18/04/2024

CODE-A

Aakash
Medical | IIT-JEE | Foundations

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AIM – 720

(*Advanced* INTENSIVE *Mastery for* 720)

MM : 720 **CST-10** **Time : 3 Hrs. 20 Mins.**

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 **List I** with **List II**.

	List I Salt with percentage dissociation		**List-II** van't Hoff factor
(a)	NaCl, 100% dissociation	(i)	4
(b)	$CaCl_2$, 25% dissociation	(ii)	2.5
(c)	Na_3PO_4, 100% dissociation	(iii)	2
(d)	$AlCl_3$, 50% dissociation	(iv)	1.5

Choose the correct option

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

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

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

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

2. If 0.02 M aqueous solution of sodium sulphate undergoes 90% dissociation at 27°C then the osmotic pressure of the solution will be

(1) 4.25 atm (2) 2.75 atm

(3) 1.38 atm (4) 3.12 atm

3. Which of the following has minimum bond length?

(1) O_2 (2) O_2^+

(3) O_2^- (4) O_2^{2-}

4. Hybridisation and shape of SF_4 is

(1) sp^3d and see-saw respectively

(2) sp^3d^2 and square pyramidal

(3) sp^3d and T shape respectively

(4) sp^3 and tetrahedral

5. Which of the following methods is most suitable for separation of a mixture of o-nitrophenol and p-nitrophenol?

(1) Differential extraction

(2) Simple distillation

(3) Steam distillation

(4) Adsorption chromatography

6. Consider the following statements

Statement I: Isopentane and neopentane are structural isomers.

Statement II: One carbon atom in isopentane is tertiary.

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 correct but statement II is incorrect

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

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

Assertion (A): In group 14 elements the tendency to show +2 oxidation state increases in the order of Ge < Sn < Pb.

Reason (R): Heavier members of group 14 have inability to use ns^2 electrons of valence shell.

In the light of above statements, choose the correct answer

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

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

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

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

8. In the given reaction species X is

$$S_8(s) + OH^-(aq) \longrightarrow S^{2-}(aq) + H_2O(l) + X(aq)$$

(1) $S_2O_3^{2-}$ (2) SO_3^{2-}

(3) SO_4^{2-} (4) $S_4O_6^{2-}$

9. Which among the following set represents neutral oxides?

(1) NO_2, N_2O and CO_2

(2) SnO, GeO_2 and CO

(3) In_2O_3, N_2O_3 and GeO

(4) CO, N_2O and NO

10. The wave number for the longest wavelength transition in the Paschen series of atomic hydrogen is (R_H = Rydberg constant of H atom)

(1) $\frac{R_H}{9}$

(2) $\frac{R_H}{16}$

(3) $\frac{7}{144}R_H$

(4) $\frac{9}{400}R_H$

11. When Cl_2 gas reacts with cold and dilute sodium hydroxide solution, the oxidation number of chlorine changes from

(1) Zero to –1 and zero to +1

(2) Zero to +1 and zero to +5

(3) Zero to –1 and zero to –5

(4) Zero to +1 and zero to +3

12. IF_7 on aqueous hydrolysis gives

(1) HF and HIO_3 (2) HOF and HIO_3

(3) HF and HIO_4 (4) HOF and HIO_4

13. Consider the following reactions.

$$2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$$

$$2Mg + O_2 \xrightarrow{\Delta} 2MgO$$

The number of moles of MgO formed when oxygen produced by 0.5 mole of $KClO_3$ is completely reacted with Mg is

(1) 0.5 mole (2) 1 mole

(3) 1.5 moles (4) 2 moles

14. Mole fraction of solvent in aqueous solution of 1 molal NaOH is approximately.

(1) 0.98 (2) 0.02

(3) 0.75 (4) 0.25

15. Which of the following is an outer orbital complex and exhibits paramagnetic behaviour?

(1) $[Co(NH_3)_6]^{3+}$

(2) $[Fe(CN)_6]^{4-}$

(3) $[FeF_6]^{3-}$

(4) $[Co(H_2O)_6]^{3+}$

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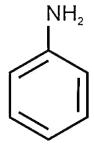
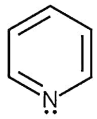
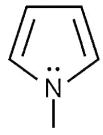
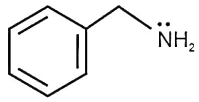
16. Which of the following is strongest base?

(1) 

(2) 

(3) 

(4) 

17. Which among the following is most easily hydrolysed by aqueous KOH?

(1) $C_6H_5CH_2Cl$ (2) $C_6H_5CHClC_6H_5$

(3) CH_3CH_2Cl (4) $CH_3CHClCH_3$

18. $CH_3CH_2CH=CH_2 + HBr \xrightarrow{(C_6H_5CO)_2O_2} A \text{ (major)}$

The compound (A) in above reaction is

(1) 1–Bromobutane

(2) 2–Bromobutane

(3) 1, 2–Dibromobutane

(4) 3– Bromobutane

19. Given below are two statements:

Statement I: Most of the trivalent lanthanoid ions are colourless in the solid state.

Statement II: The lanthanoid ions other than the f^{14} type are all paramagnetic.

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

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

(2) Both statement I and statement II are correct

(3) Both statement I and statement II are incorrect

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

20. Consider the given reaction

$$C(s, \text{graphite}) + \frac{1}{2}O_2(g) \rightarrow CO(g)$$

If the enthalpy change for the given reaction is –a J/mol at T K temperature, then the value of change in internal energy will be

(1) (–a + 8.314 T) kJ/mol

(2) – (a + 4.157 T) J/mol

(3) (a + 4.157 T) J/mol

(4) (a – 8.314 T) J/mol

21. Consider the following statements

(a) Glucose is oxidised to gluconic acid on reaction with bromine water.

(b) (+) Isomer of glyceraldehyde has 'D' configuration.

(c) The pentaacetate of glucose does not react with hydroxylamine.

The correct statements are

(1) (a) and (b) only (2) (b) and (c) only

(3) (a) and (c) only (4) (a), (b) and (c)

22. Which of the following alkanes cannot be made in good yield by Wurtz reaction?

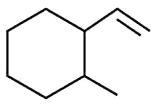
(1) n–Pentane

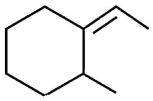
(2) 3, 4–Dimethyl hexane

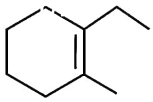
(3) n–Hexane

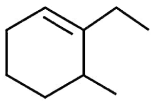
(4) 2, 3–Dimethylbutane

23. Which of the following compounds liberates maximum amount of energy on hydrogenation reaction?

(1) 

(2) 

(3) 

(4) 

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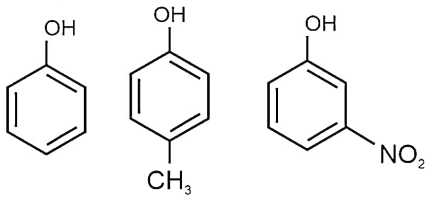
24. Correct order of acidic strength of the given compounds is

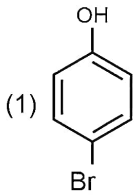


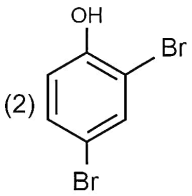
(i) (ii) (iii)

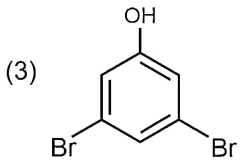
(1) (iii) > (i) > (ii) (2) (ii) > (iii) > (i)

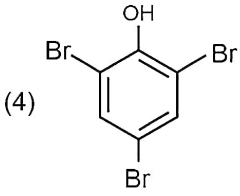
(3) (iii) > (ii) > (i) (4) (ii) > (i) > (iii)

25. Phenol on reaction with bromine water majorly gives

(1) 

(2) 

(3) 

(4) 

26. Consider the following statements

(a) Negative electron gain enthalpy of sodium is greater than lithium.

