तर के लिए परीक्षार्थी को **4** अंक दिए जाएँगे। प्रत्येक गलत गलत उत्तर के लिए कुल योग में से एक अंक घटाया जाएगा। अधिकतम अंक **720** हैं।
- इस पृष्ठ पर विवरण अंकित करने एवं उत्तर पत्र पर निशान लगाने के लिए केवल नीले/काले बॉल पॉइंट पेन का प्रयोग करें।
- रफ कार्य इस परीक्षा पुस्तिका में निर्धारित स्थान पर ही करें।
- खाली पेपर, किलप बोर्ड, लॉग टेबल, स्लाइड रूल, कैलकुलेटर, सेल्फिलर फोन, पेजर और इलेक्ट्रॉनिक गैजेट्स को किसी भी रूप में परीक्षा हॉल के अंदर ले जाने की अनुमति नहीं है।

SYLLABUS

Chemistry

Chemical Equilibrium, Ionic equilibrium, Thermodynamics & thermochemistry, GOC I, P-Block Element

Biology

Cell-The Unit of Life, Cell Cycle and Cell Division, Photosynthesis in Higher Plants, Respiration in Plants, Plant Growth and Development, Excretory Products and their Elimination, Locomotion and Movement, Neural Control and Coordination, Chemical Coordination and Integration

Physics

Thermometry, Calorimetry, Heat transfer, KTG, Thermodynamics, Elasticity, Thermal Expansion, Oscillation And Wave, Mechanical properties of Fluids, Mechanical properties of Solids

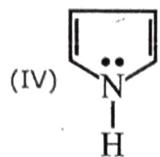
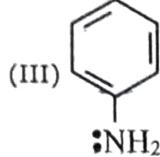
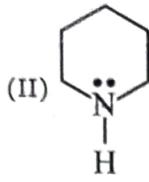
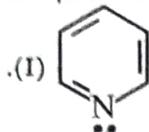
CHEMISTRY

SECTION – A [CHEMISTRY]

- 1.** The reactant will be most stable if the value of K_C for the reaction is:
- 2×10^{-7}
 - 5×10^8
 - 1.7×10^{-3}
 - 1×10^{-15}
- 2.** Compare the HOH [Heat of hydrogenation] in following compounds.
- $\text{CH}_2=\text{CH}_2$
 - $\text{CH}_3-\text{CH}=\text{CH}_2$
 - $$\begin{array}{c} \text{CH}_3 & & \text{H} \\ & \diagdown & \diagup \\ & \text{C}=\text{C} & \\ & \diagup & \diagdown \\ & \text{H} & \text{CH}_3 \end{array}$$
- Correct order of heat of hydrogenation**
- $a > c > b$
 - $a > b > c$
 - $c > b > a$
 - $c > a > b$
- 3.** Among the following the correct order of acidity is :
- $\text{HClO}_3 < \text{HClO}_4 < \text{HClO}_2 < \text{HClO}$
 - $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$
 - $\text{HClO}_4 < \text{HClO}_2 < \text{HClO} < \text{HClO}_3$
 - $\text{HClO}_4 < \text{HClO} < \text{HClO}_2 < \text{HClO}_3$
- 4.** Match the column :
- | Column-I | Column-II |
|-------------------|------------------|
| (a) Aromatic | (p) |
| (b) Anti-Aromatic | (q) |
| (c) Non-Aromatic | (r) |
| | (s) |
- (a)-(q), (b)-(p), (c)-(r), (s)
 - (a)-(p), (b)-(q), (c)-(r), (s)
 - (a)-(r), (b)-(q), (c)-(p), (s)
 - (a)-(p), (s), (b)-(q), (c)-(r)
- 5.** For the equilibrium $\text{SO}_2\text{Cl}_2(g) \rightleftharpoons \text{SO}_2(g) + \text{Cl}_2(g)$, what is the temperature at which $\frac{K_p(\text{atm})}{K_c(M)} = 3?$
- 0.027 K
 - 0.36 K
 - 36.54 K
 - 273 K
- 6.** Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?
- $\text{I}_2 > \text{Br}_2 > \text{Cl}_2 > \text{F}_2$
 - $\text{Cl}_2 > \text{Br}_2 > \text{F}_2 > \text{I}_2$
 - $\text{Br}_2 > \text{I}_2 > \text{F}_2 > \text{Cl}_2$
 - $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$
- 7.** Find out the correct order of stability of the following alkenes.
- -
 -
 -
- $R > Q > P > S$
 - $P > Q > R > S$
 - $R > Q > S > P$
 - $P > S > Q > R$
- 8.** In the following equilibrium
 I : $A+2B \rightleftharpoons C ; K_{eq}=K_1$
 II : $C+D \rightleftharpoons 3A ; K_{eq}=K_2$
 III : $6B+D \rightleftharpoons 2C ; K_{eq}=K_3$
 hence :
 (1) $3K_1K_2=K_3$
 (2) $K_1^3K_2^2 = K_3$
 (3) $3K_1K_2^2=K_3$
 (4) $K_1^3K_2 = K_3$

9. The stability of +1 oxidation state among Al, Ga, In and Tl increases in the sequence:
 (1) Tl < In < Ga < Al
 (2) In < Tl < Ga < Al
 (3) Ga < In < Al < Tl
 (4) Al < Ga < In < Tl

10. Order of basic strength in the following compounds



- (1) (IV) > (I) > (II) > (III)
 (2) (I) > (II) > (III) > (IV)
 (3) (II) > (I) > (IV) > (III)
 (4) (II) > (I) > (III) > (IV)

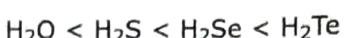
11. **Statement-1 :** Le Chatelier's principle predicts that an increase in temperature favors an endothermic process.

Statement-2 : An endothermic process is that which absorbs heat - and hence tends to minimize the temperature increase.

- (1) Statement-1 is True, Statement-2 is True;
 Statement-2 is a correct explanation for Statement-1.
 (2) Statement-1 is True, Statement-2 is True;
 Statement-2 is NOT a correct explanation for Statement-1
 (3) Statement-1 is True, Statement-2 is False
 (4) Statement-1 is False, Statement-2 is True

12. Given below are two statements :

Statement I : The boiling points of the following hydrides of group 16 elements increases in the order -

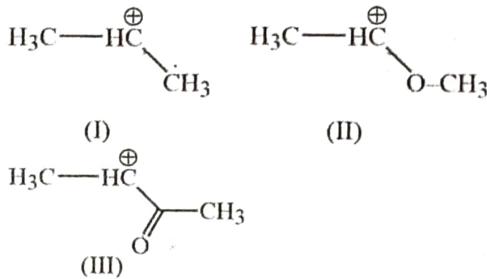


Statement II : The boiling points of these hydrides increase with increase in molar mass.

In the light of the above statements, choose the most appropriate answer from the options given below :

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

13. What is the decreasing order of stability of the ions?



- (1) I > II > III
 (2) II > III > I
 (3) III > I > II
 (4) II > I > III

14. In an exothermic gaseous reaction, $K_p = 0.025 \text{ atm}^{-1}$. Which of the following is not the favourable condition to shift the equilibrium in backward direction ?

- (1) Low pressure
 (2) High temperature
 (3) Removal of products from the reaction mixture
 (4) Removal of reactants from the reaction mixture

15. Which of the following is amphoteric ?

- (1) Al(OH)_3
 (2) B(OH)_3
 (3) Mg(OH)_2
 (4) NaOH

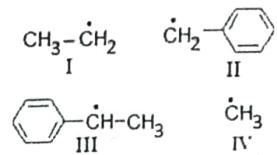
16. Which statement is incorrect.

- (1) The energy of actual structure of the molecule is lower than that of any canonical structure
- (2) The energy difference between actual structure and least energy resonance structure is called as resonance energy
- (3) More number of resonating structure, more resonance
- (4) In equivalent resonance structure of acetate ion of C=O bond length are unequal

17. What will be the H^+ ion concentration, when 4g NaOH dissolved in 1000 mL of water?

- (1) 10^{-1}
- (2) 10^{-13}
- (3) 10^{-4}
- (4) 10^{-10}

18. Arrange the following free radical in decreasing order of stability:

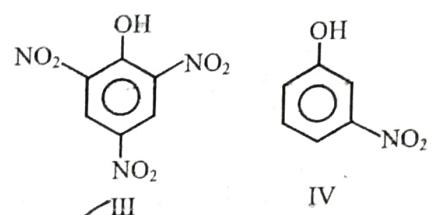
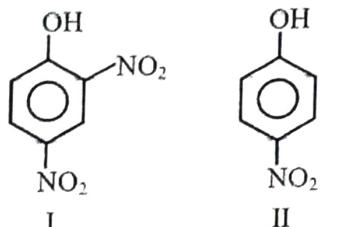


- (1) III > II > I > IV
- (2) IV > I > II > III
- (3) IV > III > II > I
- (4) III > IV > II > I

19. 400 mL of $\frac{1}{200}$ M H_2SO_4 , 400 mL of $\frac{1}{100}$ M HCl and 200 mL water are mixed together, pH of the resulting solution is:

