25/04/2024

CODE-A

Aakash
Medical | IIT-JEE | Foundations

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AIM – 720

(*Advanced* INTENSIVE *Mastery for* 720)

MM : 720 **CST – 14** **Time : 3 Hrs. 20 Mins.**

Complete Syllabus of NEET

Instructions:

(i) There are two sections in each subject, *i.e.* Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
(ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.
(iii) Use blue/black ballpoint pen only to darken the appropriate circle.
(iv) Mark should be dark and completely fill the circle.
(v) Dark only one circle for each entry.
(vi) Dark the circle in the space provided only.
(vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

CHEMISTRY

Choose the correct answer:

SECTION-A

1. Match the complexes given in column I with their spin only magnetic moment given in column II.

Column I	Column II
a. $[Cu(NH_3)_4]^{2+}$	(i) 5.92 BM
b. $[Cr(C_2O_4)_2(NH_3)_2]^-$	(ii) Zero
c. $[Fe(H_2O)_6]^{3+}$	(iii) 3.87 BM
d. $[Ti(H_2O)_6]Cl_4$	(iv) 1.73 BM

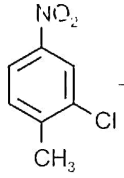
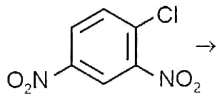
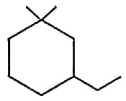
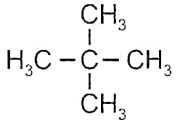
The correct option is
(1) a(iii), b(ii), c(iv), d(i)
(2) a(iv), b(iii), c(i), d(ii)
(3) a(i), b(ii), c(iii), d(iv)
(4) a(ii), b(iii), c(i), d(iv)

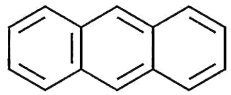
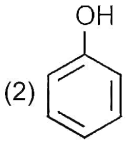
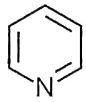
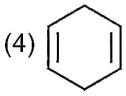
2. If for a certain reaction Δ_rH is 50 kJ mol^{-1} at 450 K, the value of Δ_rS for which the reaction will be spontaneous at the same temperature is
(1) -100 JK^{-1} mol^{-1} (2) 120 JK^{-1} mol^{-1}
(3) -56 JK^{-1} mol^{-1} (4) 79 JK^{-1} mol^{-1}

3. The reaction(s) in which hydrogen is getting reduced is/are
(i) $CuO + H_2 \rightarrow Cu + H_2O$
(ii) $H_2O_2 \xrightarrow{h\nu} 2H_2O + O_2$
(iii) $2Na + H_2 \longrightarrow 2NaH$
The correct option is
(1) (i) and (ii) only
(2) (ii) and (iii) only
(3) (i) only
(4) (iii) only

4. Oxidation number of A, B, C are +3, +6 and –2 respectively. Possible formula of the compound is
(1) $A_2(B_2C_3)_4$
(2) $A_2(BC_4)_3$
(3) $A_3(BC_3)_4$
(4) $A_3(BC_4)_2$

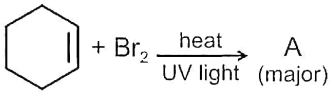
5. Choose the incorrect statement.
   (1) Diborane catches fire spontaneously upon exposure to air to form boric anhydride and hydrogen gas
   (2) Diborane readily hydrolysed by water to give boric acid
   (3) Diborane undergoes cleavage reactions with Lewis bases to give borane adducts
   (4) In diborane both the boron atoms are sp^3 hybridised

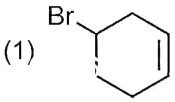
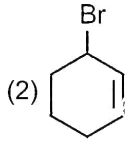
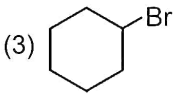
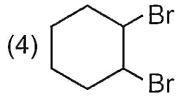
6. Which nomenclature is not correct according to IUPAC system?
   (1)  → 2-Chloro-1-methyl-4-nitrobenzene
   (2)  → 4-Chloro-1,3-dinitrobenzene
   (3)  → 3-Ethyl-1,1-dimethylcyclohexane
   (4)  → 2,2-Dimethylpropane

7. Which of the following is an aromatic hydrocarbon?
   (1) 
   (2) 
   (3) 
   (4) 

8. Which among the following statements is incorrect?
   (1) Primary aliphatic amines react with nitrous acid to produce corresponding alcohols
   (2) Primary aliphatic amines are stronger bases than ammonia
   (3) Aryl amines are stronger bases than primary aliphatic amines
   (4) Aryl amines react with nitrous acid at low temperature to produce diazonium salt

9. Consider the following reaction



   The product A is
   (1) 
   (2) 
   (3) 
   (4) 

10. An organic compound A (C_4H_9Cl) on reaction with Na/diethyl ether gives a hydrocarbon, which on monochlorination gives only one chloro derivative. Compound A is
    (1) Isobutyl chloride
    (2) n-Butyl chloride
    (3) sec-Butyl chloride
    (4) tert-Butyl chloride

11. The correct IUPAC name of
    $[Pt(NH_3)ClBr(NO_2)]^-$ is
    (1) Amminebromidochloridonitritoplatinum (II) ion
    (2) Aminebromidochloridonitritoplatinum (II) ion
    (3) Amminebromidochloridonitrito-N-platinate (II) ion
    (4) Bromidochloridoamminenitrito-N-platinate (II) ion

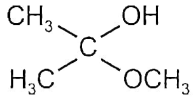
12. The amount of water (in g) produced by the combustion of 8 g of methane is
    (1) 9 g (2) 36 g
    (3) 18 g (4) 24 g

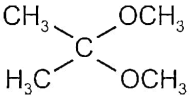
Space for Rough Work

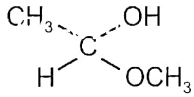
13. Match the following prefixes with their multiples and choose the incorrect match.

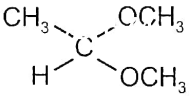
Prefixes	Multiples
(1) micro	10^{-6}
(2) mega	10^{6}
(3) giga	10^{12}
(4) femto	10^{-15}

14. Which among the following is a ketal?

(1) 

(2) 

(3) 

(4) 

15. IUPAC name of Adipic acid is

(1) Hexanedioic acid (2) Hexanoic acid

(3) Pentanedioic acid (4) Pentanoic acid

16. If temperature coefficient of a reaction is 3, then by what factor rate of reaction will be increased on increasing temperature from 10°C to 30°C?

(1) 6 times (2) 3 times

(3) 27 times (4) 9 times

17. n-factor for H_3PO_2 is

(1) 1 (2) 2

(3) 3 (4) Zero

18. Consider the following statements.

Statement-I: CrO_5 has butterfly like structure.

Statement-II : CrO_5 has 2 peroxy linkages.