(b) Electronegativity of carbon is greater than phosphorous.

(c) Atomic radius of silicon is greater than phosphorous.

The correct statements are

(1) (a) and (b) only

(2) (b) and (c) only

(3) (a) and (c) only

(4) (a), (b) and (c)

27. Given below are two statements

Statement I: Noble gases have large positive electron gain enthalpies.

Statement II: Electron gain enthalpy of F is numerically equal to ionization enthalpy of F^-.

In the light of above statements, choose the correct answer

(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

28. For which of the following reaction $K_p > K_c$?

(1) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

(2) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

(3) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

(4) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$

29. If equal volume of HCl with pH= 3 and pH= 4 are mixed together, then pH of the resultant solution will be nearly [log (5.5) = 0.74]

(1) 6.52 (2) 2.26

(3) 3.26 (4) 1.63

30. Correct order of limiting molar conductivity of the given ions in water at 298 K is

(1) $SO_4^{2-} > OH^- > Br^- > Cl^-$

(2) $OH^- > SO_4^{2-} > Br^- > Cl^-$

(3) $OH^- > SO_4^{2-} > Cl^- > Br^-$

(4) $SO_4^{2-} > OH^- > Cl^- > Br^-$

31. Given below are the two statements

Statement I : Unit of rate constant of zero order reaction is $mol^{-1}\ L\ s^{-1}$.

Statement II : All natural and artificial radioactive decay of unstable nuclei take place by zero order kinetics.

In the light of above statements, choose the correct answer

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

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

(3) Both statement I and statement II are correct

(4) Both statement I and statement II are incorrect

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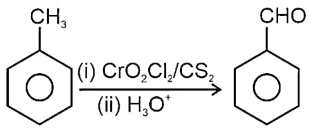
32. 

Given reaction is known as

(1) Rosenmund reduction

(2) Stephen reaction

(3) Etard reaction

(4) Gatterman-Koch reaction

33. Given below are two statements

Statement (I): Benzaldehyde and acetone can be distinguished by Fehling's test.

Statement (II): Benzaldehyde and acetaldehyde can be distinguished by Tollens' reagent.

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 but statement II is correct

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

34. Dimethylglyoxime in basic medium is used to test

(1) Co^{2+} (2) Ni^{2+}

(3) Fe^{2+} (4) Zn^{2+}

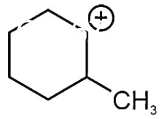
35. Colour of $PbCrO_4$ is

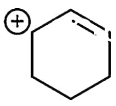
(1) Yellow (2) Red

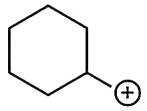
(3) Green (4) Blue

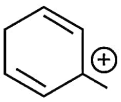
SECTION - B

36. Which of the following carbocations is most stable?

(1) 

(2) 

(3) 

(4) 

37. Identify the incorrect statement from the following.

(1) For hydrogen atom, the number of degenerate orbitals in second shell is four.

(2) The shapes of d_{xy}, d_{yz}, d_{xz} are similar to each other

(3) The shapes of $d_{x^2-y^2}$ and d_{z^2} orbitals are similar to each other

(4) The shape of 4d and 5d orbitals is similar to 3d orbital, but differ in energy and size

38. The enthalpy of formation is negative for which pair of compounds?

(1) H_2O and H_2Se (2) H_2O and H_2S

(3) H_2O and H_2Te (4) H_2S and H_2Se

39. Given below are the two statements

Statement (I): The metal – carbon bond in metal carbonyls possess both σ and π character.

Statement (II): The metal – carbon σ bond is formed by the donation of lone pair of electrons on the carbonyl carbon into a vacant orbital of the metal.

In the light of above statements, choose the correct answer

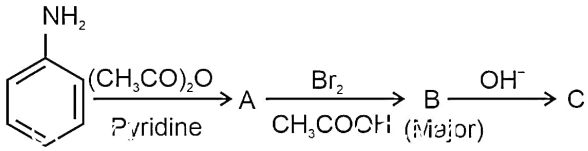
(1) Both statement (I) and statement (II) are correct.

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

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

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

40. Consider the following of reaction sequence



Compound A and C respectively are

(1) Acetanilide and 2–Bromoaniline

(2) N–Phenylethanamide and 4–Bromoaniline

(3) N–Methylaniline and 2, 4–Dibromoaniline

(4) N– Phenylethanamide and 3–Bromoaniline

Space for Rough Work

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41. Given below are two statements: one is labelled as Assertion (A) while other is labelled as Reason (R)

Assertion (A): Standard enthalpy of formation for KCl(s) = 0.

Reason (R): Standard enthalpy of formation of element in its reference state is taken as zero.

(1) (A) is correct but (R) is not correct

(2) (A) is not correct but (R) is correct

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

(4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

42. Least basic compound among the following is

(1) $Tm(OH)_3$ (2) $Tb(OH)_3$

(3) $Pm(OH)_3$ (4) $Gd(OH)_3$

43. Which pair contains only globular proteins?

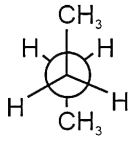
(1) Keratin and myosin

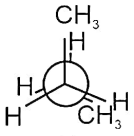
(2) Keratin and insulin

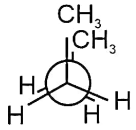
(3) Myosin and albumin

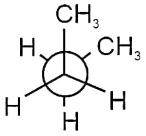
(4) Insulin and albumin

44. Most unstable conformation of n–butane is (consider $C_2 - C_3$ bond rotation)

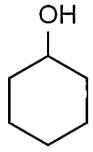
(1) 

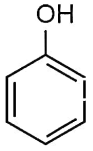
(2) 

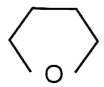
(3) 

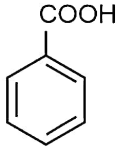
(4) 

45. The compound which does not liberate H_2 gas on reaction with sodium is?

(1) 

(2) 

(3) 

(4) 

46 The resistance of a conductivity cell containing 0.02 M solution of NaCl at 298 K is 80 Ω. If the conductivity of 0.02 M NaCl solution is 0.008 S cm^{-1} then cell constant of the cell will be

(1) 0.064 cm^{-1} (2) 1.82 cm^{-1}

(3) 0.034 cm^{-1} (4) 0. 64 cm^{-1}

47. Conjugate acid of HPO_4^{2-} and conjugate base of H_2O respectively are

(1) PO_4^{3-} , H_3O^+

(2) $H_2PO_4^-$, H_3O^+

(3) $H_2PO_4^-$, OH^-

(4) H_3PO_4, OH^-

48. If the rate constant of a first order reaction is 1.8424×10^{-4} s^{-1} then the time required for the completion of 20% of the reaction will be

(1) 750 s (2) 650 s

(3) 1550 s (4) 1250 s

49. Product formed on reaction of aldehyde and primary amine is

(1) Amide (2) Schiff's base

(3) Oxime (4) Hydrazone

50. Match **List -I** with **List -II**

	List-I Molecules		**List-II Shape**
(a)	XeF_2	(i)	T–shape
(b)	H_2O	(ii)	Linear
(c)	PCl_5	(iii)	Bent
(d)	ClF_3	(iv)	Trigonal bipyramidal

Choose the correct answer from the options given below.