- (1) 2.1
- (2) 2.8
- (3) 3
- (4) 3.1

20. The correct order of increasing dissociation constant $[K_a]$ of the following compound is-



$$(1) \text{II} < \text{IV} < \text{I} < \text{III}$$

$$(2) \text{IV} < \text{III} < \text{I} < \text{II}$$

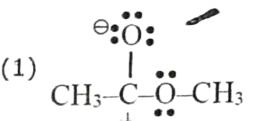
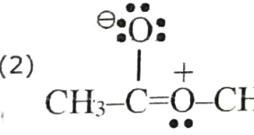
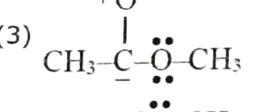
$$(3) \text{IV} < \text{II} < \text{I} < \text{III}$$

$$(4) \text{IV} < \text{I} < \text{II} < \text{III}$$

21. pH for the solution of salt undergoing anionic hydrolysis is given by:

- (1) $\text{pH} = 1/2 [\text{pK}_w + \text{pK}_a + \log C]$
- (2) $\text{pH} = 1/2 [\text{pK}_w + \text{pK}_a - \log C]$
- (3) $\text{pH} = 1/2 [\text{pK}_w + \text{pK}_b - \log C]$
- (4) None of these

22. Which of the following resonating structure is most stable?

- (1) 
- (2) 
- (3) 
- (4) 

- 23.** When 100 ml of 0.4 M CH_3COOH are mixed with 100 ml of 0.2 M NaOH, the $[\text{H}_3\text{O}^+]$ in the solution is approximately :

$$[\text{K}_a(\text{CH}_3\text{COOH})] = 1.8 \times 10^{-5}$$

- (1) $1.8 \times 10^{-6}\text{M}$
- (2) $1.8 \times 10^{-5}\text{M}$
- (3) $9 \times 10^{-6}\text{M}$
- (4) $9 \times 10^{-5}\text{M}$

- 24.** Find the value of $\frac{[\text{NaCN}]}{[\text{HCN}]}$. Given pH of the buffer solution of NaCN and HCN is 9.3 and K_a of HCN is 5×10^{-10} .

- (1) 0
- (2) 9.3
- (3) 1
- (4) 10

- 25.** The pH of saturated solution of $\text{Mg}(\text{OH})_2$ in water will be ($K_{sp} = 4 \times 10^{-12}$)

- (1) $4 - \log 2$
- (2) $10 - \log 2$
- (3) $4 + \log 2$
- (4) $10 + \log 2$

- 26.** The solubility product of AgCl is 4.0×10^{-10} at 298K. The solubility of AgCl in 0.04M CaCl_2 will be:

- (1) $2.0 \times 10^{-5}\text{ M}$
- (2) $1.0 \times 10^{-10}\text{ M}$
- (3) $5.0 \times 10^{-9}\text{ M}$
- (4) $2.2 \times 10^{-4}\text{ M}$

- 27.** Which of the following is bronsted Lowry acid-
(1) SO_4^{2-} (2) H_3O^+ (3) OH^- (4) Cl^-

- 28.** The concentration of $[\text{H}^+]$ and concentration of $[\text{OH}^-]$ of a 0.1 M aqueous solution of 2% ionised weak monobasic acid is:

[ionic product of water = 1×10^{-14}]

- (1) $0.02 \times 10^{-3}\text{M}$ and $5 \times 10^{-11}\text{M}$
- (2) $1 \times 10^{-3}\text{M}$ and $3 \times 10^{-11}\text{M}$
- (3) $2 \times 10^{-3}\text{M}$ and $5 \times 10^{-12}\text{M}$
- (4) $3 \times 10^{-2}\text{M}$ and $4 \times 10^{-13}\text{M}$

- 29.** 1 mole of A and 0.5 mole of B were enclosed in three litre vessel. The following equilibrium was established under suitable conditions :



At equilibrium the amount of B was found to be 0.3 mole the equilibrium constant K_C will be :

- (1) 11.1
- (2) 1.11
- (3) 0.01
- (4) 2.50

- 30.** For the reaction : $\text{A(g)} + 2\text{B(g)} \rightarrow 2\text{C(g)} + 3\text{D(g)}$ the value of ΔH at 27°C is 19 Kcal. The value of ΔE for the reaction would be :-

- (1) 20.8 Kcal
- (2) 19.8 Kcal
- (3) 18.8 Kcal
- (4) 17.8 Kcal

- 31.** **Assertion :** The ionization of hydrogen sulphide in water is low in the presence of hydrochloric acid

Reason : Hydrogen sulphide is a weak acid.

- (1) If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- (2) If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- (3) If Assertion is True but the Reason is False
- (4) If both Assertion & Reason are false

- 32.** An equal volume of 1M HCl and 1M H_2SO_4 are neutralized by 1M NaOH solution and X and Y kJ/eq. of heat liberated respectively correct relationship is:-

- (1) $X = 2Y$
- (2) $X = 3Y$
- (3) $X = 4Y$
- (4) $X = \frac{Y}{2}$

- 33.** Which of the following is most soluble in water ?

- (1) MnS ($K_{SP}=8 \times 10^{-37}$)
- (2) ZnS ($K_{SP}=7 \times 10^{-16}$)
- (3) Bi_2S_3 ($K_{SP}=1 \times 10^{-70}$)
- (4) Ag_2S ($K_{SP}=6 \times 10^{-51}$)

- 34.** The occurrence of reaction is impossible if

- (1) ΔH is +ve ; ΔS is +ve
- (2) ΔH is -ve ; ΔS is -ve
- (3) ΔH is -ve ; ΔS is +ve
- (4) ΔH is +ve ; ΔS is -ve

- 35.** Standard enthalpies of combustion of $\text{CH}_3\text{OH(l)}$, C(s) and $\text{H}_2\text{(g)}$ are -726, -393 and -286 kJ mol⁻¹ respectively. What will be the standard enthalpy of formation of $\text{CH}_3\text{OH(l)}$?

- (1) -239 kJ/mol
- (2) -383 kJ/mol
- (3) -620 kJ/mol
- (4) -46 kJ/mol

CHEMISTRY

SECTION - B [CHEMISTRY]

36. The electron affinity values (in kJ mol^{-1}) of three halogens X, Y and Z are respectively - 349, -333 and -325. Then X, Y and Z respectively are

- F_2 , Cl_2 and Br_2
- Cl_2 , F_2 and Br_2
- Cl_2 , Br_2 and F_2
- Br_2 , Cl_2 and F_2

37. Which one of the following can more readily donate the lone pair?

- NH_3
- PH_3
- AsH_3
- BiH_3

38. Al and Ga have the same covalent radius because of -

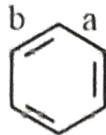
- Greater shielding of s-electron of Ga atoms ✗
- Poor shielding of s-electron of Ga atoms ✗
- Poor shielding of d-electron of Ga atoms
- Greater shielding of d-electron of Ga atoms

39. Match the column :

	Column-I (Functional group)	Column-II (effect)
(a) $-X$	(p)	+M and +I
(b) $\begin{array}{c} \text{C}-\text{O} \\ \parallel \\ \text{O} \end{array}$	(q)	+M and -I
(c) $-\text{CN}$	(r)	-M and -I
(d) $\begin{array}{c} \text{N}-\text{H} \\ \theta \end{array}$	(s)	-M and +I

- (a)-(q), (b)-(s), (c)-(r), (d)-(p)
- (a)-(p), (b)-(r), (c)-(s), (d)-(q)
- (a)-(p), (b)-(s), (c)-(r), (d)-(q)
- (a)-(q), (b)-(s), (c)-(p), (d)-(r)

40.



(C-C) bond length designated by a and b are in order :

- $a > b$
- $b > a$
- $a = b$
- None of these

41. Match the column :

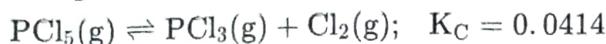
	Column-I	Column-II
(a) Inductive effect	(p)	Complete displacement of πe^- and Temporary effect
(b) Resonance	(q)	Complete displacement of πe^- and Permanent effect
(c) Hyper conjugation	(r)	Partial displacement of σe^- and Permanent effect
(d) Electromeric effect	(s)	Complete displacement of σe^- and Permanent effect

- (a)-(p), (b)-(q), (c)-(r), (d)-(s)
- (a)-(r), (b)-(q), (c)-(s), (d)-(p)
- (a)-(r), (b)-(q), (c)-(p), (d)-(s)
- (a)-(p), (b)-(r), (c)-(s), (d)-(q)

42. In which of the following equilibria, the value of K_p is less than K_c ?

- $\text{H}_2 + \text{I}_2(\text{g}) \rightleftharpoons 2 \text{HI}(\text{g})$
- $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$
- $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2 \text{NO}(\text{g})$
- $\text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + \text{H}_2(\text{g})$

43. Amount of PCl_5 (in mole) need to be added to one litre vessel at 250°C in order to obtain a concentration of 0.1 mole of Cl_2 for the given change is :

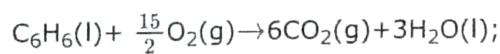


- (1) 0.3415
- (2) 0.03415
- (3) 3.415
- (4) 0.3145

44. The molar heat capacity of water at constant pressure is $75 \text{ J K}^{-1} \text{ mol}^{-1}$. 1.0 KJ of heat is supplied to 100 g of water which is free to expand, the increase in temperature of water is:

- (1) 1.2 K
- (2) 2.4 K
- (3) 4.8 K
- (4) 6.6 K

45. Consider the reaction at 300 K.



$$\Delta H = -3271 \text{ KJ}$$

What is ΔU for the combustion of 1.5 mole of benzene at 27°C ?