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

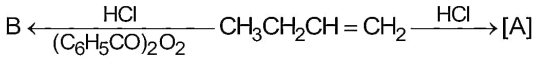
(1) Both the statement I and statement II are correct

(2) Both the statement I and statement II are incorrect

(3) Statement I is incorrect and statement II is correct

(4) Statement I is correct and statement II is incorrect

19. In the given reaction, major products [A] and [B] respectively are



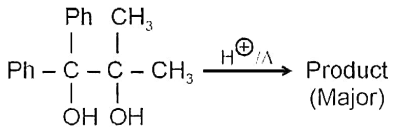
(1) $CH_3CH_2\underset{\underset{Cl}{|}}{C}HCH_3$ and $CH_3CH_2CH_2CH_2-Cl$

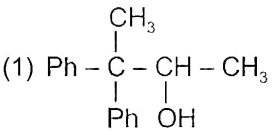
(2) $CH_3CH_2\underset{\underset{Cl}{|}}{C}HCH_3$ and $CH_3CH_2\underset{\underset{Cl}{|}}{C}HCH_3$

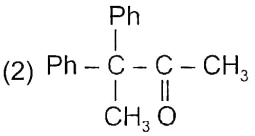
(3) $CH_3CH_2CH_2CH_2-Cl$ and $CH_3CH_2\underset{\underset{Cl}{|}}{C}HCH_3$

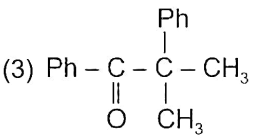
(4) $CH_3CH_2\underset{\underset{Cl}{|}}{C}HCH_3$ and $CH_3\underset{\underset{Cl}{|}}{C}H\underset{\underset{Cl}{|}}{C}HCH_3$

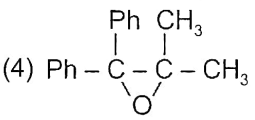
20. Major product of the given reaction is



(1) 

(2) 

(3) 

(4) 

21. Pernicious anaemia and increased fragility of RBCs respectively are caused by the deficiency of

(1) Vitamin B_{12} and Vitamin C

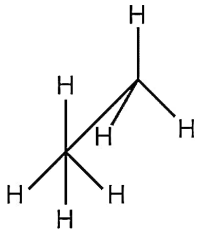
(2) Vitamin B_{12} and Vitamin E

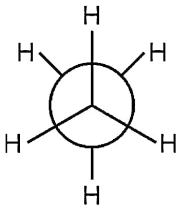
(3) Vitamin B_6 and Vitamin K

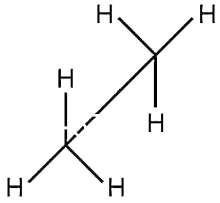
(4) Vitamin B_1 and Vitamin B_2

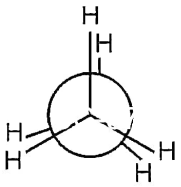
Space for Rough Work

22. Which among the following is an eclipsed form of Newman's projection of ethane?

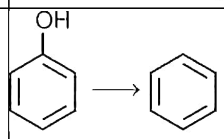
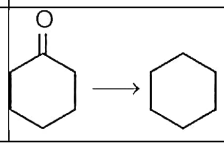
(1) 

(2) 

(3) 

(4) 

23. Match the reactions given in column I with reagents given in column II

	Column I		Column II
a.	$(CH_3)_3C-OH \rightarrow CH_3-\underset{\displaystyle CH_3}{\overset{|}{C}}=CH_2$	(i)	CrO_3
b.	$R-\underset{\displaystyle OH}{\overset{|}{CH}}-R' \rightarrow R-\underset{\displaystyle O}{\overset{\|}{C}}-R'$	(ii)	Zn-Hg/HCl
c.		(iii)	Cu/573 K
d.		(iv)	Zn dust/Δ

The correct match is

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

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

24. The order of K_H values of A, B and C gases is $K_{H_A} > K_{H_B} > K_{H_C}$. Then, the correct order of their solubility at a given temperature is

(1) A > B > C (2) B > A > C

(3) C > B > A (4) B > C > A

25. If α is the degree of dissociation of Na_2SO_4. The van't Hoff factor used for calculation of molecular mass is

(1) $1 + 2\alpha$ (2) $1 - 2\alpha$

(3) $1 + \alpha$ (4) $1 - \alpha$

26. BCl_3 is a planar molecule whereas NCl_3 is pyramidal because

(1) Nitrogen atom is smaller than boron atom

(2) BCl_3 has no lone pair but NCl_3 has a lone pair of electrons

(3) B–Cl bond is more polar than N–Cl bond

(4) N–Cl bond is more covalent than B–Cl bond

27. The compound having planar structure is

(1) XeO_4 (2) CCl_4

(3) XeF_4 (4) SF_4

28. The wavelength of light emitted when the electron in a hydrogen atom undergoes transition from an energy level with n = 3 to an energy level with n = 2 is (R_H = 109677 cm^{-1})

(1) $\frac{1}{36\,R_H}$

(2) $\frac{36}{5\,R_H}$

(3) $\frac{5\,R_H}{36}$

(4) $\frac{R_H}{36}$

29. Zinc reacts with dilute nitric acid to give

(1) NO (2) N_2O

(3) NO_2 (4) N_2

30. Tear gas is

(1) CCl_3NO_2

(2) $COCl_2$

(3) $CHCl_2NO_2$

(4) $ClCH_2CH_2SCH_2CH_2Cl$

Space for Rough Work

31. Given below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R)

Assertion (A) : Element with atomic number Z = 48 is a *s*-block element.

Reason (R) : Those elements having general outer electronic configuration $(n-1)d^{1-10}ns^{0-2}$ belong to *s*-block.

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) Both (A) and (R) are false

32. Given below are two statements

Statement I : Electron gain enthalpy provides a measure of the ease with which an atom adds an electron to form anion.

Statement II : In case of sulphur the added electron occupies a larger region of space and the electron – electron repulsion is much less as compared to oxygen.

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

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

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

33. The equilibrium constants of the following reactions are

$P + 2Q \rightleftharpoons R$; K_1

$R + 2S \rightleftharpoons 2T$; K_2

$P + U \rightleftharpoons T$; K_3

The equilibrium constant (K) for the reaction $2S + 2Q \rightleftharpoons P + 2U$ will be

(1) $\frac{K_1^2}{K_2K_3}$ (2) $\frac{K_1K_2}{2K_3}$

(3) $\frac{K_1K_3}{K_2}$ (4) $\frac{K_1K_2}{K_3^2}$

34. The ionization constant of a weak acid HA is 10^{-7}. The degree of dissociation of HA in its 0.004 M solution is

(1) 4×10^{-1} (2) 5×10^{-2}

(3) 5×10^{-3} (4) 4×10^{-2}

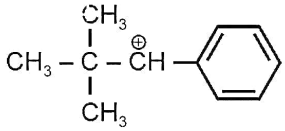
35. If conductivity of 0.02 M KCl solution is 0.002 S cm^{-1} then the molar conductivity (S cm^2 mol^{-1}) of the solution will be

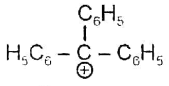
(1) 100 (2) 150

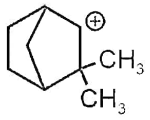
(3) 141 (4) 129

SECTION-B

36. Consider the following species

I. 

II. 

III. 

Hyperconjugation is not possible in

(1) I and II only (2) II and III only

(3) I and III only (4) I, II and III

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

Assertion (A): N,N-Diethylbenzene sulphonam de is insoluble in alkali.

Reason (R): N,N-Diethylbenzene sulphonamide does not contain any hydrogen attached to nitrogen atom.

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

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

Space for Rough Work

38. Consider the following statements.

Statement I: In a coordination entity of type $[PtCl_2(en)_2]^{2+}$, only the cis-isomer shows optical activity.

Statement II: $[Co(en)_3]^{3+}$ is an optically inactive complex ion.

Choose the correct option.

(1) Both statement I and statement II are correct

(2) Statement I is correct but statement II is incorrect

(3) Both statement I and statement II are incorrect

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

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

Assertion (A) : CCl_3COOH is more acidic than CH_3COOH.

Reason (R) : In CCl_3COOH, $-CCl_3$ group acts as electron withdrawing group which stabilises the $CCl_3COO^{\ominus}$ ion more as compared to CH_3COO^- ion.