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

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

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

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

Space for Rough Work

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BOTANY

SECTION-A

51. Read the following statements and choose the option for **correct** ones:

a. The terminator is located towards 3′-end of the coding strand of DNA.

b. DNA-dependent DNA polymerase facilitates the opening of the helix during transcription.

c. A failure in cell division after DNA replication results into polyploidy.

d. The ribosome consists of structural RNAs and about 80 different proteins.

e. AUG has dual functions, as it codes for lysine and also acts as stop codon.

Choose the **correct** answer from the options given below:

(1) b, e only

(2) a, c, e only

(3) b, d, e only

(4) a, c, d only

52. Direction of DNA and RNA synthesis during replication and transcription is

(1) 3′ → 5′

(2) 5′ → 3′

(3) 3′ → 5′ and 5′ → 3′ respectively

(4) 5′ → 3′ and 3′ → 5′ respectively

53. Which of the following statements quotes the importance of satellite DNA w.r.t. paternity testing?

(1) It forms only 20% of the human genome

(2) It codes for enzyme needed for DNA replication

(3) It shows high degree of polymorphism, which is heritable from parents to children

(4) It is found only on 1.4 million locations in human genome as SNPs

54. Arrange the following in increasing order of their organisation and choose the **correct** option

a. Gene

b. Chromosome

c. Nucleotide

d. Genome

(1) a → d → c → b

(2) b → a → d → c

(3) c → b → a → d

(4) c → a → b → d

55. Assimilation number shows

(1) Decrease in photosynthetic rate due to accumulation of photosynthetic products

(2) Relationship between the chlorophyll and photosynthesis

(3) CO_2 availability to plants

(4) Rate of enzymatic activity during carbon reactions of photosynthesis

56. Essentiality of sunlight for photosynthesis was established by

(1) Jan Ingenhousz

(2) Joseph Priestley

(3) Cornelius van Niel

(4) Julius von Sachs

57. Select the statement which is **not** true w.r.t. nucleolus.

(1) It is a non-membrane bound structure present in nucleus

(2) Its content is continuous with the rest of the cytoplasm

(3) It is a site for active ribosomal RNA synthesis

(4) It is a spherical structure present in eukaryotes

58. The fluid nature of plasma-membrane is responsible for all, **except**

(1) Endocytosis

(2) Secretion

(3) Protecting cells from virus attacks

(4) Formation of intercellular junctions

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

Assertion (A) : In prokaryotes, ribosomes are associated with plasma membrane of the cell.

Reason (R) : Only one type of ribosomes having 40S and 30S subunits are found in prokaryotes.

(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

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

Statement (A): Complete disintegration of nuclear envelope marks the start of metaphase.

Statement (B): Chromosomes are spread through the cytoplasm of the cell during metaphase.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both the statements are correct

(4) Both the statements are incorrect

61. If at the end of S-phase, number of chromosomes in a cell is 16, then during its mitotic division what would be the number of chromosomes at the end of anaphase and each daughter cell respectively?

(1) 16, 8 (2) 32, 16

(3) 8, 16 (4) 16, 32

62. Of the total duration of a cell cycle, interphase lasts for

(1) About 5% (2) Less than 50%

(3) More than 95% (4) About 75%

63. Match the column-I with column-II and choose the **correct** option.

	Column-I	**Column-II**
A.	Quagga	(i) Mauritius
B.	Thylacine	(ii) Africa
C.	Dodo	(iii) Russia
D.	Steller's sea cow	(iv) Australia

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

64. In aerobic respiration of a pyruvic acid molecule, during how many steps there are release of CO_2 molecule?

(1) Two

(2) Seven

(3) Five

(4) Three

65. β- thalassemia differs from α-thalassemia as the former is

(1) An autosome linked recessive blood disease

(2) Controlled by the gene located on chromosome 11

(3) Quantitative problem of synthesising too few globin molecules

(4) Controlled by two closely linked genes HBA1 and HBA2.

66. T.H. Morgan crossed yellow bodied-white eyed female *Drosophila* with brown bodied-red eyed male and then intercrossed their F_1 progeny. Through this experiment he observed that

(1) The gene for eye colour is located on the Y-chromosome

(2) Genes for eye colour and body colour do not segregate independently of each other

(3) The proportion of non-parental type combinations in F_2 generation are much higher than parental type

(4) Frequency of recombination between gene pairs is a measure of the distance between genes

67. An individual with Turner's syndrome

(1) Is fertile

(2) Shows trisomy of sex chromosome

(3) Shows gynaecomastia

(4) Has rudimentary ovaries

Space for Rough Work

68. In which among the following protected areas tribal people are an integral components of the system?
(1) Biosphere reserve
(2) Wildlife safari park
(3) Zoological park
(4) Botanical garden

69. Which among the following represents monohybrid cross?
(1) PpQQRr × PpQQRr
(2) PpQqRr × PpQqRr
(3) PPQQRr × PPQQRr
(4) PpQq × PpQq

70. Intrafascicular cambium is found in
(1) Monocot stem (2) Dicot leaf
(3) Dicot stem (4) Monocot root

71. Two statements are given below.

Statement I : In heartwood, tyloses are found which make them functional for conduction of water.

Statement II : Tyloses are balloon like swellings of xylem parenchyma into the lumen of tracheids.

In the light of above statements, choose **correct** answer from the option given below.
(1) Only statement I is correct
(2) Only statement II is correct
(3) Both statements are correct
(4) Both statements are incorrect

72. Which of the following is **not** a day neutral plant?
(1) Tomato
(2) Pepper
(3) Cucumber
(4) Sugarbeet

73. Anatropous ovule is found in
(1) Monocots only
(2) Dicots only
(3) Most of the angiosperms
(4) All gymnosperms and pteridophytes

74. State **True(T)** or **False(F)** to the given statements and choose the correct option.
a. Protandrous condition is found in sunflower.
b. Protogynous condition is found in *Ficus.*
c. Flowers pollinated by flies and beetles secrete foul odours to attract them.
d. Self-incompatibility as an outbreeding device is a genetically controlled process.

	a	b	c	d
(1)	T	F	T	F
(2)	F	F	T	T
(3)	T	T	T	T
(4)	F	F	F	T

75. Select the **correctly** matched pair.

(1)	Pyrenoids	–	Contain protein besides starch
(2)	Green algae	–	Laminarin or mannitol as stored food
(3)	Cellulose	–	Similar to amylopectin and glycogen
(4)	Algin	–	Hydrocolloid obtained from red algae

76. *Adiantum* belongs to class
(1) Psilopsida
(2) Lycopsida
(3) Sphenopsida
(4) Pteropsida

77. Which of the following statements is **incorrect**?
(1) Primary treatment is a physical process which involves removal of large and small particles from sewage through filtration and sedimentation
(2) Flocs are masses of bacteria associated with fungal filaments to form mesh like structures
(3) The Ministry of Environment and Forest has initiated Ganga Action Plan (1985) and Yamuna Action Plan
(4) The greater the BOD of waste water, less is its polluting potential