- (1) -3267.25 KJ
- (2) -4900.88 KJ
- (3) -4906.5 KJ
- (4) 85.28 KJ

46. The bond energies of C-C, C=C, H-H and C-H linkages are 350, 600, 400 and 410 kJ/mol, respectively. The heat of hydrogenation of ethylene is

- (1) -170 kJ mol^{-1}
- (2) -260 kJ mol^{-1}
- (3) -400 kJ mol^{-1}
- (4) 450 kJ mol^{-1}

47. Ammonium nitrate can decompose with explosion by the following reaction.
 $\text{NH}_4\text{NO}_3(\text{s}) \rightarrow \text{N}_2\text{O}(\text{g}) + 2\text{H}_2\text{O}; \Delta H = -37.0 \text{ KJ/mol}$
Calculate the heat produced when 2.50g of NH_4NO_3 decomposes -

- (1) 1.06 KJ
- (2) 0.96 KJ
- (3) 1.16 KJ
- (4) 1.26 KJ

48. What is the change in entropy when 2.5 mole of water is heated from 27°C to 87°C ?

Assume that the heat capacity is constant.

$$(C_{p,m}(\text{H}_2\text{O})) = 4.2 \text{ J/g-K}, \ln(1.2) = 0.18$$

- (1) 16.6 J/K
- (2) 9 J/K
- (3) 34.02 J/K
- (4) 1.89 J/K

49. The equilibrium constant K_p for the homogeneous gaseous reaction is 10^{-3} . The standard Gibbs free energy change ΔG° for the reaction at 27°C -

- (1) Zero
- (2) - 1.8 Kcal
- (3) - 4.145 Kcal
- (4) + 4.145 Kcal

50. A monoprotic acid in a 0.1 M solution ionizes to 0.001%. Its ionization constant is -

- (1) 1.0×10^{-3}
- (2) 1.0×10^{-6}
- (3) 1.0×10^{-8}
- (4) 1.0×10^{-11}

BIOLOGY

SECTION – A |BOTANY|

51. What are example of inclusion bodies:-

- (i) Mesosome
 - (ii) Chromatophores
 - (iii) Gas vacuole
 - (iv) Phosphate granules
 - (v) Cyanophycean granules
 - (vi) Glycogen granules
- (1) Only (ii), (iii) & (iv)
 (2) Only (iii), (iv) & (v)
 (3) Only (iii), (iv), (v) & (vi)
 (4) Only (iv), (v) & (vi)

52. Photophosphorylation is a process in which :

- (1) Light energy is converted into chemical energy in the form of ATP
- (2) NADP is formed
- (3) Chemical energy is used to produce ATP
- (4) CO₂ is reduced to carbohydrate

53. In plasmid R gene is responsible for

- (1) Exchange of genetic material between two partners
- (2) Antibiotic resistance
- (3) Locomotion
- (4) All of the above

54. Which of the following is true?

- (1) ATP & NADPH + H⁺ both are formed towards stroma.
- (2) ATP & NADPH + H⁺ both are formed in lumen of thylakoid.
- (3) ATP is formed in lumen while NADPH + H⁺ is formed towards stroma.
- (4) NADPH + H⁺ formed in lumen while ATP is formed in stroma.

55. Which among the following can be seen in the ultra structure of both eukaryotic and prokaryotic cell?

- (1) Ribosome
- (2) Mitocondria
- (3) Chloroplast
- (4) ER

56.

In an experiment where a part of a leaf is enclosed in a test tube containing KOH-soaked cotton and exposed to light, will-

- (1) Test positive for starch
- (2) Test negative for starch due to unavailability to absorb light inside test tube
- (3) Test negative for starch due to unavailability to absorb CO₂
- (4) Test negative for starch due to absence of water

57.

Which of the following is not correct?

- (1) Virchow explained that cells are formed from pre-existing cells.
- (2) Schleiden and Schwann formulated the cell theory.
- (3) Robert Brown discovered the cell.
- (4) A unicellular organism carries out its life activities within a single cell.

58.

Photorespiration occurs due to _____ activity of RuBisCO.

- (1) Carboxylase
- (2) Reductase
- (3) Transferase
- (4) Oxygenase

59.

Assertion : Photorespiration doesn't occur in C₄ plants.

Reason : CO₂ concentration at the enzyme site is high in C₄ plants.

Chose correct option-

- (1) Both assertion and reason are correct, and reason is the correct explanation for assertion.
- (2) Assertion is correct and Reason is wrong
- (3) Assertion is wrong and Reason is correct
- (4) Both Assertion and Reason are wrong

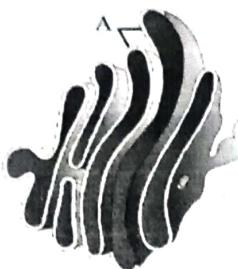
60.

The difference between rough endoplasmic reticulum and smooth endoplasmic reticulum is that rough endoplasmic reticulum

- (1) does not contain ribosomes
- (2) contains ribosomes
- (3) does not transport proteins
- (4) transports proteins

- 61.** Lysosomes are the reservoirs (store houses) of:-
 (1) hydrolytic enzymes
 (2) secretory glycoproteins
 (3) RNA and protein
 (4) fats (or sugars or ATP)
- 62.** Mark the odd one (with respect to internal factors affecting photosynthesis)
 (1) Amount of chlorophyll
 (2) Light intensity
 (3) Mesophyll cells
 (4) Orientation of leaves
- 63.** The cell organelle involved in the glycosylation of proteins is:
 (1) ribosome
 (2) peroxisome
 (3) Golgi body
 (4) endoplasmic reticulum
- 64.** For further complete oxidation of glucose, pyruvic acid enters to which among the following?
 (1) ETS
 (2) Oxidative decarboxylation
 (3) EMP pathway
 (4) None of the above
- 65.** In plant tonoplast facilitates the transport of a number of (i); (ii) the concentration gradient.
 (1) (i) Solutes (ii) Along
 (2) (i) ions (ii) Along
 (3) (i) ions (ii) against
 (4) (i) solutes (ii) against
- 66.** Acetyl-CoA can be formed from the breakdown of:-
 (1) Carbohydrates only
 (2) Carbohydrates, fats and amino acids
 (3) Carbohydrates & fats only
 (4) Carbohydrates & amino acids only
- 67.** A number of proteins synthesized by ribosomes on the (i) are modified in the (ii) of the (iii).
 (1) (i) ER (ii) Golgi body (iii) cisternae
 (2) (i) Golgi body (ii) cisternae (iii) ER
 (3) (i) cisternae (ii) ER (iii) Golgi body
 (4) (i) ER (ii) cisternae (iii) Golgi body
- 68.** How many net gain ATP molecules are directly yielded from complete oxidation of one glucose (including ATP of TCA)?
 (1) 4
 (2) 2
 (3) 3
 (4) 8
- 69.** The main function of lysosome is :
 (1) Sexual reproduction
 (2) Extracellular digestion
 (3) Intracellular digestion
 (4) None of these
- 70.** Match the columns & choose the correct option:-
- | | Column - I | | Column - II |
|-----|------------------------|-------|---------------------------|
| (A) | Hexokinase | (i) | ETS |
| (B) | Pyruvate dehydrogenase | (ii) | Glycolysis |
| (C) | Citrate Synthase | (iii) | Oxidative decarboxylation |
| (D) | NADH dehydrogenase | (iv) | TCA cycle |
- (1) (A) - (i), (B) - (iii), (C) - (ii), (D) - (iv)
 (2) (A) - (iv), (B) - (i), (C) - (ii), (D) - (iii)
 (3) (A) - (iii), (B) - (ii), (C) - (i), (D) - (iv)
 (4) (A) - (ii), (B) - (iii), (C) - (iv), (D) - (i)

71. Identify the correct statement for A in the given diagram -



- Its number always remain constant in Golgi complex of all organism
- The cis and trans faces are entirely different but not interconnected
- Diameter is 0.5m to 1.0 m
- Concentrically arranged near the nucleus with distinct convex cis or the forming face and concave trans or the maturing face

72. First oxidative decarboxylation in aerobic respiration occurs during the conversion of:-

- Oxalosuccinic acid to isocitric acid
- Pyruvic acid to acetyl CoA
- α -ketoglutaric acid to succinyl CoA
- Fumaric acid to malic acid

73. What are types of thylakoid inside the chloroplast:-

- Granal thylakoid and stroma lamellae
- Granum thylakoid only
- Stroma thylakoid only
- None of the above

74. During which state in the complete oxidation of glucose are the greatest number of ATP molecules formed from ADP ?

- Conversion of pyruvic acid to acetyl Co-A
- Electron transport chain
- Glycolysis
- Kreb's cycle

75. Mitosis without cytoplasmic division is called:-

- Cryptomitosis
- Endomitosis
- Free nuclear div.
- Mitosis

76. Match the column in respect with the measurement of growth-

Column I	Column II
(a) Maize root cells	(i) Length
(b) Watermelon cell	(ii) Surface area
(c) Pollen tube	(iii) Cell number
(d) Dorsiventral leaf	(iv) Cell size

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

(2) a-iii, b-ii, c-i, d-iv ✓

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

(4) a-i, b-ii, c-iv, d-iii ✓

77. The homologous chromosomes follow the process of synapsis in the stage

Or

Pairing of homologous chromosome takes place in

- Leptotene
- Zygotene
- Diplotene
- Pachytene

78. Synthetic auxins are:-

- IAA
- IBA
- NAA
- Both (1) & (2)

79. A higher proportion of ethylene is found in-

- Ripening banana
- Green banana
- Green apple
- Fresh potato tuber

80. In what respect auxin and cytokinins act antagonistically ?

- Cell division
- Plant growth
- Growth of lateral buds
- Delay in senescence

81. **Assertion:** Juvenile conifers are sprayed with GA

- Reason:** GA delays senescence and malting period

Which of the given options are correct?