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) (A) is true but (R) is false

(3) (A) is false but (R) is true

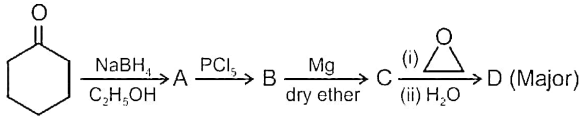
(4) Both (A) and (R) are true and (R) is the correct explanation of (A)

40. Concentration of reactant at time t that follows first order kinetics is (Initial concentration of reactant = a_0 and rate constant = k)

(1) a_0e^{-kt} (2) a_0e^{kt}

(3) $a_0e^{-k/t}$ (4) $a_0e^{k/t}$

41. Consider the following reaction sequence



Major product **D** is

(1) Primary alcohol (2) Secondary alcohol

(3) Ether (4) Aldehyde

42. Consider the following statements.

Statement I : Attack of electrophile on benzene nucleus results in the formation of σ-complex as an intermediate.

Statement II : In sigma complex one of the carbon atom is sp^3 hybridised.

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

(1) Both statement I and statement II are correct

(2) Statement I is correct but statement II is incorrect

(3) Both statement I and statement II are incorrect

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

43. Sucrose on hydrolysis gives

(1) D-(+)-Glucose and D-(–)-Fructose

(2) D-(+)-Glucose and D-(+)-Glucose

(3) D-(+)-Galactose and D-(–)-Glucose

(4) D-(+)-Galactose and D-(–)-Fructose

44. Identify the correct statement among the following.

(1) Cr^{6+} undergoes disproportionation in aqueous phase

(2) Cu does not exhibit variable oxidation states

(3) V_2O_5 is used as a catalyst for the oxidation of SO_2 in contact process

(4) $PdCl_2$ acts as a catalyst for the oxidation of ethyne to ethanoic acid

Space for Rough Work

45. The enthalpy of combustion of H_2, cyclohexene and cyclohexane are –50, –35 and –25 kJ mol^{-1} respectively. The heat of hydrogenation of cyclohexene is
(1) –140 kJ mol^{-1} (2) –60 kJ mol^{-1}
(3) –110 kJ mol^{-1} (4) –127 kJ mol^{-1}

46. The incorrect statement among the following is
(1) H_2^+ ion has one electron
(2) O_2^+ ion is diamagnetic
(3) The bond orders of O_2^+, O_2, O_2^- and O_2^{2-} are 2.5, 2, 1.5 and 1 respectively
(4) C_2 molecule has four electrons in its two degenerate π molecular orbitals

47. The conductivity of electrolytic solutions depends on
(a) Concentration of the electrolyte
(b) Viscosity of the solvent
(c) Temperature
(1) (a) only
(2) (a) and (b) only
(3) (c) only
(4) (a), (b) and (c)

48. Consider the following statements about catalyst
(a) Catalyst does not affect the equilibrium composition of a reaction mixture
(b) Catalyst lowers the activation energy for the forward reaction more than for reverse reaction
(c) Catalyst does not appear in the balanced chemical equation.
The **incorrect** statement(s) is/are
(1) (a) and (b) only (2) (b) and (c) only
(3) (b) only (4) (a) and (c) only

49. Given below are two statements one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**
Assertion (A) : Basicity of H_3PO_3 is two
Reason (R) : H_3PO_3 contains two P–OH bonds
In the light of the above statements, choose the correct answer from the options given below.
(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) Both (A) and (R) are false

50. If a particle of mass 3 mg is moving with a velocity of 1000 ms^{-1} then the wavelength associated with the moving particle will be ($h = 6.6 \times 10^{-34}$ Js)
(1) 2.2×10^{-28} m (2) 2.2×10^{-34} m
(3) 2.2×10^{-31} m (4) 2.2×10^{-33} m

BOTANY

SECTION-A

51. Who proposed that the bodies of animals and plants are composed of cells and products of cells?
(1) Matthias Schleiden (2) Theodore Schwann
(3) A German Botanist (4) Rudolf Virchow

52. Ribosomes are found to be present in all, **except**
(1) Mitochondria
(2) Chloroplast
(3) Cytoplasm
(4) Smooth endoplasmic reticulum

Space for Rough Work

53. Read the following statements and choose the **correct** option.

Statement A : The Golgi cisternae are concentrically arranged near the nucleus with distinct convex *cis* face and concave *trans* face.

Statement B : The *cis* and the *trans* faces of the Golgi apparatus are entirely different and are not connected.

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

54. The completion of prophase can be marked by the following characteristic events, **except**

(1) Disappearance of Golgi body and ER
(2) Formation of compact mitotic chromosomes
(3) Attachment of spindle fibers to the kinetochores of chromosomes
(4) Formation of mitotic apparatus by two asters together with spindle fibers

55. In meiosis, separation of sister chromatids from each other occurs during

(1) Anaphase - I (2) Prophase - II
(3) Metaphase - II (4) Anaphase - II

56. Read the statements of **assertion (A)** and **reason (R)** and select the **correct** option.

Assertion (A) : The daughter cells do not resemble each other, when produced as a result of meiosis.

Reason (R) : Recombination of chromosomes occurs during pachytene stage of prophase II.

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

57. Read the following features :

a. Two chains are coiled in a right-handed fashion.
b. Guanine is bonded with thymine with three H-bonds
c. Sugar-phosphate constitutes backbone
d. Stacking of base pairs occurs
e. Presence of 2′-OH group in pentose sugar

How many of them are found in dsDNA?

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

58. Polyploidy, a chromosomal anomaly, arises due to

(1) Deletion/addition of a codon
(2) Lack of satellite region of chromosome
(3) Failure in cell division after DNA replication
(4) Absence of RNA polymerase in a cell

59. Cistron can be defined as

(1) A segment of DNA coding for a polypeptide
(2) Sequence that appear in rRNA
(3) Sequence of amino acids in a polypeptide chain
(4) Region of DNA where DNA polymerase binds

60. Methyl guanosine triphosphate is a component of

(1) The template used in translation process
(2) Catalytic RNA molecule
(3) Polymer of amino acid
(4) Adapter molecule used in translation

61. C_4 plants can be differentiated from C_3 plants as the former lack

(1) Calvin pathway
(2) Photorespiration
(3) Hatch and Slack Pathway
(4) Non-cyclic photophosphorylation

Space for Rough Work

62. All of the following are the internal factors affecting photosynthesis, **except**
(1) Water
(2) Orientation of leaves
(3) Number of mesophyll cells
(4) Amount of chlorophyll

63. Which of the following cells regulate the opening and closing of stomata?
(1) Subsidiary cells
(2) Guard cells
(3) Sieve cells
(4) Companion cells

64. Select the **correct** option w.r.t. collenchyma.
(1) Presence of large intercellular spaces
(2) Forms the major component within organs and have thin walls made up of cellulose only
(3) Occurs in layers below epidermis in most of the dicots
(4) Consists of long, narrow cells with thick and lignified walls

65. The 'Bakanae' disease of rice seedlings, was caused by a
(1) Bacterium
(2) Fungal pathogen
(3) Sub-viral agent
(4) Blue-green algae

66. The seeds of beet are called perispermic as these seeds have persistent
(1) Nucellus (2) Chalaza
(3) Hilum (4) Micropyle

67. Select the **correctly** matched pair.
(1) Castor -- Dioecious plant
(2) Orchids – Single ovule in ovary
(3) Pollen grains – 25-50 micrometers in diameter
(4) Intine of pollen grain – Made up of sporopollenin

68. Regarding human ABO blood group, there are __A__ different genotypes and __B__ different phenotypes in the population.
Select the **correct** option for **A** and **B**.