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78. Which of the following pairs of organisms show interaction known as commensalism?
(1) Fig and fig wasp
(2) Orchids and bees
(3) Clown fish and sea anemone
(4) Cuckoo and crow

79. Identify true (T) and false (F) statements and select the **correct** option.
a. Pioneer communities established on a bare rock are lichens.
b. Species composition is not a key functional aspect of an ecosystem.
c. Standing state is the amount of all the inorganic substances present in the soil at any given time.

	a	b	c
(1)	T	F	F
(2)	F	F	T
(3)	T	T	F
(4)	T	T	T

80. Select the **incorrect** statement from the following.
(1) Order is assemblage of families which exhibit fewer similar characters
(2) In taxonomic hierarchy, species is lowermost category
(3) Family is a group of closely related classes with few general characters
(4) Taxonomic hierarchy contains seven obligate categories

81. Which of the following statements is/are **not** true w.r.t. acellular structures that are characterised by having an inert crystalline structure when outside the living cell?
a. They are exception to the cell theory, and are connecting link between living and non-living entities.
b. Occurrence of certain enzymes in these structures shows their non-living nature .
c. Their high specific gravity shows living nature of these acellular structures.
d. D.J. Ivanowsky demonstrated that the extract of the TMV infected plants of *Nicotiana tabacum* could cause infection in healthy plants.
(1) Only d
(2) a, b and d
(3) b, c and d
(4) Only b and c

82. Read the following statements.
a. Mode of nutrition is photoautotrophic.
b. The body is not enclosed by cell wall.
c. They are found in fresh water as well as in marine water.
d. They float passively in water currents.
e. Members are chief producers in the oceans.
The **correct** ones w.r.t. chrysophytes are:
(1) a, b, c and e
(2) a, c, d and e
(3) b, d and e
(4) Only a and c

83. ____ is a scar on the seed coat through which the developing seeds were attached to the fruit.
Select the **correct** option to fill in the blank.
(1) Micropyle
(2) Testa
(3) Hilum
(4) Epicotyl

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

Column-I	Column-II
a. Offset	(i) Ginger
b. Runner	(ii) *Eichhornia*
c. Phylloclade	(iii) *Oxalis*
d. Rhizome	(iv) *Euphorbia*

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

85. Consider the following statements (a – d) and select the option for **correct** ones.
a. The calyx of Brassicaceae family shows polysepalous condition and imbricate aestivation.

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b. The gynoecium of mustard family is bicarpellary, syncarpous.

c. Generally legume as a fruit type is seen in Liliaceae.

d. The floral formula for Solanaceae is $\oplus\ \male\ K_{(5)}C_{(5)}\ \overbrace{A_5}\ \underline{G}_{(2)}$

(1) a, b and d

(2) a, b and c

(3) a, c and d

(4) b and d only

SECTION-B

86. How many bp of DNA are wrapped around one histone octamer to form a nucleosome?

(1) 100 bp

(2) 30 bp

(3) 200 bp

(4) 50 bp

87. Amino acid methionine is coded by which of the following codon?

(1) UUU

(2) AUG

(3) UUG

(4) UAA

88. *Omnis cellula-e cellula* means

(1) Cell is the structural unit of life

(2) Cell is the fundamental unit of life

(3) New cells are formed from pre-existing cells

(4) Functions differ from cell to cell

89. After karyokinesis in animal cells, cytokinesis takes place

(1) In centrifugal manner

(2) In centripetal manner

(3) By fusion of phragmoplast

(4) By formation of cell plate

90. Which of the following is **not** required for link reaction of aerobic respiration?

(1) Pyruvate dehydrogenase

(2) NAD^+

(3) Coenzyme A

(4) Ni^{2+}

91. What will be the sequence of these genes on a linear chromosome, if the recombination frequency between the genes are as follows : p and r is 5%, q and r is 22%, p and q is 27%, r and s is 31%, p and s is 36%, q and s is 9%

(1) p, q, r, s

(2) q, p, s, r

(3) p, r, q, s

(4) p, s, q, r

92. Read the features of unknown plants **'A'** and **'B'**.

Character	**'A'**	**'B'**
Hypodermis	Absent	Collenchymatous
Vascular bundles	Radial	Conjoint
Endodermis	Distinct	Single layered
Pericycle	Not in patches	Semilunar patches

'A' and **'B'** most likely to be

(1) A-Monocot root, B-Dicot stem

(2) A-Dicot stem, B-Dicot leaf

(3) A-Monocot leaf, B-Dicot root

(4) A-Dicot stem, B-Dicot root

93. Select the **incorrectly** matched pair.

(1)	Auxins	–	Promote flowering in pineapples
(2)	Gibberellins	–	Decrease malting process
(3)	Abscisic acid	–	Plant metabolism inhibitor
(4)	Ethylene	–	Promotes female flowers in cucumber

94. Two statements are given below.

Statement I: Seed of *Lupinus arcticus* does not show a period of dormancy.

Statement II: Seeds of date palm can retain the viability for many years.

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

(1) Only statement I is correct

(2) Only statement II is correct

(3) Both the statements are correct

(4) Both the statements are incorrect

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95. Which of the following bryophytes provide peat?
(1) *Sphagnum* (2) *Marchantia*
(3) *Funaria* (4) *Riccia*

96. Read the following statements and select the **correct** option.
Statement A : Cyclosporin A is used as an immunosuppressive agent in organ-transplant patients.
Statement B : Statins are produced by bacteria and used as clot buster.
(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

97. Which of the following pairs contribute to decrease in population density?
(1) Emigration and mortality
(2) Emigration and natality
(3) Natality and immigration
(4) Mortality and natality

98. Which of the following statements is **incorrect**?
(1) Stratification is the vertical distribution of different species occupying different levels.
(2) Humification is the process of decomposition of detritus to form humus.
(3) Secondary productivity is the rate of formation of new organic matter by consumers.
(4) Hydrarch succession takes place in areas like rock, sand.

99. Dikaryon condition is seen in which organism?
(1) *Albugo*
(2) *Rhizopus*
(3) *Trichoderma*
(4) *Agaricus*

100. Which of the following is **mismatched**?
(1) *Trifolium* – Ornamental plant – Poaceae
(2) Tobacco – Fumigatory – Solanaceae
(3) *Gloriosa* – Ornamental plant – Lily family
(4) *Indigofera* – Dye – Fabaceae

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ZOOLOGY

SECTION-A

101. AIDS was first reported in the year
(1) 1987 (2) 1981
(3) 1891 (4) 1982

102. In adult frogs, lesser water is required for excretion as compared to tadpoles as former excrete
(1) Urea
(2) Ammonia
(3) Uric acid
(4) Lactic acid

103. In human females, the ovarian stroma is divided into
(1) Primary and secondary follicle
(2) An outer medulla and an inner cortex
(3) A peripheral cortex and an inner medulla
(4) An outer layer of epithelium and an inner layer of follicles

104. The hormone released by the atrial wall of the human heart leading to decrease in blood pressure is
(1) Atrial natriuretic factor
(2) Erythropoietin
(3) Cholecystokinin
(4) Secretin

105. The rise per base pair in B-DNA is
(1) 3.4 Å
(2) 3.4 nm
(3) 34 Å
(4) 0.34 Å

106. Adenosine differs from adenylic acid as
(1) Former is a nucleotide
(2) Former contains a pentose sugar, nitrogenous base and phosphate group
(3) Latter is a nucleic acid
(4) Latter has a nucleoside attached to a phosphate group