- Both assertion & reason are correct and reason is correct explanation of assertion
- Both assertion & reason are correct but reason is not explanation of assertion
- Assertion is correct but reason is wrong
- Both assertion & reason are in correct

82. In chloroplast proton gradient formation occurs:

- (1) In thylakoid membrane
- (2) In lumen
- (3) In stroma
- (4) In periplastidial space

83. Bundle sheath cells of C₄ plants:-

- (1) Allow gaseous exchange
- (2) Have intercellular spaces
- (3) Have large number of chloroplasts
- (4) All of these

84. Ubiquinone is located

- (1) On the outer surface of inner membrane
- (2) On the inner surface of outer membrane
- (3) Within inner membrane
- (4) Within outer membrane

85. Which is not true regarding cyclic electron transfer system (ETS) in higher plants?

- (1) A possible location of cyclic electron transfer system is in the stroma lamellae
- (2) Only PS I is involved
- (3) results only in the synthesis of ATP
- (4) External electron donor is required

BIOLOGY

SECTION - B, BOTANY

- 86.** Which one of the following statement is incorrect for interphase stage?
- Period of great metabolic activity
 - Also called preparatory phase
 - Absence of replication of DNA
 - It covers over 95% of the total duration of cell cycle
- 87.** Which one of the following proceeds reformation of the nuclear envelope during M phase of the cell cycle -
- Transcription from chromosomes and reassembly of the nuclear lamina
 - Formation of the contractile ring and formation of the phragmoplast
 - Formation of the contractile ring and transcription from chromosome
 - Decondensation from chromosomes and reassembly of the nuclear lamina
- 88.** A type of cell division which reduces chromosome number to half is
- Mitosis
 - Multiple fission
 - Fragmentation
 - Meiosis
- 89.** Anaphase is characterised by -
- Migration of daughter chromatid toward equator.
 - centromere of each chromosome remain directed toward pole
 - centromere of each chromosome remain directed toward equator
 - Chromatid split and centromere separate
 - Chromatid separate after centromere split
- i, ii, v
 - ii, iv, v
 - iii, v
 - ii, iv
- 90.** In the somatic cell cycle :
- In G₁ phase DNA content is double the amount of DNA present in the original cell
 - RNA replication takes place in S-phase
 - A short interphase is followed by a long mitotic phase
 - G₂ phase follows mitotic phase
- 91.** What number of chromosome does onion somatic cell have in G₁, S, G₂ & M - phase respectively
- 32, 16, 16, 32
 - 16, 32, 16, 16
 - 16, 16, 16, 16
 - None of these
- 92.** Which of these is an H carrier?
- PS II
 - Ferredoxin
 - Plastocyanin
 - Plastoquinone
- 93.** Acceptor of CO₂ in C₃ Cycle is-
- 3C compound
 - 4C compound
 - 5C compound
 - 6C compound
- 94.** The modified view of the law of limiting factor is written as:-
- Relatively limiting factor
 - The factor in relative minimum
 - The most significant factor
 - Any of the above
- 95.** Meaning of glycolysis is-
- Splitting of water
 - Splitting of sugar
 - Splitting of fat
 - Splitting of protein
- 96.** When two molecules of acetyl-CoA enter the TCA cycle, net gain at the end of the cycle is:-
- 2NADH₂ + 2FADH₂ + 1GTP
 - 3NADH₂ + 2FADH₂ + 2GTP
 - 6NADH₂ + 2FADH₂ + 2GTP
 - 3NADH₂ + 1FADH₂ + 4GTP

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97. Match list I with list II-

	List-I		List-II
(A)	Breaking of C-C bond	(I)	Cyt b-C ₁
(B)	Amphibolic pathway	(II)	Glucose → Pyruvate
(C)	Complex - III	(III)	O ₂
(D)	Last e- acceptor	(IV)	TCA Cycle

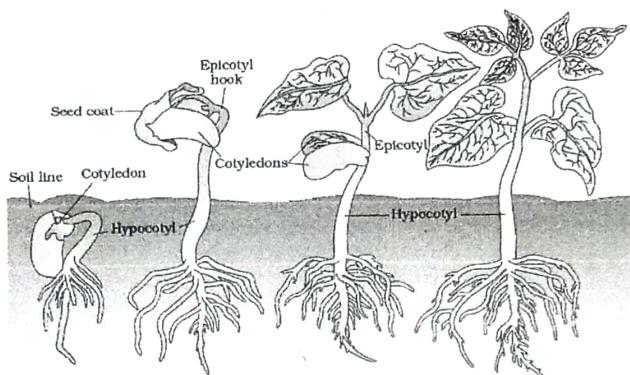
(1) A-III, B-IV, C-II, D-I

(2) A-II, B-I, C-IV, D-III

(3) A-II, B-IV, C-I, D-III

(4) A-IV, B-II, C-III, D-I

98. The given figure shows-



(1) Germination & development in bean

(2) Germination & development in maize

(3) Germination & development in pea

(4) Germination & development in gram

99. Hormone ref

(1) ABA

(2) auxin

(3) GA

(4) cytokinin

100. Assertion: The sum of growth and differentiation is development.

Reason: Development in plants is under the control of extrinsic factors only.

(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 statement but (R) is false.

(4) Both (A) and (R) are false.

BIOLOGY

SECTION – A [ZOOLOGY]

101. In the presence of Ca^{2+} channel blockers, which of the following will be true?

- (1) Neurotransmitter is released but Na^+ channels of post-synaptic neuron will not open
- (2) Neurotransmitter is not released but Na^+ channels of post-synaptic neuron will open up
- (3) Neurotransmitter is released but K^+ channels of post-synaptic neuron open up
- (4) Neither neurotransmitter is released nor the Na^+ channels of post-synaptic neuron open up

102. Which of the part of hind brain consists of fibre tracts that interconnect different regions of brain:-

- (1) Cerebellum
- (2) Pons
- (3) Medulla
- (4) Amygdala

103. The two major division of Human neural system are?

- (1) CNS and brain
- (2) ANS and PNS
- (3) CNS and PNS
- (4) Brain and Spinal cord

104. Statement-I : Three major parts make up the brain stem; mid brain, cerebellum and medulla oblongata.

Statement-II : The dorsal portion of the midbrain consists mainly of four round swelling (lobes) called cerebral aqueduct.

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

105. Match List - I with List - II:

	List - I	List - II
(a)	Multipolar neuron	(i) Somatic neural system
(b)	Bipolar neuron	(ii) Cerebral cortex
(c)	Myelinated nerve fibre	(iii) Retina of Eye
(d)	Unmyelinated nerve fibre	(iv) Spinal nerves

Choose the correct answer from the options given below: -

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

106. Which part doesn't include in limbic system ?

- (1) Limbic lobe
- (2) Corpora quadrigemina
- (3) Amygdala lobe
- (4) Hippocampus

107. Identify the correct set of statements :

- (a) In Hydra, neural organization is composed of network of neurons.
- (b) Afferent nerves transmit impulses from CNS to tissues.
- (c) Somatic neural system relays impulses from CNS to smooth muscles.
- (d) The cell body contains Nissl's granules.
- (e) The myelinated nerve fibres are not enveloped with schwann cells.

Choose the correct answer from options given below :

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

108. Select the incorrect statement regarding synapses-

- (1) Electrical current can flow directly from one neuron into the other across the electrical synapse.
- (2) Chemical synapses use neurotransmitters
- (3) Impulse transmission across a chemical synapse is always faster than that across an electrical synapse.
- (4) The membranes of presynaptic and postsynaptic neurons are in close proximity in an electrical synapse.

109. Match List I with List II:

List I		List II
A. Pons	I.	Provides additional space for Neurons. Regulates posture and balance.
B. Hypothalamus	II.	Controls respiration and gastric secretions.
C. Medulla	III.	Connects different regions of brain.
D. Cerebellum	IV.	Neuro secretory cells

Choose the correct answer from the options given below:-

- (1) A-I, B-III, C-II, D-IV
- (2) A-II, B-I, C-III, D-IV
- (3) A-II, B-III, C-I, D-IV
- (4) A-III, B-IV, C-II, D-I

110. Find out the **incorrect** statement regarding muscle contract protein structure -

- (1) Each myosin filament is also a polymerised protein
- (2) Many monomeric protein called Meromyosins Constitute one thick filament.
- (3) Each Meromyosin has two important part head being called LMM and tail being called HMM
- (4) The globular head is an active ATPase enzyme and has binding sites for ATP and active sites for actin.