	A	**B**
(1)	Four	Six
(2)	Seven	Four
(3)	Six	Four
(4)	Eight	Six

69. Which among the following traits of the pea plant can express itself only in homozygous condition?
i. Round seed
ii. Green seed colour
iii. Terminal flower
iv. Violet flower colour
v. Yellow pod colour
(1) i, iii and v (2) i and iv only
(3) iii, iv and v (4) ii, iii and v

70. In which among the following disorders, affected individual has only one sex chromosome?
(1) Klinefelter's syndrome
(2) Down's syndrome
(3) Turner's syndrome
(4) Phenylketonuria

71. In a typical Mendelian dihybrid cross on pea plant, out of 256 individuals obtained in F_2 generation, how many of them are homozygous for both the traits?
(1) 16 (2) 64
(3) 32 (4) 96

72. With regard to the value of respiratory quotient of the substrate, choose the **incorrect** representation among the following.
(1) Proteins > fats
(2) Tripalmitin < proteins
(3) Malic acid < glucose
(4) Glucose < Oxalic acid

Space for Rough Work

73. Select the **correct** option w.r.t. biodiversity in different regions in descending order.
(1) Temperate > Tropical > Arctic
(2) Tropical > Temperate > Arctic
(3) Tropical > Arctic > Temperate
(4) Temperate > Arctic > Tropical

74. The species confined to a particular region and not found anywhere else is known as
(1) Extinct species
(2) Vulnerable species
(3) Endangered species
(4) Endemic species

75. Which of the following statements is **incorrect**?
(1) In taxonomic hierarchy the number of common characters goes on decreasing from species to kingdom.
(2) Each taxonomic category, referred to as a unit of classification, in fact, represents a rank and is commonly termed as taxon.
(3) External and internal structures, along with the structure of cell, development process and ecological information of organisms are essential and form basis of modern taxonomy studies.
(4) Families are characterised only on the basis of vegetative features of plant species.

76. Which of the following statements is **correct**?
(1) Thermoacidophiles are eubacteria.
(2) Mycorrhizal roots have root cap and root hairs.
(3) In Phycomycetes, zoospores or aplanospores are produced endogenously in sporangium.
(4) Lichens are good pollution indicators as they grow only in polluted area.

77. Regarding protozoans, which of the following statement(s) is/are **not** true
(a) All protozoans are heterotrophs and live as predators or parasites.
(b) Amoeboid protozoans live in fresh water, sea water or moist soil.
(c) All flagellated protozoans have an infectious spore like stage in their life cycle.
(d) Sporozoans include endoparasites such as *Plasmodium* which causes malaria in humans.
(1) (a), (b) and (c) (2) Only (b) and (c)
(3) (a), (b) and (d) (4) Only (c)

78. In a pinnately compound leaf a number of leaflets are present on a common axis, the ___A___, which represents the midrib of the leaf as in ___B___.
Here A and B respectively are
(1) Pulvinus and beans
(2) Petiole and mango
(3) Rachis and neem
(4) Stipule and silk cotton

79. How many plants in the list given below shows veinlets forming a network in leaf?
Hibiscus rosa-sinensis, Trifolium, Solanum tuberosum, Zea mays, Triticum aestivum, Allium cepa
(1) 4 (2) 2
(3) 3 (4) 6

80. The **correct** floral formula of onion is
(1) $\oplus\ \male\ K_{(5)}\ \overset{\frown}{C_{(5)}}\ A_5\ \underline{G}_{(2)}$
(2) $Br\ \oplus\ \male\ \overset{\frown}{P_{(3+3)}}\ A_{3+3}\ \underline{G}_{(3)}$
(3) $\%\ \male\ K_{(5)}\ C_{1+2+(2)}\ A_{(9)+1}\ \underline{G}_1$
(4) Ebr. $\oplus$ or $\%\ \male\ K_{2+2}C_{x4}A_{2+4}\underline{G}_{(2)}$

81. The taxonomy which is based on cytological information like chromosome number, structure, behaviour is called
(1) Numerical taxonomy
(2) Chemotaxonomy
(3) Cytotaxonomy
(4) Phenetics

Space for Rough Work

82. Match the **column I** with **column II** and select the **correct** option.

	Column I		Column II
a.	*Spirogyra*	(i)	Moss
b.	*Cycas*	(ii)	Pteridophyte
c.	*Selaginella*	(iii)	Algae
d.	*Sphagnum*	(iv)	Gymnosperm

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

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

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

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

83. Statins is produced by a

(1) Bacterium (2) Fungus

(3) Cyanobacterium (4) Green alga

84. Find the **odd** one w.r.t. mutualism.

(1) Lichens (2) Mycorrhizae

(3) Fig and fig wasp (4) Cuckoo and crow

85. Find **odd** one w.r.t. the important steps in the process of decomposition.

(1) Catabolism (2) Fragmentation

(3) Stratification (4) Humification

SECTION-B

86. Which of the following statements is **not** true regarding inclusion bodies in prokaryotes?

(1) They are bound by a single membrane system

(2) They lie freely in the cytoplasm

(3) Reserve material is stored in these structures

(4) These are found in the blue-green photosynthetic bacteria

87. The best stage to study the shapes (V, L, J, I) of chromosomes is

(1) Prophase (2) Metaphase

(3) Anaphase (4) Telophase

88. Sickle cell anaemia is a result of

(1) Point mutation

(2) Chromosomal aberration

(3) Defected RNA polymerase

(4) Failure in translation process

89. Translation of polypeptide is terminated by

(1) α factor

(2) Release factor

(3) σ factor

(4) A specific tRNA

90. Identify the **incorrect** statements.

(a) All tissues interior to the vascular cambium constitute the bark.

(b) Bark that is formed early in season is called soft bark.

(c) Youngest layer of secondary xylem lies just inner side the vascular cambium.

(d) Autumn wood is lighter in colour and has a lower density.

Select the **correct** option.

(1) (a) and (c) only

(2) (c) and (d) only

(3) (a) and (d) only

(4) (a), (c) and (d) only

91. In the light of given statements, choose the **correct** option.

Statement I : Ethylene usually decreases the respiration rate during fruit ripening.

Statement II : In most situations, ABA does not act as antagonist to GAs.

(1) Only statement I is correct

(2) Only statement II is correct

(3) Both statements are correct

(4) Both statements are incorrect

Space for Rough Work

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d.	*Sphagnum*	(iv)	Gymnosperm

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

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

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

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

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(2) Only statement II is correct

(3) Both statements are correct

(4) Both statements are incorrect

Space for Rough Work

92. Which one of the following statements is **not** true?
(1) Pollination by wind is less common amongst abiotic pollinations.
(2) In an angiosperm, functional megaspore develops into embryo sac.
(3) Pollen grains maintain viability for months in some members of Rosaceae, Leguminoseae and Solanaceae.
(4) In angiosperms, the placenta is located inside the ovarian cavity.

93. Choose the **incorrect** statement regarding Law of Dominance.
(1) The factors occur in pairs.
(2) This law is universally applicable.
(3) In a dissimilar pair of factors, the dominant one is able to express its effect.
(4) It is used to explain the expression of only one of the parental traits in a monohybrid cross.

94. Sucrose is converted into glucose and fructose by the enzyme.
(1) Aldolase
(2) Phosphofructokinase
(3) Invertase
(4) Hexokinase

95. TMV is a
(1) Single stranded DNA virus
(2) Double stranded RNA virus
(3) Double stranded DNA virus
(4) Single stranded RNA virus

96. Match the column I with column II.

	Column I		Column II
a.	Malvaceae	(i)	*Colchicum*
b.	Asteraceae	(ii)	*Gossypium*
c.	Liliaceae	(iii)	*Helianthus*
d.	Poaceae	(iv)	*Cynodon*

Select the **correct** option.
(1) a(ii), b(iii), c(i), d(iv)
(2) a(i), b(iv), c(ii), d(iii)
(3) a(iii), b(ii), c(i), d(iv)
(4) a(iv), b(i), c(ii), d(iii)

97. Which of the following statements is **incorrect** w.r.t. gymnosperms?
(1) Stem is unbranched in *Cycas*.
(2) *Sequoia* is one of the tallest tree species.
(3) Ovules are not enclosed by any ovary wall.
(4) They lack true roots, stem or leaves.