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107. In chemical safety testing, the scientists follow the same procedure used for testing toxicity of drugs. Transgenic animals are made to carry genes which make them
(1) More sensitive to toxic substances than non-transgenic animals
(2) Less sensitive to toxic substances than non-transgenic animals
(3) Resistant to toxic substances
(4) Non-sensitive to toxic substances

108. The epithelium that covers the dry surface of the skin and moist surface of the buccal cavity is
(1) Glandular epithelium
(2) Simple cuboidal epithelium
(3) Compound epithelium
(4) Simple squamous epithelium

109. The epithelium characterised by a single layered tall, slender cells with the presence of their nuclei at the base is
(1) Columnar epithelium
(2) Cuboidal epithelium
(3) Squamous epithelium
(4) Compound epithelium

110. The number of disulfide bonds present between A and B chains of a mature human insulin is
(1) Two
(2) Three
(3) One
(4) Four

111. Different types of ion channels present on the neural membrane are
(1) Selectively permeable to different ions
(2) Completely impermeable to sodium ions only
(3) Freely permeable to all different types of ions
(4) Freely permeable to potassium ions only

112. Hypothalamus does not contain centre to control
(1) Body temperature
(2) Urge for eating
(3) Urge for drinking
(4) Cardiovascular reflexes

113. Choose the **correct** match w.r.t. lymphoid organs/tissues and their features in humans.

(1)	Appendix	–	Filters blood
(2)	Thymus	–	Bean-shaped
(3)	MALT	–	Lymphoid tissue located within the lining of major tracts of the body
(4)	Lymph nodes	–	Primary lymphoid organs

114. In humans, the endometrium undergoes cyclical changes during A while the myometrium exhibits strong contractions during B .
Choose the option which **correctly** represents A and B respectively.
(1) Menstrual cycle, spermiation
(2) Menstrual cycle, parturition
(3) Delivery of the baby, menopause
(4) Menopause, ovulation

115. Choose the option that **correctly** represents external genitalia in human male and female respectively.
(1) Penis, vagina
(2) Mons pubis, testes
(3) Penis, clitoris
(4) Epididymis, vagina

116. In India, the legal marriageable age of human males and females respectively are
(1) 18 years; 21 years
(2) 21 years; 18 years
(3) 18 years; 18 years
(4) 21 years; 21 years

117. Which of the following sets of venereal diseases are completely curable if detected early and treated properly?
(1) Genital herpes, syphilis
(2) Syphilis, gonorrhoea
(3) AIDS, genital herpes
(4) Gonorrhoea, AIDS

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118. Select the **incorrect** option w.r.t. vasectomy.
(1) Terminal method to prevent any more pregnancies
(2) A small part of vas deferens is removed or tied up
(3) Seminal plasma is without sperms
(4) This technique is ineffective with very high reversibility.

119. Choose the **odd** one w.r.t skull bones in an adult human.
(1) Hyoid (2) Incus
(3) Ethmoid (4) Ischium

120. Which of the following animals have open and closed circulatory system respectively?
(1) Ctenophores, molluscs
(2) Molluscs, arthropods
(3) Annelids, chordates
(4) Arthropods, annelids

121. All of the following are placental mammals, **except**
(1) Lemur
(2) Bobcat
(3) Wolf
(4) Numbat

122. Read the given statements and select the **correct** option w.r.t. evolution.
Statement A : The rate of appearance of new life forms is linked to the life cycle or the life span.
Statement B : Evolution by natural selection, in a true sense would have started when cellular forms of life with differences in metabolic capability originated on Earth.
(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

123. Who among the following worked in Malay Archipelago and came to similar conclusions as Darwin?
(1) Alfred Wallace
(2) Thomas Malthus
(3) Karl Ernst Von Baer
(4) Hugo deVries

124. Match column I with column II.

	Column I		**Column II**
a.	Thrombocytes	(i)	6000-8000/mm^3 of blood
b.	Erythrocytes	(ii)	12-16 gms in 100 mL of blood
c.	Leucocytes	(iii)	5-5.5 millions/mm^3 of blood
d.	Haemoglobin	(iv)	1,500,00-3,500,00/ mm^3 of blood

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

125. Which of the following is responsible for initiating and maintaining the rhythmic contractile activity of the human heart?
(1) Purkinje fibres
(2) Bundle of His
(3) SAN
(4) AVN

126. All of the following animals are oviparous, **except**
(1) *Ornithorhynchus*
(2) *Exocoetus*
(3) *Scoliodon*
(4) *Ichthyophis*

127. In an adult human, under normal physiological conditions, when percentage saturation of haemoglobin with O_2 is plotted against pO_2 then the shape of obtained graph is
(1) Sigmoid
(2) Parabola
(3) Hyperbola
(4) J-shaped

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128. Which among the given sets of factors favours the formation of carbamino-haemoglobin?
(1) High pCO_2, low pO_2
(2) Low pCO_2, high pO_2
(3) High pCO_2, high pO_2
(4) Low pCO_2, low pO_2

129. Uricotelic mode of excretion is exhibited by
(1) *Clarias*
(2) *Salamandra*
(3) *Calotes*
(4) *Ornithorhynchus*

130. How many of the statements given below are incorrect for gel electrophoresis?
a. DNA fragments are forced to move towards a positively charged electrode.
b. Larger the size of DNA fragment, closer it remains to the loading well.
c. Separated DNA fragments can be seen in the visible light.
Select the **correct** option.
(1) Zero
(2) One
(3) Two
(4) Three

131. In the restriction enzyme *Bam*HI, the roman number 'I' represents the
(1) Genus of the bacteria
(2) Species of the bacteria
(3) Order of isolation of enzyme from same bacterial strain
(4) Strain of the bacteria

132. Today we know 'X' restriction enzymes that have been isolated from over 230 strains of bacteria.
Select the **correct** option for 'X'.
(1) Less than 200
(2) More than 900
(3) Less than 500
(4) Less than 900

133. A researcher found an organism during his voyage. On further examination, he observed that the organism is unsegmented and has a calcareous exoskeleton. The organism also has three germ layers and the foot is muscular. The organism should be placed in the phylum
(1) Coelenterata
(2) Annelida
(3) Mollusca
(4) Chordata

134. Select the **incorrect** match w.r.t. common names.
(1) *Asterias* – Star fish
(2) *Sepia* – Cuttle fish
(3) *Wuchereria* – Tapeworm
(4) *Ancylostoma* – Hookworm

135. If a foreign DNA is ligated at *Sal* I site of pBR322 then the transformants can be differentiated from non-transformants by plating on
(1) Ampicillin
(2) Kanamycin
(3) Chloramphenicol
(4) Tetracycline

SECTION-B

136. How many of the organic compounds mentioned in the box belong to the category of acid-insoluble fraction?

Nucleotides, Polysaccharides, Amino acids, Lipids, Nucleic acids, Monosaccharides, Proteins

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

137. **Assertion (A) :** Thyroid hormone interacts with intracellular receptors and regulate gene expression or chromosome function.
Reason (R): Thyroxine is steroidal in chemical nature.
In the light of above statements, choose the **correct** option.