111. **Statement-I :** Cardiac muscle are involuntary in natures as the nervous system does not control their activities directly.

Statement-II : Based on the appearance cardiac muscles are nonstriated.

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

112. The H-zone in the skeletal muscle fibre is-

- (1) Extension of myosin filaments in the central portion of the A-band
- (2) The absence of myofibrils in the central portion of A-band
- (3) The central gap between myosin filaments in the A-band
- (4) The central part of myosin filaments not overlapped by thin filaments in the A-band

113. Read following statements from **A-E** :

- (A) Formation of cross bridge.
- (B) Release Ca^{+2} ions from sarcoplasmic reticulum into the sarcoplasm
- (C) ATP hydrolysis occur at myosin head
- (D) Unmasking of myosin binding sites
- (E) Acting filaments slides over myosin filaments

Arrange in **correct** order of muscle contraction

- (1) C → A → B → D → E
- (2) C → B → D → A → E
- (3) B → D → C → A → E
- (4) B → A → C → D → E

114. Ciliary movement occurs in most of our internal tubular organs which are lined by ...**A** epithelium. The coordinated movement of cilia in the ...**B**... help us in removing dust particles. Passage of ova through female reproductive tract is facilitated by the ...**C**... movement.

Identify **A**, **B** and **C** to complete the given statement.

- (1) **A**-squamous, **B**-trachea, **C**-ciliary
- (2) **A**-cuboidal, **B**-trachea, **C**-amoeboid
- (3) **A**-ciliated, **B**-trachea, **C**-ciliary
- (4) **A**-stratified, **B**-trachea, **C**-amoeboid

115. During muscular contraction, which of the following events occur?

- (i) H-zone disappears
 - (ii) A-band elongated
 - (iii) The length of I band reduces
 - (iv) Length of thin filament is unaffected
 - (v) Length of sarcomere reduce
- (1) (i), (iii), (iv) and (v)
 - (2) (i), (ii) and (v)
 - (3) (ii), (iv) and (v)
 - (4) (i) (ii) and (iii)



116. Match List I with List II :

List-I		List-II	
A.	Fibrous joints	I.	Adjacent vertebrae, limited movement
B.	Cartilaginous joints	II.	Humerus and pectoral girdle, rotational
C.	Hinge joints	III.	Skull, don't allow any movement
D.	Ball and socket joints	IV.	Knee, Help in locomotion

Choose the correct answer from the options given below :

- (1) A-II, B-III, C-I, D-IV
- (2) A-III, B-I, C-IV, D-II
- (3) A-IV, B-II, C-III, D-I
- (4) A-I, B-III, C-II, D-IV

117. Which character is **not** associated with White muscle fibres ?

- (1) Less quantity of myoglobin
- (2) Number of mitochondria are few
- (3) Amount of sarcoplasmic reticulum is low
- (4) Depend on anaerobic process for energy

118. Fill in the blanks :-

On average, _____ of blood is filtrated by the kidney per minute which constitute roughly _____ of the blood - pumped out by each ventricle of heart in a minute -

- (1) 125 ml, 1/6th
- (2) 100-125 ml, 1/6th
- (3) 1100-1200 ml, 1/5th
- (4) 5 L, 1/10th

119. Statement I: Kidneys do not play any significant role in the removal of ammonia.

Statement II: Some amount of ammonia may be retained in the kidney matrix of some animals to maintain a desired osmolarity.

- (1) Both **statements I** and **II** are incorrect
- (2) **Statement I** correct and **II** incorrect
- (3) **Statement I** incorrect and **II** correct
- (4) Both **statements I** and **II** are correct

120. Fill in the blanks :-

- (a) Reabsorption of water from distal parts of the tubules is facilitated by hormone A.
- (b) Dialysis fluid contain all the constituents as in plasma except B.
- (c) A healthy adult human excretes (on an average) C gm of urea/day.
- (1) A → Aldosterone, B → Nitrogenous wastes, C → 25-30
- (2) A → Aldosterone, B → Nitrogenous wastes, C → 20-25
- (3) A → ADH, B → Nitrogenous wastes, C → 25-30
- (4) A → ADH, B → Nitrogenous wastes, C → 20-25

121. Assertion (A): Glucose, amino acids, Na^+ etc. in the filtrate are reabsorbed actively.

Reason (R): The nitrogenous wastes are absorbed by passive transport.

- (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 statement but **(R)** is false.
- (4) Both **(A)** and **(R)** are false.

122. Fill in the blanks :-

(i) In counter current mechanism, NaCl is transported by the a limb of Henle's loop which is exchanged with the b limb of vasa recta.

(ii) NaCl is returned to the interstitium by ascending portion of c.

- (1) a-ascending, b-descending, c-collecting tubule
- (2) a-descending, b-ascending, c-collecting tubule
- (3) a-descending, b-ascending, c-vasa recta
- (4) a-ascending, b-descending, c-vasa recta

123. Identify the correct option with respect to hormone, its source and its function:-

(1) **Hormone-** Renin, **Source-** Kidney, **Functions-** Converts angiotensin I to angiotensin II

(2) **Hormone-** ANF, **Source-** Ventricles of heart, **Functions-** Increases blood pressure

(3) **Hormone-** ADH, **Source-** Adenohypophysis, **Functions-** Increases water loss through urine

(4) **Hormone-** Aldosterone, **Source-** Adrenal cortex, **Functions-** Stimulates reabsorption of Na^+ and water from DCT

124. **Statement-I :** The process of release of urine is called micturition and the neural mechanism causing it is called the micturition reflex.

Statement-II : Micturition occurs when initiation of relaxation of smooth muscles of the bladder and simultaneous contraction of urethral sphincter.

- (1) Both **Statement-I** and **Statement-II** are true.
- (2) **Statement-I** is false but the **Statement-II** is true.
- (3) **Statement-I** is true but the **Statement-II** is false.
- (4) Both **Statement-I** and **Statement-II** are false.

125. Presence of which of the following conditions in urine are indicative of Diabetes Mellitus?

- (1) Uremia and Renal Calculi
- (2) Ketonuria and Glycosuria
- (3) Renal calculi and Hyperglycaemia
- (4) Uremia and Ketonuria

126. Match the following-

	Column - I	Column - II
(A)	Liver	(i) excrete watery fluid containing NaCl, small amount of urea and lactic acid etc
(B)	Sebaceous gland	(ii) excrete sterols, hydrocarbons, waxes etc.
(C)	Lungs	(iii) secrete degraded hormones.
(D)	Sweat gland	(iv) remove 200 ml of CO ₂ per minute.

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

127. A pregnant female delivered a baby who suffers from Stunted growth, mental retardation, Intelligence quotient, and Abnormal skin.

This is the result of?

- (1) Over secretion of pars distalis
- (2) Deficiency of iodine in diet
- (3) Low secretion of growth hormone
- (4) Cancer of the thyroid gland

128. **Assertion :** Pancreas is a composite gland.
Reason : Pancreas secretes pancreatic juice as well as β cells of it secrete Insulin hormone.

- (1) If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- (2) If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- (3) If Assertion is True but the Reason is False
- (4) If both Assertion & Reason are false.

129. **Statement-I :** Glucagon reduces the cellular glucose uptake and utilisation thus glucagon is hyperglycemic hormone.

- Statement-II :** Glucagon acts mainly on hepatocytes and adipocytes cell of adipose tissue to stimulate glycogenesis.
- (1) Both **statements I** and **II** are correct.
 - (2) Both **statements I** and **II** are incorrect.
 - (3) Only **statement I** is correct.
 - (4) Only **statement II** is correct.

130. Select the set of disorders which are caused due to hyper secretion of hormones?

- (1) Acromegaly and cretinism
- (2) Grave's disease and diabetes mellitus
- (3) Cretinism and addison's disease
- (4) Acromegaly and exophthalmic goitre

131. The main glucocorticoid in our body is-

- (1) Cortisol
- (2) Glucagon
- (3) Insulin
- (4) Aldosterone

132. **Statement-I :** A neuron is microscopic structure composed of two major parts namely cell body and axon.

Statement-II : The PNS is divided into two divisions called somatic neural system and autonomic neural system.

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

133. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (mostly in the nucleus)?

- (1) Insulin, glucagon
- (2) Thyroxine, insulin
- (3) Somatostatin, oxytocin
- (4) Cortisol, testosterone

134. Which of the following functions are regulated by melatonin hormone of pineal gland?

- (a) Menstrual cycle
 - (b) 24 hour rhythm
 - (c) Defense capability
 - (d) Pigmentation
 - (e) Ca^{++} level of blood
 - (f) Water and Electrolyte balance
 - (g) Metabolism
- (1) a, b, c, d, e
 - (2) a, c, d, f, g
 - (3) b, d, e, f, g
 - (4) a, b, c, d, g

135. Statement-I : Gastrin act on the gastric glands and stimulates the secretion of hydrochloric acid and pepsinogen.

Statement-II : CCK acts on the exocrine pancreas and stimulate secretion of water and bicarbonates ions.