98. Read the following statements and select the **correct** option.

Statement A : BOD is a measure of the organic matter present in the water.

Statement B : The greater the BOD of waste water, more is its polluting potential.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements A and B are correct
(4) Both statements A and B are incorrect

99. The equation for exponential population growth is
(1) $\frac{dN}{dt} = rN$
(2) $\frac{dt}{dN} = rN$
(3) $\frac{rN}{dN} = dt$
(4) $dN + dt = rN$

100. Rock is the natural reservoir of
(1) Carbon
(2) Nitrogen
(3) Phosphorus
(4) Hydrogen

Space for Rough Work

ZOOLOGY

SECTION-A

101. The type of epithelium that forms the walls of blood vessels is
(1) Ciliated columnar epithelium
(2) Simple cuboidal epithelium
(3) Simple squamous epithelium
(4) Simple columnar epithelium

102. The seminiferous tubules present in testis of humans open into the vasa efferentia through
(1) Vas deferens (2) Epididymis
(3) Ejaculatory duct (4) Rete testis

103. In humans, CNS and PNS constitute the
(1) Brain (2) Endocrine system
(3) Neural system (4) Spinal cord

104. Earth was supposed to have been formed about _____ years back.
Select the **correct** option to fill in the blank.
(1) 4.5 billion (2) 8.5 billion
(3) 10 million (4) 15 million

105. The total number of cranial nerves arising from the brain of a frog is
(1) Ten (2) Twenty
(3) Twelve (4) Twenty four

106. Crystalline proteins synthesized by *Bacillus thuringiensis* is activated by
(1) Acidic pH of the insect gut
(2) Alkaline pH of the bacterial cell
(3) Alkaline pH of the insect gut
(4) Acidic pH of the bacterial cell

107. Which of the following structure(s)/cells is/are mainly responsible for secreting progesterone in human females?
(1) Interstitial cells (2) Leydig cells
(3) Corpus luteum (4) Secondary follicles

108. How many hydroxyl group(s) is/are present in a glycerol molecule ?
(1) Four (2) Three
(3) Two (4) One

109. _____ represents roughly the cytoplasmic composition of living tissues.
Select the **correct** option to fill in the blank.
(1) Acid-insoluble pool
(2) Acid-soluble pool
(3) Biomacromolecule
(4) Molecule with weight in the range of 10,000 daltons and above

110. A monomeric antibody molecule is represented by 'X' and is associated with 'Y' immune response. Select the **correct** option that represents 'X' and 'Y' respectively.
(1) H_2L_4 ; Humoral (2) H_4L_2 ; Cell-mediated
(3) H_2L_2 ; Humoral (4) H_4L_4 ; Cell-mediated

111. All of the following options are true for AIDS, **except**
(1) It can be diagnosed by ELISA.
(2) It is a congenital disease.
(3) It is usually transmitted through the contaminated blood products.
(4) There is always a time-lag between the infection and appearance of AIDS symptoms.

112. Select the **correct** pair of diseases/infections that can be transmitted most likely *via* infected needles and syringes.
(1) AIDS, Diphtheria
(2) Cancer, Common cold
(3) HIV, Hepatitis-B
(4) Plague, AIDS

Space for Rough Work

113. Select the **correct** match w.r.t. frogs.
(1) Olfactory lobes – Present in forebrain
(2) Bidder's canal – Present in female
(3) Compound eyes – Sense organ
(4) Circulatory system – Open type

114. In humans, how many formed elements given in the box below are granulocytes?

Neutrophils, B-lymphocytes, T-lymphocytes, Monocytes, Basophils, Eosinophils

Select the **correct** option.
(1) Four (2) Three
(3) Five (4) Two

115. Which of the following is administered to avoid erythroblastosis fetalis?
(1) Anti-Rh antigens to the mother immediately after the delivery of first Rh –ve child
(2) Anti-Rh antibodies to the mother immediately after the delivery of first Rh +ve child
(3) Anti-Rh antigens to the foetus immediately after the delivery from Rh –ve mother
(4) Anti-Rh antibodies to the foetus immediately before the delivery from the Rh +ve mother

116. Select the **incorrect** match.

(1)	*Balaenoptera*	-	Viviparous aquatic mammal
(2)	*Corvus*	-	Oviparous flying gnathostome
(3)	*Bungarus*	-	Poisonous crawling chordate
(4)	*Clarias*	-	Marine bony fish

117. RNA interference involves
(1) Synthesis of DNA from mRNA
(2) Silencing of specific mRNA due to complementary dsRNA molecule that binds to and prevents the translation of mRNA
(3) Interference of RNA synthesis from DNA
(4) Synthesis of cDNA and RNA using reverse transcriptase

118. Enzymes catalysing oxidoreduction between two substrates belong to the class
(1) Hydrolases
(2) Lyases
(3) Dehydrogenases
(4) Ligases

119. Electrical current can flow directly from one neuron to the other neuron across a synapse. Such type of synapse is
(1) Abundant in our body
(2) Rare in our body
(3) Characterized by slow impulse transmission
(4) Characterised by impulse transmission with the help of neurotransmitters

120. Select the condition from the options given below that triggers menstruation in human females.
(1) Increase in secretion of gonadotrophins
(2) Sudden fall in the progesterone levels
(3) Increase in the GnRH secretion
(4) Surge of luteinizing hormone

121. Which of the following cells present in human testis periodically undergo meiosis?
(1) Immature male germ cells
(2) Spermatogonia
(3) Primary spermatocytes
(4) Spermatozoa

122. Choose the **odd** one w.r.t bones of human forelimbs.
(1) Radius
(2) Ulna
(3) Tibia
(4) Phalanges

Space for Rough Work

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117. RNA interference involves
(1) Synthesis of DNA from mRNA
(2) Silencing of specific mRNA due to complementary dsRNA molecule that binds to and prevents the translation of mRNA
(3) Interference of RNA synthesis from DNA
(4) Synthesis of cDNA and RNA using reverse transcriptase

118. Enzymes catalysing oxidoreduction between two substrates belong to the class
(1) Hydrolases
(2) Lyases
(3) Dehydrogenases
(4) Ligases

119. Electrical current can flow directly from one neuron to the other neuron across a synapse. Such type of synapse is
(1) Abundant in our body
(2) Rare in our body
(3) Characterized by slow impulse transmission
(4) Characterised by impulse transmission with the help of neurotransmitters

120. Select the condition from the options given below that triggers menstruation in human females.
(1) Increase in secretion of gonadotrophins
(2) Sudden fall in the progesterone levels
(3) Increase in the GnRH secretion
(4) Surge of luteinizing hormone

121. Which of the following cells present in human testis periodically undergo meiosis?
(1) Immature male germ cells
(2) Spermatogonia
(3) Primary spermatocytes
(4) Spermatozoa

122. Choose the **odd** one w.r.t bones of human forelimbs.
(1) Radius
(2) Ulna
(3) Tibia
(4) Phalanges

Space for Rough Work

123. Choose the **correct** option w.r.t. characteristics and an example of a synovial joint in humans.

	Characteristic	Example
(1)	Lymph filled between two bones	Suture between frontal and parietal bone
(2)	Cartilage between two bones	Joint between tarsals
(3)	Synovial fluid filled between two bones	Joint between thoracic vertebrae
(4)	Fluid filled synovial cavity between two bones	Joint between carpals

124. Tracheophyte ancestors gave rise to all of the following, **except**

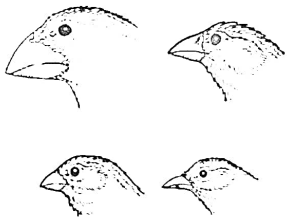
(1) Zosterophyllum

(2) Arborescent lycopods

(3) *Rhynia*-type plants

(4) Bryophytes

125. Consider the figure given below w.r.t. Darwin's finches and choose the **incorrect** option w.r.t. them.



(1) One of the best examples of adaptive radiation

(2) Many other forms with altered beaks arose from the original insect-eating finches

(3) Exhibit founder effect

(4) Are an example of speciation

126. In adult humans, under normal physiological conditions, each red coloured iron containing pigment present in RBCs can carry a maximum of how many molecule(s) of O_2?