Space for Rough Work

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

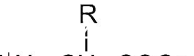
(2) Both (A) and (R) are true but (R) is not the correct explanation of the (A)

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

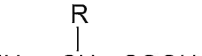
(4) Both (A) and (R) are false

138. Select the option that **correctly** represents the zwitterionic form of an amino acid.

(1) 

(2) 

(3) 

(4) 

139. Read the given statement.

Plasmodium enters the human body as (a) through the bite of an infected (b) mosquito.

Choose the option that **correctly** fills the blanks (a) and (b) respectively.

(1) (a)-Female gametocytes; (b)-male *Aedes*

(2) (a)-Trophozoites; (b)-male *Anopheles*

(3) (a)-Male gametocytes; (b)-female *Aedes*

(4) (a)-Sporozoites; (b)-female *Anopheles*

140. A group of students were performing an experiment on a frog in the lab. They dissected the heart of frog and kept it in a jar. Later, they noticed that the heart kept on beating for sometime.

Select the option that explains this situation.

(1) Frogs have a myogenic heart.

(2) Frogs are poikilotherms.

(3) Frogs have sinus venosus.

(4) Frogs have a 3-chambered heart.

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

	Column I	**Column II**
a.	Rosie	(i) Cotton bollworms
b.	Eli Lilly	(ii) Lacks C-peptide
c.	*cry II Ab*	(iii) A transgenic cow
d.	Mature insulin	(iv) An American company (v) Corn borers

(1) a(v), b(ii), c(i), d(iv)

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

(3) a(v), b(iv), c(i), d(ii)

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

142. In polarised state of a nerve fibre, the outer surface of the axonal membrane possesses a positive charge while its inner surface is negatively charged due to

(1) Influx of more Na^+ ions than efflux of K^+ ions

(2) More K^+ in extracellular fluid than Na^+

(3) Active transport of more sodium ions into cells

(4) Active transport of ions through sodium-potassium pump

143. Read the following statements w.r.t humans.

a. There are remarkable differences between the reproductive events in males and in females.

b. The male reproductive system is located outside the pelvic region.

c. Both testes and ovaries are covered by a dense protective covering.

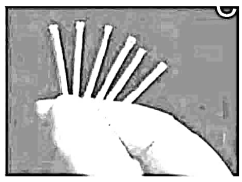
d. Both testes and ovaries are spherical in shape.

Choose the option with only **correct** statement(s).

(1) a and b (2) b and c

(3) b, c and d (4) Only a

144. Observe the figure given below.



Identify the figure and select the **correct** option.

Space for Rough Work

TG :- @RAJHARSH77

(1) It increases phagocytosis of sperms within the uterus.

(2) It prevents the users from contracting STIs and AIDS.

(3) It inhibits ovulation and alters the quality of cervical mucus to prevent/retard entry of sperms.

(4) It is made of thick rubber sheath.

145. Select the **correct** statement from the following.

(1) All mammals except seals and dolphins have seven cervical vertebrae.

(2) By the time of 500 mya, invertebrates were formed and active.

(3) Amphibians lay thick shelled eggs which do not dry up in sun.

(4) Small sized reptiles of era in which dinosaurs existed do not exist today.

146. The type of movements shown by macrophages in our body is also exhibited by

(1) *Amoeba* and *Euglena*

(2) *Hydra* and *Paramoecium*

(3) Leucocytes and *Amoeba*

(4) Spermatozoa and *Sycon*

147. Select the **incorrect** statement.

(1) Production of body heat and erythrocytes are functions of the skeletal system in humans.

(2) Decreased levels of oestrogen in old aged human females is a common cause of osteoporosis

(3) Some of the movements result in a change of place or location.

(4) Locomotion is generally for search of food, shelter, mate, suitable breeding grounds and favourable climatic conditions.

148. Complete the analogy and select the **correct** option w.r.t. human respiratory system.

Inspiratory Reserve Volume : 2500 mL to 3000 mL : : Minute Volume :_____.

(1) 1000 – 1100 mL

(2) 2500 – 3000 mL

(3) 6000 – 8000 mL

(4) 1100 – 1200 mL

149. Select the set of paired structures of human excretory system.

(1) Kidneys and urinary bladder

(2) Ureters and kidneys

(3) Urinary bladder and urethra

(4) Ureters and urethra

150. Consider the following for methods of transformation.

a. Suitable for plants

b. Use of high velocity micro-particles of gold or tungsten coated with DNA

Identify the method and select the **correct** option.

(1) Microinjection

(2) Gene gun

(3) Electroporation

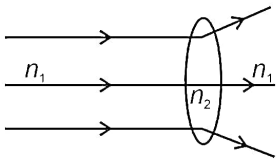
(4) Disarmed vector mediated

TG :- @RAJHARSH77

PHYSICS

SECTION-A

151. A parallel beam of light is incident on a thin convex lens as shown in figure. Given ray diagram could be correct if



(1) $n_1 = n_2$

(2) $n_1 < n_2$

(3) $n_2 < n_1$

(4) Both (1) & (2)

152. Bottom of container filled with a transparent liquid appears slightly raised due to

(1) Refraction (2) Interference

(3) Diffraction (4) Reflection

Space for Rough Work

153. In Young's double slit experiment, the spacing between successive maxima or minima is given by (Where the symbols have their usual meaning)

(1) $\frac{\lambda d}{D}$

(2) $\frac{\lambda D}{d}$

(3) $\frac{\lambda D}{2d}$

(4) $\frac{\lambda d}{2D}$

154. The average value of electric energy density in an electromagnetic waves is (E_0 is amplitude of electric field)

(1) $\frac{1}{2}\varepsilon_0 E_0^2$

(2) $\frac{E_0^2}{2\varepsilon_0}$

(3) $\varepsilon_0 E_0^2$

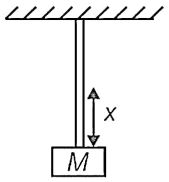
(4) $\frac{1}{4}\varepsilon_0 E_0^2$

155. Average velocity vector of nitrogen gas molecules at 27°C in a container at rest is

(1) 850 m/s (2) 300 m/s

(3) 863 m/s (4) Zero

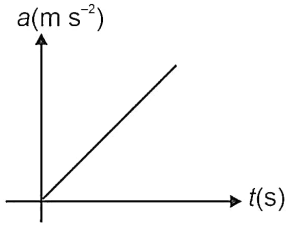
156. A heavy block of mass M hangs in equilibrium at the end of a rope of mass m and length l connected to a ceiling. The tension in rope at a distance x as shown is

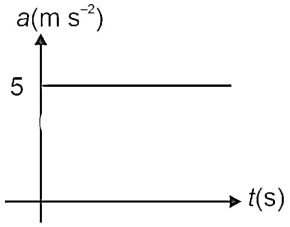


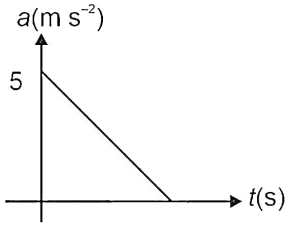
(1) $Mg - \frac{mgx}{l}$ (2) $Mg + \frac{mg(l-x)}{l}$

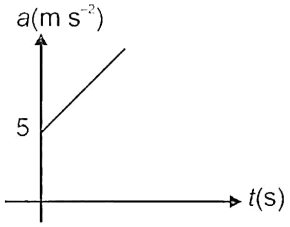
(3) $Mg + \frac{mg(l-x)}{x}$ (4) Mg

157. A body moves with velocity $v = -3 + 5t$. The correct variation of acceleration with time is shown by (Where velocity is in m s^{-1} and time in seconds)