- (1) Both **statements I** and **II** are correct.
- (2) Both **statements I** and **II** are incorrect.
- (3) Only **statement I** is correct.
- (4) Only **statement II** is correct.

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BIOLOGY

SECTION – B [ZOOLOGY]

136. Complete the statement by choosing appropriate match among the following –

	Column-I	Column-II
(A)	Resting potential	(i) Chemicals involved in the transmission of impulses at synapses.
(B)	Nerve impulse	(ii) Gap between the pre-synaptic and post-synaptic neurons.
(C)	Synaptic cleft	(iii) Electrical potential difference across the resting neural membrane.
(D)	Neurotransmitters	(iv) An electrical wave like response of a neuron to a stimulation.

- (1) A-ii, B-iii, C-i, D-iv
- (2) A-iv, B-iii, C-ii, D-i
- (3) A-iii, B-iv, C-ii, D-i
- (4) A-iii, B-i, C-ii, D-iv

137. Assertion (A) : The medulla contains centres which control respiration, cardiovascular reflexes and gastric secretions.

Reason (R) : Medulla has very convoluted surface in order to provide the additional space for many more neurons

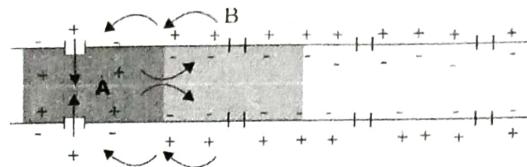
- (1) If both assertion and reason are true and reason is the correct explanation of assertion.
- (2) If both assertion and reason are true but reason is not the correct explanation of assertion.
- (3) If assertion is true but reason is false.
- (4) assertion and reason both are false

138. Statement - I : Sodium-potassium pump transports 3 Na^+ into the cell and 2 K^+ outward.

Statement - II : $\text{Na}^+ - \text{K}^+$ channel always remains in open state.

- (1) Both **statements I** and **II** are correct.
- (2) Both **statements I** and **II** are incorrect.
- (3) Only **statement I** is correct.
- (4) Only **statement II** is correct.

139. Given below is the diagrammatic representation of impulse conduction through an axon.



Select the option with the incorrect information about impulse conduction at point A and B :

- (1) An electric current flows on the inner surface from site A to B and on outer surface, from site B to A to complete the circuit
- (2) Action potential generated at site-A arrives at site B
- (3) This current promotes opening of channels at site-B.
- (4) Polarity at the site-B is reversed and hence called repolarisation

140. Correctly match column-I with column-II.

	Column-I	Column-II
A	Tetany	i mutation in genes responsible for healthy muscle and structure.
B	Osteoporosis	ii auto immune condition leading to long term neuromuscular disease causing weakening of skeletal muscles.
C	Muscular dystrophy	iii Inflammation of joints
D	Arthritis	iv Rapid spasms in muscle
E	Myasthenia Gravis	v Decrease in bone mass

- (1) A → (i), B → (ii), C → (iii), D → (iv), E → (v)
- (2) A → (iv), B → (v), C → (iii), D → (i), E → (ii)
- (3) A → (iv), B → (v), C → (i), D → (iii), E → (ii)
- (4) A → (ii), B → (iii), C → (i), D → (v), E → (iv)

Q

- Read the following statements carefully and select the appropriate option given below.
- A single U-shaped bone called hyoid is present at the base of the skull and it is also included in the cranium.
 - The junction between a motor neuron and the sarcolemma of the muscle fibre is called the neuromuscular junction.
 - Sternum is a flat bone on the ventral midline of thorax.
 - Ribs has two articulation surfaces on its ventral ends and hence called bicephalic.
 - The two halves of the pelvic girdle meet ventrally to form the public symphysis containing fibrous cartilage.
- (1) All are correct except (ii) and (iii)
 (2) All are correct except (iii) and (iv)
 (3) All are correct except (i) and (iv)
 (4) All are correct except (i) and (v)

Q

142. Assertion (A) : Muscle contraction is initiated by a signal sent by the central Nervous system via a motor neuron.

Reason (R) : The Junction between a motor neuron and the sarcolemma of muscle fibre is called the Neuromuscular Junction.

- 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 statement but (R) is false.
- Both (A) and (R) are false.

143. Following are the steps of dialysis -

- Blood is passed into a vein
- Blood is mixed with heparin
- Blood is mixed with anti-heparin
- Blood is drained from convenient artery
- Blood is passed through a coiled and porous cellophane tube bathing in dialysis fluid.
- Removal of nitrogenous waste from blood

The correct sequence of steps is -

- A → B → C → D → E → F
- F → C → E → B → A → D
- D → B → E → F → C → A
- D → C → E → F → B → A

144. Statement-I : 99% of the filtrate has to be reabsorbed by the renal tubules this process is ~~is~~ called reabsorption.
Statement-II: Reabsorption either by actively and passively substances like glucose, amino acids, Na⁺ etc. in the filtrate are reabsorbed passively.

- Both Statement-I and Statement-II are correct
- Statement-I is incorrect but the Statement-II is correct.
- Statement-I is correct but the Statement-II is incorrect.
- Both Statement-I and Statement-II are incorrect.

145. Assertion (A) : ANF mechanism acts as a check on the renin angiotensin mechanism.

Reason (R) : ANF can cause vasoconstriction and thereby increase the blood pressure.

- 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 statement but (R) is false.
- Both (A) and (R) are false.

146. Which of the following parts of the nephron is correctly matched with their functions ?

	Column-I (Parts of the nephron)		Column-II (Functions)
(A)	Proximal convoluted tubules	(i)	Sodium is reabsorbed actively in this region
(B)	Distal convoluted tubules	(ii)	Sodium and water are reabsorbed under hormonal influence in this region
(C)	Descending limb	(iii)	Primary site of glucose and amino acid reabsorption
(D)	Ascending limb	(iv)	Major substance reabsorbed here is water by osmosis

- A-i, B-ii, C-iii, D-iv
- A-iv, B-i, C-ii, D-iii
- A-iii, B-iv, C-ii, D-i
- A-iii, B-ii, C-iv, D-i

Match the column related to pancreas

(a) Hyperglycemia	(i)	Due to insulin, stimulates conversion of glucose to glycogen.
(b) Gluconeogenesis	(ii)	Due to glucagon, increased blood sugar.
(c) Hypoglycemia	(iii)	Rapid movement of glucose from blood to hepatocyte decreased blood glucose.
(d) Glycogenesis	(iv)	Due to glucagon, stimulate conversion of non-carbohydrate substances into glucose.

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

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

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

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

148.

Consider the following statements and select the option stating which ones are **true (T)** and which ones are **false (F)**?

- (A) The Anterior pituitary gland is under the direct neural regulation of the hypothalamus.
- (B) Thyrocalcitonin is a protein hormone which regulates the blood calcium level.
- (C) Catecholamines stimulate the breakdown of glycogen resulting in an increased concentration of glucose in blood.
- (D) Oxytocin and Vasopressin are actually synthesised by the hypothalamus and are transported to pituitary gland through a portal circulatory system

(1) A-T, B-F, C-T, D-F

(2) A-T, B-F, C-F, D-T

(3) A-T, B-T, C-T, D-F

(4) A-F, B-T, C-T, D-F

149. Assertion :- Thyrocalcitonin & Parathormone have antagonistic effect on blood calcium level
Reason:- Thyrocalcitonin lower the blood calcium level and parathormone raises the blood calcium level by removal of calcium from bone and reabsorption of calcium from nephrons.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

150. Statement-I : Hormones which interact with intracellular receptors generate second messenger.

Statement-II : Hormones like insulin glucagon pituitary hormones generate second messengers.

(1) Both **statements I** and **II** are correct.

(2) Both **statements I** and **II** are incorrect.

(3) **Statement I** is correct but **Statement II** is incorrect.