(1) Four (2) Three

(3) Two (4) One

127. The relaxation of the diaphragm and the inter-costal muscles during normal expiration returns the diaphragm and sternum to their normal position and

(1) Reduces the thoracic volume

(2) Increases the thoracic volume

(3) Reduces the intra-pulmonary pressure

(4) Increases the pulmonary volume

128. All of the following animals are not hermaphrodite, **except**

(1) *Antedon* (2) *Loligo*

(3) *Limulus* (4) *Euspongia*

129. **Assertion (A) :** Bacteriophages have very high copy numbers of their genome within the bacterial cells.

Reason (R) : The number of bacteriophages per bacterial cell is high.

In the light of above statements, select 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, **(R)** is false

(4) **(A)** is false, **(R)** is true

130. _____ remove nucleotides from the end of the DNA. Select the **correct** option to fill in the blank.

(1) DNA polymerases

(2) Restriction endonucleases

(3) DNA ligases

(4) Restriction exonucleases

Space for Rough Work

131. The last step among the following w.r.t. Recombinant DNA Technology is
(1) Culture of the host cells in a bioreactor
(2) Ligation of alien DNA with cloning vector
(3) Extraction of the desired product
(4) Isolation of desired DNA fragment

132. Read the following statements :

Statement (a): The quality control testing method is same for all the products.

Statement (b): The preservatives are added to the product after the biosynthetic stage.

Select the **correct** option.
(1) Both statements (a) and (b) are correct
(2) Both statements (a) and (b) are incorrect
(3) Only statement (a) is correct
(4) Only statement (b) is correct

133. Consider the following.
(a) Developing a DNA vaccine
(b) IVF techniques
(c) Use of gene therapy

Select the **correct** option w.r.t application(s) of biotechnology.
(1) (a) only (2) (c) only
(3) (a) and (b) only (4) (a), (b) and (c)

134. A male cockroach can be differentiated from a female cockroach on the basis of
(1) Presence of anal cerci
(2) Absence of antennae
(3) Presence of anal styles
(4) Absence of alary muscles

135. MTPs are considered relatively safe upto how many weeks of pregnancy?
(1) 26 (2) 24
(3) 12 (4) 28

SECTION - B

136. Normal activities of the human heart are autoregulated by nodal tissue. This illustrates which property of the human heart?
(1) Contractility (2) Myogenic
(3) Neurogenic (4) Elasticity

137. When a sperm comes in contact with zona pellucida layer of the ovum during fertilization, it induces changes in the
(1) Membrane that allows the entry of additional sperms
(2) Membrane that blocks the entry of additional sperms
(3) Graafian follicle to release the ovum
(4) Myometrium to induce uterine contractions

138. Juxta-glomerular cells of human kidney release a hormone 'X' which stimulates the production of RBCs. Identify 'X' and select the **correct** option.
(1) Erythropoietin (2) ANF
(3) Renin (4) Cortisol

139. Select the **odd** one w.r.t. true fishes.
(1) Dog fish (2) Flying fish
(3) Angel fish (4) Star fish

140. **Assertion (A) :** The cerebral cortex is referred to as grey matter.

Reason (R) : The neuronal cell bodies are concentrated in cerebral cortex.

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) Both **(A)** and **(R)** are false

Space for Rough Work

141. The principal nitrogenous waste in humans is synthesized in the _____ but is excreted out mostly through _____.

Choose the option that **correctly** fill the blanks respectively.

(1) Liver, Kidneys (2) Kidneys, Liver

(3) Liver, Liver (4) Kidneys, Kidneys

142. The RBC production in people who have migrated from the plain region to mountain area increases many folds because at high altitude

(1) Environment is pollution free and abundant O_2 is available

(2) Partial pressure of O_2 is less than the plane region therefore, more RBCs are produced to meet the requirement of body

(3) Oxygen binding affinity of haemoglobin is high

(4) Ultraviolet rays enhance the RBC production

143. All of the following pair of organisms show convergent evolution, except

(1) Lemur – Spotted cuscus

(2) Bobcat – Tiger cat

(3) Mouse – Marsupial mouse

(4) Flying phalanger – Sugar glider

144. Select the **correct** statement w.r.t. humans.

(1) An acromion process is characteristically found in the pelvic girdle.

(2) Glenoid cavity is a depression to which the thigh bone articulates.

(3) Vertebrochondral ribs do not articulate directly with the sternum but join the 7^{th} rib with the help of hyaline cartilage.

(4) Sternum is a flat bone on the dorsal midline of thorax.

145. Choose the **incorrect** statement. w.r.t. humans.

(1) Neurohypophysis releases two hormones in the blood called oxytocin and vasopressin.

(2) Melatonin plays a very important role in the regulation of a 24-hour rhythm of the body.

(3) Only two parathyroid glands are present on the back side of the thyroid gland.

(4) PTH along with TCT plays a significant role in calcium balance in the body.

146. A phosphate moiety is an important structural constituent of

(1) Palmitic acid and adenosine

(2) Lecithin and adenylic acid

(3) Cytosine and uridylic acid

(4) Glutamic acid and lecithin

147. A genetically modified crop that can help in solving the problem of night blindness is

(1) Bt cotton (2) Bt soyabean

(3) Golden rice (4) Bt corn

148. Consider the given statements and select the **correct** option.

Statement A : Bone and cartilage are skeletal connective tissues and blood is a fluid connective tissue.

Statement B : Bone marrow in some bones is the site of production of blood cells.

(1) Both statements A and B are correct

(2) Statement A is correct but statement B is incorrect

(3) Statement A is incorrect but statement B is correct

(4) Both statements A and B are incorrect

Space for Rough Work

149. Complete the analogy by selecting the **correct** option w.r.t. STIs.

Genital warts : Completely curable : : _____ : Incurable

(1) Syphilis (2) Gonorrhoea

(3) Chlamydiasis (4) Genital herpes

150. Match column I with column II and select the **correct** option.

	Column I		Column II
(a)	Protection from STIs	(i)	Implants
(b)	Terminal method of contraception	(ii)	Tubectomy
(c)	Removal of small part of fallopian tube	(iii)	Condoms
(d)	Inhibit implantation	(iv)	Sterilisation

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

PHYSICS

SECTION-A

151. Consider the following statements.

Statement A: Astronomical unit (Au), Parsec (pc) and light year (ly) are units normally used for measuring very large distances.

Statement B: Astronomical unit < Parsec < light year.

In the light of above statement tick 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 A and B are correct

(4) Both statements A and B are incorrect

152. A particle of mass 'm' and charge 'q' is accelerated through a potential difference of 'V' from rest. Its final kinetic energy is

(1) qVm

(2) qV

(3) $\frac{qV}{m}$

(4) $\frac{q}{mV}$

153. A circular disc of radius R is placed in the plane of the paper. A uniform electric field $\vec{E}$ is also present in the plane of the paper. The electric flux associated with circular surface will be

(1) $\pi R^2 E$

(2) $\frac{\pi R^2 E}{2}$

(3) $\frac{\pi R^2 E}{4}$

(4) Zero

154. Laplace's correction in the formula for the speed of sound given by Newton was needed because sound waves

(1) Are longitudinal

(2) Propagate adiabatically

(3) Propagate isothermally

(4) Have long wavelength

155. The displacement of a particle in SHM is in opposite phase with

(1) Acceleration (2) Velocity

(3) Frequency (4) Time period

Space for Rough Work

156. **Assertion (A):** Electrons are not the sole carrier of current in substances.