(1)


(2)


(3)


(4)


158. A particle is thrown vertically upwards from ground such that it passes same height at 1 s and 5 s. The time of flight for the complete journey of particle is

(1) 8 s (2) 6 s

(3) 7 s (4) 5.8 s

159. The velocity of projection of an oblique projectile is $\vec{v} = (6\hat{i} + 7\hat{j})$ m s^{-1}. The speed of the projectile at the highest point of the trajectory is

(1) 3 m-s^{-1}

(2) 7 m s^{-1}

(3) 6 m s^{-1}

(4 $\sqrt{85}$ m s^{-1}

Space for Rough Work

160. The self-inductance of solenoid of a length l and number of turns N, with a fixed cross-sectional area A, increases if

(1) l increases but N remains constant

(2) l decreases and N increases

(3) l increases and N decreases

(4) N decreases but l remains constant

161. The output of a step-down transformer is measured to be 240 V when connected to glow a 120 W bulb. The value of peak current is

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

(2) $\sqrt{2}$ A

(3) 2 A

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

162. A block of mass 2 kg is allowed to slide down a fixed smooth inclined plane of angle 53° and length 2 m. Power developed by gravitational force at the instant when the block reaches the bottom of inclined plane is

(1) 64 W (2) $64\sqrt{2}$ W

(3) $128\sqrt{2}$ W (4) 128 W

163. The potential energy of a particle of mass 5 kg, moving in xy plane, is given by

$U = (-2x + 2y)$ J

The magnitude of force on the particle at point (2 m, 2 m) is

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

(3) 4 N (4) Zero

164. A transverse wave is represented by the equation $y = 6\sin\left(\frac{\pi}{6}\right)\sin(4x - 16t)$ where x, y in metre and t is in second. The velocity of the wave will be

(1) 4 m/s

(2) 16 m/s

(3) 8 m/s

(4) 2 m/s

165. A block of mass m is vertically suspended from a spring of negligible mass and the system oscillates with frequency n. If a block of mass $4m$ is used, then frequency of system will become

(1) $\frac{n}{4}$

(2) $4n$

(3) $\frac{n}{2}$

(4) $2n$

166. If distance between the plate of an isolated charged capacitor increased then which of the following will not change?

(1) Capacitance

(2) Charge

(3) Energy

(4) Both (1) and (3)

167. Consider the following statements and choose the correct option.

Statement A : Net charge on an electric dipole is zero.

Statement B : Like charge must attract each other.

(1) Both statement (A) and statement (B) are correct

(2) Both statement (A) and statement (B) are incorrect

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

(4) Statement (A) is incorrect and statement (B) is correct

168. When the energy of the incident radiation is increased by 30% the kinetic energy of the photoelectrons emitted from a metal surface increased from 0.6 eV to 0.9 eV. The work function of the metal is

(1) 1.3 eV

(2) 1 eV

(3) 0.4 eV

(4) 1.5 eV

Space for Rough Work

169. Consider the two statements given below and choose the correct option.

Statement I: Nuclear forces are short range forces.

Statement II: Nuclear forces are equal in strength to electromagnetic forces inside the nucleus.

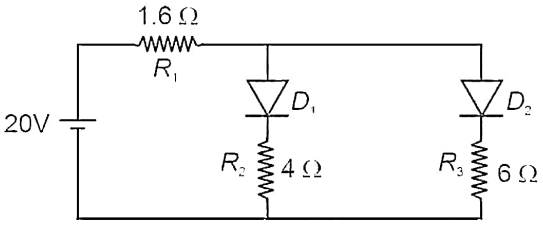
(1) Statement I is correct and statement II is incorrect

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

(3) Both statements are correct

(4) Both statements are incorrect

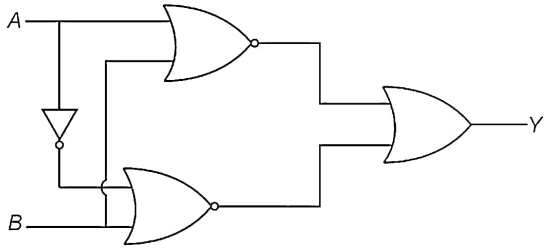
170. The given circuit has two ideal diodes connected as shown in the figure below. The current flowing through the resistance R_1 will be



(1) 3.57 A (2) 2.63 A

(3) 1.72 A (4) 5 A

171. The truth table for the given logic circuit is



(1)

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

(2)

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

(3)

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

(4)

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

172. For an ideal or perfect heat insulator the value of thermal conductivity (K) is

(1) Infinite

(2) Zero

(3) $1 \le K \le 2$

(4) $-2 \le K \le -1$

173. The first law of thermodynamics is based on

(1) Law of conservation of energy

(2) Law of conservation of mechanical energy

(3) Law of conservation of gravitational energy

(4) Law of conservation of momentum

174. In which of the following process the P-V diagram is a straight line parallel to volume axis?

(1) Isobaric

(2) Isothermal

(3) Isochoric

(4) Adiabatic

175. Choose the option that does not represent the characteristic of an ideal fluid.

(1) Fluid is incompressible

(2) Fluid is viscous

(3) Fluid flow is steady

(4) Fluid flow is irrotational

176. Match the physical quantities given in column-I with the dimensional formula given in column-II and choose the correct option.

	Column-I	Column-II
a.	Torque	(i) $[M^0L^2T^{-2}K^{-1}]$
b.	Energy density	(ii) $[M^1L^2T^{-2}K^0]$
c.	Angular momentum	(iii) $[M^1L^2T^{-1}K^0]$
d.	Specific heat	(iv) $[M^1L^{-1}T^{-2}K^0]$

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

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

177. A force $\vec{F} = \alpha\hat{i} + 3\hat{j} + 6\hat{k}$ is acting at a point $\vec{r} = 2\hat{i} - 6\hat{j} - 12\hat{k}$. The value of α for which angular momentum about origin remain conserved is

(1) 2 (2) Zero

(3) 1 (4) –1

Space for Rough Work

178. Consider a uniform square plate of side a and mass m. The moment of inertia of this plate about an axis perpendicular to its plane and passing through one of its corners is

(1) $\frac{5}{6}ma^2$

(2) $\frac{1}{12}ma^2$

(3) $\frac{7}{12}ma^2$

(4) $\frac{2}{3}ma^2$

179. Magnitude of intensity of the gravitational field inside the solid sphere is

(1) Variable and proportional to distance from centre

(2) Constant

(3) Variable but does not depend on distance from the centre

(4) Zero

180. A cube is subjected to a uniform volume compression. If the side of the cube decreases by 1%, then the bulk strain is

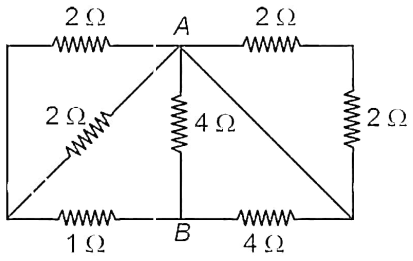
(1) 0.02

(2) 0.03

(3) 0.04

(4) 0.2

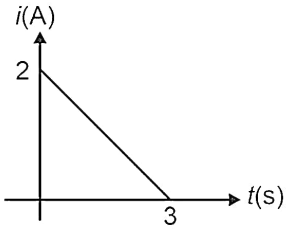
181. Effective resistance between points A and B in the given circuit is