(4) **Statement I** is incorrect but **Statement II** is correct

PHYSICS

SECTION – A [PHYSICS]

- 51.** 30 gram of copper is heated to increase its temperature by 20°C if the same quantity of heat is given to 20 gram of water the rise in its temperature. ($S_w = 4200 \text{ J/kg}\cdot\text{K}$ and $S_{cu} = 420 \text{ J/kg}\cdot\text{K}$)
- (1) 5°C
 (2) 6°C
 (3) 3°C
 (4) 8°C
- Q = m s ΔT*
 $= 30 \times 420$
- 52.** For a particle executing SHM the KE is given by $K = K_0 \sin^2 t$. The maximum value of potential energy is
- (1) K_0
 (2) Zero
 (3) $K_0/2$
 (4) Not obtainable
- 53.** From what height a block of ice must fall into a well so that $1/100$ th part of its mass may melt? The temperature of water in the well is 0°C .
- (1) 3360 m
 (2) 33.6 m
 (3) 336 m
 (4) 3.36 m
- 54.** A particle executes simple harmonic motion. Its amplitude is 8 cm and time period is 6 s. The time it will take to travel from its position of maximum displacement to the point corresponding to half of its amplitude is-
- (1) 1 sec
 (2) 3 sec
 (3) 2 sec
 (4) 4 sec
- 55.** 20 gm ice at -10°C is mixed with m gm steam at 100°C . The minimum value of m so that finally all ice and steam converts into water is : (Use $s_{ice} = 0.5 \text{ cal/gm}^{\circ}\text{C}$, $s_{water} = 1 \text{ cal/gm}^{\circ}\text{C}$, L (melting) = 80 cal/gm and L (vaporization) = 540 cal/gm)
- (1) $\frac{32}{85} \text{ gm}$
 (2) $\frac{850}{32} \text{ gm}$
 (3) $\frac{85}{32} \text{ gm}$
 (4) $\frac{320}{85} \text{ gm}$
- 156.** The time period of a mass suspended from a spring is 5s. The spring is cut into four equal parts and same mass is now suspended from one of its parts. The period is now-
- (1) 5s
 (2) ~~2.5s~~
 (3) 1.25 s
 (4) $\frac{5}{16} \text{ s}$
- 157.** 10 gm of ice at -20°C is dropped into a calorimeter containing 10 gm of water at 10°C ; the specific heat of water is twice that of ice. When equilibrium is reached, the calorimeter will contain
- (1) 20 gm of water
 (2) 20 gm of ice
 (3) 10 gm ice and 10 gm water
 (4) 5 gm ice and 15 gm water
- 158.** What will be the time period of a simple pendulum in a freely falling lift :-
- (1) 0
 (2) ∞
 (3) $\sqrt{\frac{1}{g}}$
 (4) $\sqrt{\frac{1}{2g}}$
- 159.** The temperature of a body falls from 52°C to 36°C in 10 minutes when placed in a surrounding of constant temperature 20°C . What will be the temperature of the body after another 10 min. (Use Newton's law of cooling)
- (1) 28°C
 (2) 20°C
 (3) 32°C
 (4) 24°C
- 160.** Two bodies P & Q of equal mass are suspended from two separate massless springs of force constants k_1 & k_2 respectively. If the maximum velocity of them are equal during their motion, the ratio of amplitude of P to Q is :
- (1) $\frac{k_1}{k_2}$
 (2) $\sqrt{\frac{k_2}{k_1}}$
 (3) $\frac{k_2}{k_1}$
 (4) $\sqrt{\frac{k_1}{k_2}}$

161. v_{rms} , v_{av} and v_{mp} are root mean square, average and most probable speeds of molecules of a gas obeying Maxwellian velocity distribution. Which of the following statements is correct

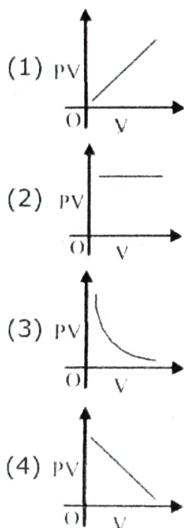
- (1) $v_{rms} < v_{av} < v_{mp}$
- (2) $v_{rms} > v_{av} > v_{mp}$
- (3) $v_{mp} < v_{rms} < v_{av}$
- (4) $v_{mp} > v_{rms} > v_{av}$

(3) (8) 2
3 3

162. The potential energy of a particle executing SHM changes from maximum to minimum in 5 s. Then the time period of SHM is :

- (1) 5 s
- (2) 10 s
- (3) 15 s
- (4) 20 s

163. Which of the following graphs is correct for an ideal gas at constant pressure ?

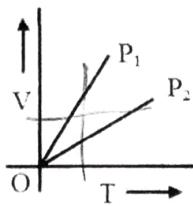


164. Two particles execute S.H.M. in same straight line. Their amplitude & frequency are equal. When their displacement is half of amplitude, they pass each other in opposite direction. Phase difference will be

- (1) $\frac{\pi}{3}$
- (2) $\frac{2\pi}{3}$
- (3) $\frac{\pi}{4}$
- (4) 2π



165. The V-T graph for an ideal gas is :



- (1) $P_1 > P_2$
- (2) $P_1 < P_2$
- (3) $P_1 = P_2$
- (4) $P_1 \geq P_2$

166. The bob of a simple pendulum is a spherical hollow ball filled with water. A plugged hole near the bottom of the oscillating bob gets suddenly unplugged. During observation, till water is coming out, the time period of oscillation would

- (1) First increase and then decrease to the original value
- (2) first decrease and then increase to the original value
- (3) remain unchanged
- (4) increase towards a saturation value

167. An ideal gas initially at pressure 1 bar is being compressed from 30 m^3 to 10 m^3 volume and its temperature decreases from 320 K to 280 K, then find final pressure of the gas.

- (1) 2.625 bar
- (2) 3.4 bar
- (3) 1.325 bar
- (4) 4.5 bar

$$PV = nRT$$

168. The total energy of a particle, executing simple harmonic motion is:- (where x is the displacement from the mean position)

- (1) independent of x
- (2) $\propto x^2$
- (3) $\propto x$
- (4) $\propto x^{1/2}$

169. A particle moving along the x-axis executes simple harmonic motion, then the force acting on it is given by

- (1) $-A Kx$
- (2) $A \cos (Kx)$
- (3) $A \exp (-Kx)$
- (4) $A Kx$

170. A vertical cylinder closed at both ends is fitted with a smooth piston dividing the volume into two parts each containing one mole of air. At the equilibrium temperature of 320 K, the upper and lower parts are in the ratio 4 : 1. The ratio will become 3 : 1 at a temperature of -

- 450 K
- 228 K
- 420 K
- 570 K

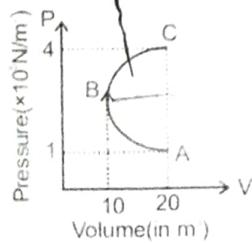
171. A perfect gas at 27°C is heated at constant pressure to double its volume. The temperature of the gas will be -

- 300°C
- 327°C
- 600°C
- 54°C

172. A simple pendulum hangs from the ceiling of a car. If the car accelerates with a uniform acceleration, the frequency of the simple pendulum will :-

- Increase
- Decrease
- Become infinite
- Remain constant

173. In the P-V diagram shown in the figure. A B C is a semicircle. Find the work done in the process A B C.

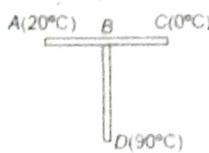


- $275\pi \text{ kJ}$
- $340\pi \text{ kJ}$
- $240\pi \text{ kJ}$
- $375\pi \text{ kJ}$

174. Two pendulums of length 1m and 1.21m respectively start swinging together with same amplitude. The number of vibrations that will be executed by the longer pendulum before the two will swing together again are :

- 9
- 10
- 11
- 12

175. Three conducting rods of same material and equal cross section areas are shown in the figure. Temperature of A, D, C are maintained at 20°C, 90°C and 0°C respectively. Ratio of length BD to that of BC if there is no heat flow in AB, is

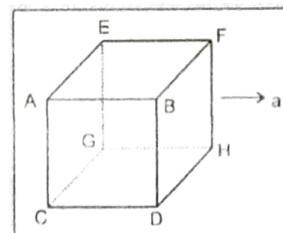


- 2 : 9
- 7 : 2
- 9 : 2
- 2 : 7

176. Equation of a wave is given as $y = f(p x + q t)$ where p and q are positive constants. What is the velocity of wave and its direction of motion?

- $\left(\frac{q}{p}\right)$, -x axis
- $\left(\frac{q}{p}\right)$, +x axis
- $\left(\frac{p}{q}\right)$, +x axis
- $\left(\frac{p}{q}\right)$, -x axis

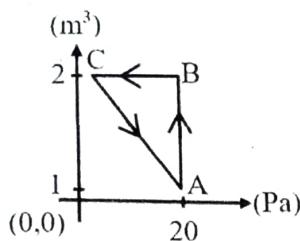
177. A cubical box is completely filled with mass m of a liquid and is given horizontal acceleration a as shown. Match the force due to fluid pressure on the faces of the cube with their appropriate values (assume zero pressure at minimum pressure)



Column-I	Column-II
A Force on face ABFE	P $\frac{ma}{2}$
B Force on face BFHD	Q $\frac{mg}{2}$
C Force on face ACGE	R $ma + \frac{mg}{2}$
D	S $\frac{ma}{2} + mg$

- A → P, B → Q, C → R
- A → Q, B → R, C → S
- A → R, B → S, C → Q
- A → R, B → P, C → S

An ideal gas is taken through a cycle $A \rightarrow B \rightarrow C \rightarrow A$ as shown in figure. If the heat supplied in the cycle is 5 J, then work done by the gas in the process $C \rightarrow A$ is



- (1) -5J
- (2) -10J
- (3) -15J
- (4) -20J

179. For an adiabatic expansion of a monoatomic perfect gas, the volume increases by 24%. What is the percentage decrease in pressure?