Reason (R): In electrolytic liquids, positive and negative ions carry the electric current.

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

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true and (R) is not the correct explanation of (A)

(3) (A) is true and (R) is false

(4) (A) is false and (R) is true

157. A storage battery of emf 10 V and internal resistance 1 Ω is being charged by a 120 V dc supply using a series resistor of 21 Ω. The terminal voltage of the storage battery during charging is

(1) 10 V (2) 15 V

(3) 5 V (4) 110 V

158. A galvanometer coil has a resistance of 20 Ω and the metre shows full scale deflection for a current of 0.2 A. The shunt resistance required to convert the galvanometer into an ammeter of range 4 A is

(1) $\frac{19}{20}\Omega$ (2) 22 Ω

(3) $\frac{20}{19}\Omega$ (4) 11 Ω

159. A charged particle having charge q accelerated through a potential difference V enters a transverse magnetic field in which it experiences a force F. If V is increased to $8V$, the particle will experience a force

(1) $\sqrt{2}F$ (2) $2F$

(3) $\frac{F}{\sqrt{2}}$ (4) $2\sqrt{2}F$

160. Magnetic field produced by a small bar magnet is similar to that of current carrying

(1) Toroid (2) Circular coil

(3) Straight conductor (4) All of these

161. In a compound microscope, the intermediate image is

(1) Virtual, erect and magnified

(2) Real, erect and magnified

(3) Real, inverted and magnified

(4) Virtual, erect and diminished

162. If convex lens made up of glass (μ_g = 1.5) and radius of curvature R is dipped into water $\left(\mu_w = \frac{4}{3}\right)$, then its focal length in water will be

(1) $2R$

(2) $\frac{R}{2}$

(3) $3R$

(4) $4R$

163. **Statement-A:** Wavelength range of microwaves is greater than that of UV-rays.

Statement-B: The wavelength range of microwave is lesser than that of Infra-red rays.

Statement-C: The frequency range of X-rays is greater than that of UV-rays

From the above statements

(1) Only statement A is true

(2) Only statement A and statement B are true

(3) Statement A, B and C all are true

(4) Only statement A and statement C are true

164. In Young's double slit experiment, phase difference between light waves reaching 3rd dark fringe and the central fringe when λ = 3500 Å is

(1) 6π (2) 4π

(3) 5π (4) $\frac{5\pi}{2}$

165. A force of $\left(2i - 3\hat{j}\right)$ N displaces an object from (0, 0)m to (4, 2)m. The work done by the force is

(1) 2 J (2) 8 J

(3) 14 J (4) 16 J

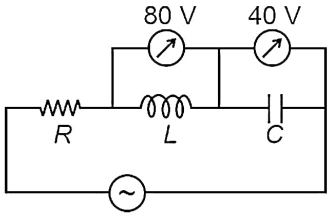
Space for Rough Work

166. A pendulum consists of a wooden block of mass 1 kg and rope length 2 metre. A bullet of mass 50 g is fired horizontally towards the pendulum with a speed v_0. The bullet comes out of the bob with speed $\frac{v_0}{4}$ horizontally. If bob just completes the motion along a vertical circle. Then speed of bullet (v_0) is

(1) $\frac{400}{3}$ m s^{-1} (2) $\frac{800}{3}$ m s^{-1}

(3) 200 m s^{-1} (4) 300 m s^{-1}

167. In the series LCR circuit shown below, the power factor of the circuit is

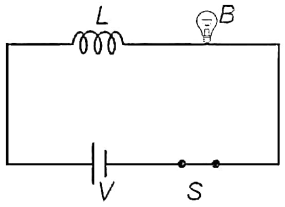


$\varepsilon = 80\sqrt{2}\sin(100\pi t)$ V

(1) $\frac{1}{2}$ (2) $\frac{\sqrt{3}}{2}$

(3) $\frac{\sqrt{3}}{4}$ (4) $\frac{1}{4}$

168. A bulb and an inductor are connected in series with dc voltage using a switch S as shown



As the switch S is opened, the bulb B

(1) Will die out immediately

(2) Will suddenly bright and then die out

(3) Will suddenly dimmed and then die out

(4) Will die out gradually without any sudden change in brightness

169. The absolute zero temperature in Fahrenheit scale nearly is

(1) –273°F (2) –320°F

(3) –460°F (4) –132°F

170. The horizontal force required to move a metal plate of area 2×10^{-2} m^2 with a velocity of 9×10^{-2} m/s when it rests on a layer of oil 3×10^{-3} m thick is

(Given coefficient of viscosity (η) = 3 Ns/m^2)

(1) 1.2 N (2) 3 N

(3) 1.8 N (4) 6 N

171. 100 g of water is heated from 20°C to 50°C. Ignoring the slight expansion of water, the change in internal energy of the water is nearly (specific heat of water 4200 J/kg K)

(1) 1.25 J (2) 12.6 kJ

(3) 42 J (4) 4.2 kJ

172. When heat is given to a gas in an isobaric process, then choose the **incorrect** option

(1) Work is done by the gas in its expansion

(2) Internal energy of gas increases

(3) Temperature of gas remains same

(4) Temperature of gas is increased

173. The difference between threshold wavelengths for two metal surfaces A and B having work function ϕ_A = 6 eV and ϕ_B = 3 eV is nearly

(1) 207 nm (2) 138 nm

(3) 257 nm (4) 276 nm

174. Consider the following radioactive decay process

$${}^{226}_{88}A \xrightarrow{2\alpha} A_1 \xrightarrow{\beta^-} A_2 \xrightarrow{\gamma} A_3 \xrightarrow{\beta^+} A_4 \xrightarrow{\alpha} A_5$$

The mass number and the atomic number of A_5 are given by

(1) 82 and 218

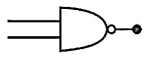
(2) 80 and 214

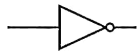
(3) 82 and 214

(4) 82 and 216

Space for Rough Work

175. Symbolic representation of four logic gates are shown as

a.  b. 

c.  d. 

Pick out which ones are for NOT, NOR and NAND gates, respectively

(1) c, b and a

(2) d, a and b

(3) b, d and a

(4) c, d and a

176. Match column I with column II

	Column I		Column II
a.	Most probable velocity	(i)	$\sqrt{\frac{8}{\pi}\frac{RT}{M}}$
b.	RMS velocity	(ii)	$\sqrt{\frac{2RT}{M}}$
c.	Average velocity	(iii)	$\frac{1}{\sqrt{2}\pi nd^2}$
d.	Mean free path	(iv)	$\sqrt{\frac{3RT}{M}}$

(1) a → ii, b → iv, c → i, d → iii

(2) a → iv, b → ii, c → i, d → iii

(3) a → i, b → iv, c → ii, d → iii

(4) a → i, b → iv, c → iii, d → ii

177. A block when kept at 10 cm mark on a metre scale balances it horizontally, if the fulcrum is at 40 cm mark. If the mass of scale is 300 g then mass of block will be [use g = 10 m/s^2]

(1) 300 g (2) 200 g

(3) 100 g (4) 600 g

178. The SI unit of angular acceleration per unit torque is

(1) kg m^2 (2) m^{-2} kg^{-1}

(3) m^{-2} kg (4) m^2 kg^{-1}

179. Acceleration due to gravity at any point in the gravitational field of earth is

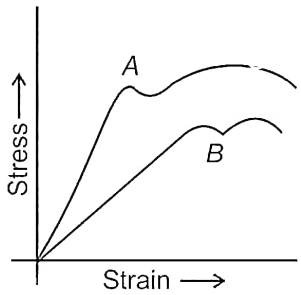
(1) Equal to gravitational field intensity at that point

(2) Equal to gravitational potential at that point

(3) Equal to gravitational force on a body kept at that point

(4) Both (2) and (3)

180. The diagram shows stress v/s strain curve for the materials *A* and *B*. From the curves it can be inferred that



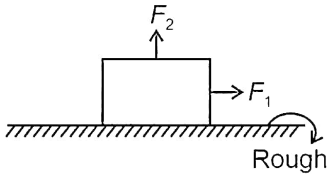
(1) A is more brittle but B is more ductile

(2) A is more ductile but B is more brittle

(3) A and B both are equally brittle

(4) B is more elastic than A

181. In the figure shown, horizontal force F_1 is applied on a block but the block does not slide. Then as the magnitude of vertical force F_2 is increased slowly. Based upon above information choose the **incorrect** statement.