(1) 1 Ω (2) 2 Ω

(3) 4 Ω (4) $\frac{4}{3}\Omega$

182. If current in a resistance R decreases according to the given i vs t graph, then the total charge passed through the resistance R is



(1) 1 C (2) 3 C

(3) 6 C (4) 4 C

183. When a charged particle is fired with a velocity $\vec{v}$ in a gravity free space containing electric field $(\vec{E})$ and magnetic field $(\vec{B})$, it is not deflected from its straight path. Then

(1) $\vec{v}\times\vec{B}=\vec{E}$

(2) $\vec{B}\times\vec{v}=\vec{E}$

(3) $\vec{v}\times\vec{E}=\vec{B}$

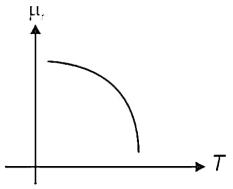
(4) $\vec{E}\times\vec{v}=\vec{B}$

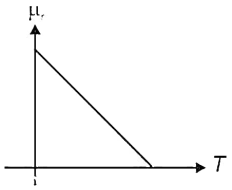
184. The magnetic field inside a toroid of 1200 turns having average radius equal to $\frac{1}{2}$m and carrying current of 1 A, is

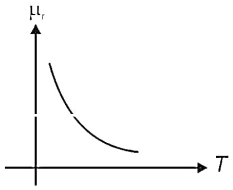
(1) 12.4×10^{-5} T (2) 4.8×10^{-4} T

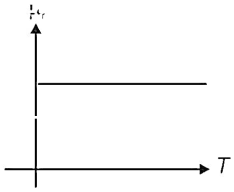
(3) 2.4×10^{-4} T (4) 25×10^{-4} T

185. Relative permeability μ_r of a paramagnetic substance is plotted against temperature (T). The correct graph is

(1) 

(2) 

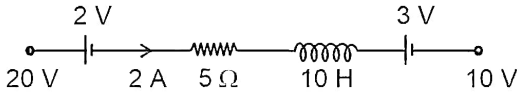
(3) 

(4) 

Space for Rough Work

SECTION-B

186. The figure given below shows the part of a circuit. The rate of change of current in the inductor is



(1) $-\frac{1}{2}$ A s^{-1}

(2) -1 A s^{-1}

(3) $-\frac{1}{4}$ A s^{-1}

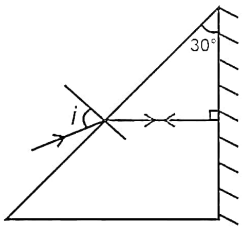
(4) $\frac{1}{4}$ A s^{-1}

187. In a L–R series circuit, an inductor of 3 mH and 8 Ω resistance is connected with emf $E = 5\cos(2000t)$ V. The amplitude of current is

(1) $\frac{1}{4}$ A (2) $\frac{1}{8}$ A

(3) $\frac{1}{2}$ A (4) 5 A

188. A prism of angle 30° is silvered at one side. A ray of light incident at an angle 45° is reflected back from the silvered surface as shown below. The refractive index of prism is



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

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

189. If the angle of incidence of light is equal to polarising angle, then

(i) Reflected ray is perpendicular to refracted ray

(ii) Refraction angle is greater than incidence angle.

(iii) Reflected light is polarized having its electric vector in the plane containing incident and reflected rays

(iv) Reflected light is polarized having its electric vector perpendicular to the plane containing incident and reflected rays

(1) (i) and (iv) are true (2) (i) and (ii) are true

(3) (i) and (iii) are true (4) (ii) and (iii) are true

190. Two identical small metal spheres having charge q and $-5q$ exerts force F on each other. The spheres are touched with each other and then kept at the same separation. The magnitude of the new force between the sphere will be

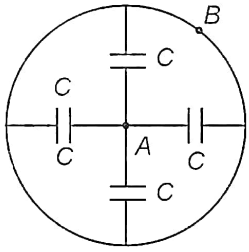
(1) F

(2) $\frac{4F}{5}$

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

(4) $4F$

191. The equivalent capacitance across A and B in the given figure is



(1) $4C$ (2) $\frac{C}{4}$

(3) $\frac{3C}{4}$ (4) $3C$

192. Let E_1 and E_2 be the energy of an electron in the second and third excited states of hydrogen atom, respectively. According to the Bohr's model of an atom, the ratio $E_1 : E_2$ is

(1) 4 : 9

(2) 9 : 4

(3) 9 : 16

(4) 16 : 9

Space for Rough Work

193. Given below are two statements

Statement I: Zener diode works as a voltage regulator in reverse bias and behaves like simple pn junction diode in forward bias.

Statement II: With increase in temperature number of electrons in conduction band in a semiconductor increases.

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

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

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

(3) Both statements are correct

(4) Both statements are incorrect

194. 100 g of water at 20°C are poured on a large block of ice at 0°C. The mass of ice that melts is (latent heat of ice = 80 cal/g)

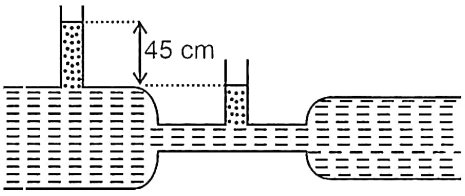
(1) 20 g

(2) 10 g

(3) 25 g

(4) 15 g

195. The difference in the reading of tubes of venturi-meter is 45 cm. Calculate speed of fluid in narrow section when speed at wider section is 4 m/s. (g = 10 m/s^2)



(1) 2.12 m/s

(2) 5 m/s

(3) 5.86 m/s

(4) 10 m/s

196. The equation of a circle is given by $(x - At)^2 + \left(y - \frac{t}{B}\right)^2 = R^2$, where R is radius of the circle. If dimension of t is given as [T] then correct dimension of A and B are respectively

(1) $A = [L^{-1}T^{-1}]$, $B = [L^{-1}T]$

(2) $A = [LT]$, $B = [LT^{-1}]$

(3) $A = [LT^{-1}]$, $B = [L^{-1}T]$

(4) $A = [L^{-1}T]$, $B = [L^{-1}T^{-1}]$

197. Match quantities in column-I with their explanation in column-II.

	Column-I		**Column-II**
a.	Moment of inertia	(i)	Twice the product of mass and areal velocity of the particle
b.	Radius of gyration	(ii)	Summation of the product of masses of the various particles and square of their perpendicular distances
c.	Angular momentum	(iii)	The root mean square distance of the particles from the axis of rotation w.r.t. mass
d.	Torque	(iv)	The product of force and its perpendicular distance

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

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

198. Consider earth to be a homogeneous sphere. Scientist A goes deep down in a mine and scientist B goes high up in a balloon. The gravitational field intensity measured by

(1) A goes on decreasing and that by B goes on increasing

(2) B goes on decreasing and that by A goes on increasing

(3) Both decrease at the same rate

(4) Both decrease at the different rate

Space for Rough Work

199. With the increase in temperature, resistivity of a material

(1) Remains constant

(2) Always decreases

(3) Always increases

(4) May increase or decrease

200. A rocket with its fuel has a mass M. The exhaust velocity of fuel is v_0. The minimum rate of consumption of fuel so that the rocket rise from ground is

(1) $\frac{Mg}{v_0}$ (2) $\frac{2Mg}{v_0}$

(3) $\frac{Mg}{2v_0}$ (4) $\frac{3Mg}{2v_0}$

❑ ❑ ❑

Space for Rough Work