- (1) 24%
- (2) 40%
- (3) 48%
- (4) 71%

180. A hole is drilled in a copper sheet. The diameter of the hole is 4.24 cm at 27.0°C . What is the change in the diameter of the hole when the sheet is heated to 227°C ? α for copper = $1.70 \times 10^{-5}\text{K}^{-1}$

- (1) $1.44 \times 10^{-2}\text{ cm}$
- (2) $14.4 \times 10^{-2}\text{ cm}$
- (3) $144 \times 10^{-2}\text{ cm}$
- (4) $0.144 \times 10^{-2}\text{ cm}$

181. Three rods made from the same material and having the same cross-sectional area, form the sides of an isosceles triangle ABC, right-angled at B. The points A and B are maintained at temperature T and $\sqrt{2}T$, respectively. In steady-state, the temperature of the point C is T_C . Assuming that only heat conduction takes place along the lengths of the rods, the value of $\frac{T_C}{T}$ is

- (1) $\frac{1}{2(\sqrt{2}-1)}$
- (2) $\frac{3}{\sqrt{2}+1}$
- (3) $\frac{1}{\sqrt{3}(\sqrt{2}-1)}$
- (4) $\frac{1}{\sqrt{2}+1}$

182. The Young's modulus of a wire of length (L) and radius (r) is Y. If the length is reduced to $\frac{L}{2}$ and radius to $\frac{R}{2}$ then its Young's modulus will be

- (1) $\frac{Y}{2}\text{s}$
- (2) Y
- (3) 2Y
- (4) 2Y

183. Statement I : The compressibility of solids is less than that of gases and liquids.

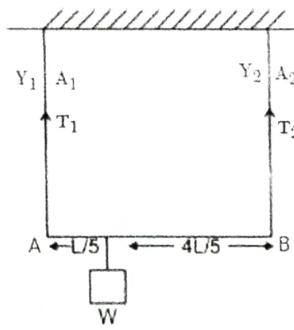
Statement II : There is tight coupling between the neighbouring atoms in solids.

- (1) Both statement I and statement II are true.
- (2) Both statement I and statement II are false.
- (3) Statement I is true but statement II is false.
- (4) Statement I is false but statement II is true.

184. When 1 kg wt. is suspended from a wire, the increment produced is 2 mm, What will be the increment in lengths when 4 kg wt. is suspended from it-

- (1) 4 mm
- (2) 8 mm
- (3) 0.5 mm
- (4) 10 mm

185. A light bar AB is suspended by two light wires, with Young's modulus, length, area of cross section and tension as (Y_1, L, A_1, T_1) and (Y_2, L, A_2, T_2) respectively. If both the wire undergo same extension then, the value of $\frac{Y_1}{Y_2}$ is



- (1) $\frac{4A_1}{A_2}$
- (2) $\frac{A_1}{A_2}$
- (3) $\frac{4A_2}{A_1}$
- (4) $\frac{A_2}{A_1}$

PHYSICS

SECTION – B [PHYSICS]

Two simple pendulums whose lengths are 100 cm and 121 cm are suspended side by side. Their bobs are pulled together and then released. After how many minimum oscillations of the longer pendulum will the two be in phase again?

- (1) 11 (2) 10 (3) 21 (4) 20

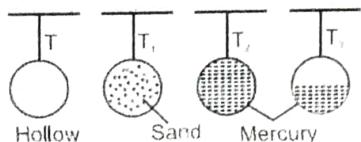
37. A mass M is suspended from a spring of negligible mass. The spring is pulled a little and released, so that the mass executes SHM of time period T . If the mass is increased by m , the time period becomes $5T/3$. Then ratio of m/M is :

- (1) 9 / 16 (2) 25 / 9
 (3) 16 / 9 (4) 4 / 3

188. A particle is acted simultaneously by mutually perpendicular simple harmonic motion $x = \text{acos}\omega t$ and $y = \text{asin}\omega t$. the trajectory of motion of the particle will be

- (1) an ellipse (2) a parabola
 (3) a circle (4) a straight line

189. The period of a simple pendulum, whose bob is a hollow metallic sphere, is T . The period is T_1 when the bob is filled with sand, T_2 when it is filled with mercury and T_3 when it is half filled with mercury. Which of the following is true ?

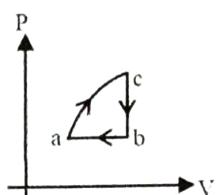


- (1) $T = T_1 = T_2 > T_3$
 (2) $T_1 = T_1 = T_3 > T$
 (3) $T > T_3 > T_1 = T_2$
 (4) $T = T_1 = T_2 < T_3$

190. A thermally insulated vessel contains some water at 0°C . The vessel is connected to a vacuum which pumps out water vapour, as a result of this intense evaporation some of the water gets freeze. If latent heat of evaporation at 0°C , $L_v = 580 \text{ cal/gm}$ and $L_f = 80 \text{ cal/gm}$. The maximum % age amount of water that can be solidified in this manner is (nearest count answer)

- (1) 12% (2) 18%
 (3) 88% (4) 100%

191. Figure shows cyclic process. From c to b, 40 J is transferred as heat from b to a, 130 J is transferred as heat, and work done is 80 J from a to c, 400 J is transferred as heat then-



- (a) work done in process a to c is 310 J
 (b) Net work done in cycle is 230 J
 (c) Net change in internal energy in cycle is 130 J
 (d) Thermal efficiency is 57.5%
 (1) a, c
 (2) b, c
 (3) a, b, d
 (4) c, d

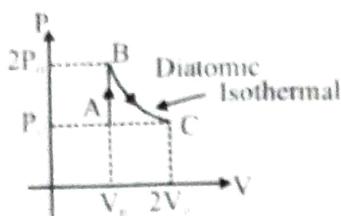
192. The internal energy of mixture of 16 g oxygen, 28 g nitrogen and 1 g hydrogen and 4 g helium, all at temperature 27°C is

- (1) 1950R
 (2) 2150R
 (3) 1300R
 (4) 1700R

193. The ratio of pressures of the same gas in two containers is $\frac{n_1 T_1}{n_2 T_2}$, where n_1 & n_2 are the number of moles and T_1 and T_2 are respective temperatures. If the two containers are now joined, the ratio of pressure to the temperature is

- (1) $\frac{P_1 T_2 + P_2 T_1}{2T_1 T_2}$
 (2) $\frac{P_1 T_2 + P_2 T_1}{T_1 T_2}$
 (3) $\frac{P_1 T_1 + P_2 T_2}{T_1 T_2}$
 (4) $\frac{P_1 T_1 + P_2 T_2}{2T_1 T_2}$

P-V curve of a diatomic gas is shown in the figure. Find the total heat given to the gas in the process A → B → C:-



- (1) $P_0 V_0 + 2P_0 V_0 \ln 2$
- (2) $\frac{1}{2} P_0 V_0 + 2P_0 V_0 \ln 2$
- (3) $\frac{5}{2} P_0 V_0 + 2P_0 V_0 \ln 2$
- (4) $3P_0 V_0 + 2P_0 V_0 \ln 2$

195. One mole ideal gas is compressed adiabatically at 27°C . Its temperature becomes 102°C . The work done in this process will be - ($\gamma = 1.5$)

- (1) -625 J
- (2) 625 J
- (3) 1245 J
- (4) -1245 J

196. The maximum energy in the thermal radiation from a hot source occurs at a wavelength of $11 \times 10^{-5} \text{ cm}$. According to Wien's law, the temperature of the source (on Kelvin scale) will be n times the temperature of another source (on the Kelvin scale) for which the wavelength at maximum energy is $5.5 \times 10^{-5} \text{ cm}$. The value of n is :

- (1) 2
- (2) 4
- (3) $1/2$
- (4) 1

197. A closed vessel contains 8 g of oxygen and 7 g of Nitrogen. Total pressure at a certain temperature is 10 atm. When all the oxygen is removed from the system without change in temperature then the pressure will be

- (1) $10 \times 7/15 \text{ atm}$
- (2) $10 \times 8/15 \text{ atm}$
- (3) $10 \times 8/16 \text{ atm}$
- (4) $10 \times 8/32 \text{ atm}$

198. In each situation of List-I, a process $A \rightarrow B \rightarrow C$ is given for an ideal gas. Match each situation of List -I with correct result in List -II.

List-I	List-II
(P)	(1) Temperature first decreases and then increases
	(2) Temperature increases continuously
(Q)	(3) Pressure first increases and then remain constant
	(4) Pressure first decreases and then remain constant
(R)	
(S)	

- (1) P → (2, 4), Q → (1, 3), R → (3), S → (3)
- (2) P → (2, 3), Q → (1, 4), R → (2, 3), S → (3)
- (3) P → (2, 4), Q → (1, 4), R → (3, 1), S → (3)
- (4) P → (2, 3), Q → (1, 3), R → (3), S → (3)

199. The design of physical instrument requires that there be a constant difference in length of 10 cm between an iron rod and copper cylinder laid side by side at all temperatures.

If $\alpha_{Fe} = 11 \times 10^{-6}/^\circ\text{C}$, $\alpha_{Cu} = 17 \times 10^{-6}/^\circ\text{C}$ then their length are (in cm).

- (1) 28.3, 18.3
- (2) 23.8, 13.8
- (3) 23.9, 13.9
- (4) 27.5, 17.5

200. A metal rope of density 6000 kg m^{-3} has breaking stress $9.8 \times 10^8 \text{ N m}^{-2}$. This rope is used to measure the depth of the sea. Then the depth of the sea that can be measured without breaking is -----

- (1) $10 \times 10^3 \text{ m}$
- (2) $20 \times 10^3 \text{ m}$
- (3) $30 \times 10^3 \text{ m}$
- (4) $40 \times 10^3 \text{ m}$