(1) The magnitude of normal reaction on block decreases

(2) The block may slide as the magnitude of vertical force is increased

(3) The block will never slide no matter what will be the value of F_2

(4) The maximum value of static friction force decreases

Space for Rough Work

182. A particle is projected from ground at an angle θ with horizontal with speed u. The radius of curvature of its trajectory at the point of projection is

(1) $\frac{u^2}{g}$

(2) $\frac{u^2}{g\sin\theta}$

(3) $\frac{u^2}{g\cos\theta}$

(4) $\frac{u^2}{g\tan\theta}$

183. The velocity of a body depends on time according to the equation $v = \frac{t^2}{35}$. The body is undergoing

(1) Uniform acceleration
(2) Uniform retardation
(3) Non-uniform acceleration
(4) Zero acceleration

184. **Assertion (A):** The ratio $\frac{C_P}{C_V}$ of a monoatomic gas is more than that of a diatomic gas.

Reason (R): The molecules of monoatomic gas have more degree of freedom than those of diatomic gas.

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

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

185. A car travels from A to B at a speed of 60 km h^{-1} and returns back to B with a speed of 60 km h^{-1}. The average velocity of car for entire trip is

(1) 60 km h^{-1} (2) Zero
(3) 48 km h^{-1} (4) 30 km h^{-1}

SECTION-B

186. A thin circular ring of mass M and radius r is rotating about its axis with a constant angular velocity ω. Two point objects each of mass m are attached gently to the opposite ends of a diameter of the ring. The ring will now rotate with an angular velocity

(1) $\frac{\omega(M-2m)}{M+2m}$ (2) $\frac{\omega M}{M+2m}$
(3) $\frac{\omega M}{M+m}$ (4) $\frac{\omega(M+2m)}{M}$

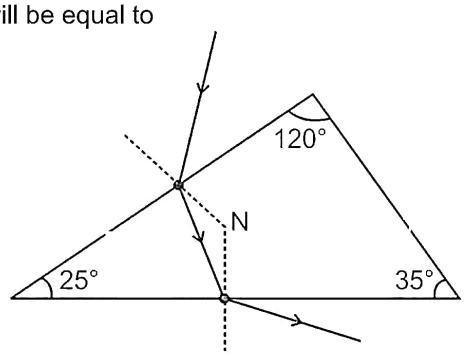
187. There are two bodies of masses 100 kg and 10000 kg separated by a distance 1 m. At what distance from the lighter body, the intensity of gravitational field will be zero?

(1) $\frac{1}{9}$ m (2) $\frac{1}{10}$ m
(3) $\frac{1}{11}$ m (4) $\frac{10}{11}$ m

188. In a Young's double slit experiment the intensity at a point where the path difference is $\frac{\lambda}{4}$ (λ is the wavelength of the light used) is I_1. If I_0 denotes the maximum intensity, then $\frac{I_1}{I_0}$ is equal to

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

189. In the given figure, the refracting angle of prism will be equal to



(1) 20° (2) 25°
(3) 120° (4) 35°

Space for Rough Work

190. A torque meter is calibrated to reference standard of mass, length and time each with 2% error. After calibration, the measured torque with this torque meter will have net error of
(1) 90% (2) 6%
(3) 10% (4) 85%

191. The number of cells, each of emf 1.5 volt and internal resistance 0.5 Ω that should be joined in series with a resistance of 10 Ω so as to send a current of 0.5 A through it, is
(1) 2 (2) 3
(3) 4 (4) 6

192. A current is made of two components, a DC component I_1 = 2 A and an AC component given by $I_2 = 2\sqrt{2}\sin 100\pi t$ A. The reading of hot-wire ammeter is
(1) $4\sqrt{2}$ A (2) $4\sqrt{3}$ A
(3) 2 A (4) $2\sqrt{2}$ A

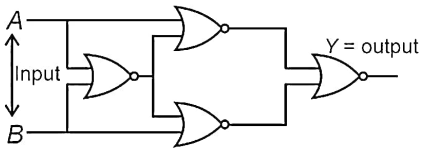
193. A current passing through a coil of self inductance of 4 mH changes at the rate of 10 mA s^{-1}. The magnitude of emf induced in the coil is
(1) 4 μV
(2) 40 μV
(3) 10 V
(4) 40 V

194. The ratio of work done by an ideal monoatomic gas to the heat supplied to it in an isobaric process is
(1) $\frac{2}{5}$ (2) $\frac{7}{2}$
(3) $\frac{3}{5}$ (4) $\frac{4}{3}$

195. A ball rises to surface at a constant velocity in a liquid whose density is 5 times greater than that of the material of the ball. The ratio of the viscous force acting on the rising ball and its weight is
(1) 4 : 1 (2) 5 : 1
(3) 8 : 1 (4) 10 : 1

196. A 12.75 eV electron beam is used to bombard gaseous hydrogen at room temperature. The number of spectral lines emitted will be
(1) 3 (2) 1
(3) 6 (4) 10

197. The output *Y* for the inputs *A* and *B* of circuit is given by



Truth table of the shown circuit is

(1)

A	B	Y
0	0	0
0	1	1
0	0	1
1	1	1

(2)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

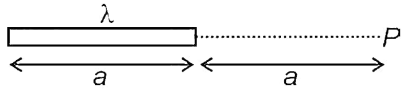
(3)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

(4)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

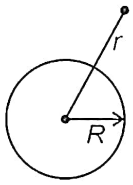
198. A thin rod of length '*a*' has a uniform positive charge per unit length λ. The electric field at a point *P* that is located along the axis of rod and a distance *a* as shown from one end will be



(1) $\frac{\lambda}{8\pi\varepsilon_0 a}$
(2) $\frac{\lambda}{4\pi\varepsilon_0 a}$
(3) $\frac{\lambda}{2\pi\varepsilon_0 a}$
(4) $\frac{3\lambda}{4\pi\varepsilon_0 a}$

Space for Rough Work

199. If the potential at the centre of uniformly charged hollow sphere of radius R is V, then electric field at a distance r from the centre of sphere will be ($r > R$)



(1) $\frac{VR}{r^2}$ (2) $\frac{Vr}{R^2}$

(3) $\frac{VR}{r}$ (4) $\frac{VR}{\sqrt{R^2 + r^2}}$

200. An open carriage in a goods train is moving with a uniform velocity of 10 m s^{-1}. If the rain adds water with zero velocity at the rate of 3 kg/s, then the additional force required by the engine to maintain same velocity of train is

(1) 0.5 N

(2) 30 N

(3) 20 N

(4) Zero

❑ ❑ ❑

Space for Rough Work