



1. The most suitable method of separation of 1 : 1 mixture of ortho and para- nitrophenols is:

- (1) Steam distillation
- (2) Sublimation
- (3) Chromatography
- (4) Crystallisation

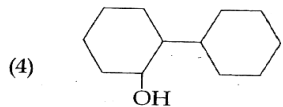
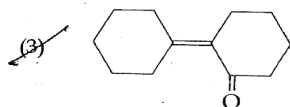
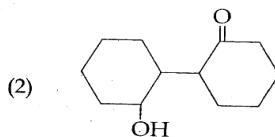
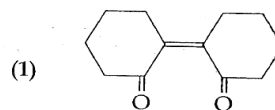
Ans : 1

2. Which of the following statements is not correct ?

- (1) Denaturation makes the proteins more active
- (2) Insulin maintains sugar level in the blood of a human body .
- (3) Ovalbumin is a simple food reserve in egg white
- (4) Blood proteins thrombin and fibrinogen are involved in blood clotting

Ans : 1

3. Of the following which is the product formed when cyclohexanone undergoes aldol condensation followed heating ?



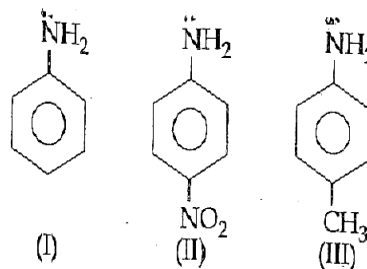
Ans : 3

4. The heating of phenyl-methyl ethers with HI produces

- (1) Benzene
- (2) Ethyl chlorides
- (3) Iodobenzene
- (4) Phenol

Ans : 4

5. The correct increasing order of basic strength for the following compounds is



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

Ans : 1

6. Which one of the following pairs of species have the same bond order?

- (1)  $N_2, O_2^-$
- (2)  $CO, NO$
- (3)  $O_2, NO^+$
- (4)  $CN^-, CO$

Ans : 4

7. Name the gas that can readily decolourise acidified  $KMnO_4$  solution.

- (1)  $P_2O_5$
- (2)  $CO_2$
- (3)  $SO_2$
- (4)  $NO_2$

Ans : 3

8. The reason for greater range of oxidation states in actinoids is attributed to

- (1) 4f and 5d levels being close in energies
- (2) The radioactive nature of actinoids
- (3) actinoid contraction
- (4) 5f, 6d and 7s levels having comparable Energies

Ans : 4

9. Concentration of the  $Ag^+$  ions in a saturated solution of  $Ag_2C_2O_4$  is  $2.2 \times 10^{-4} \text{ mol } L^{-1}$ .

Solubility product of  $Ag_2C_2O_4$  is

- (1)  $5.3 \times 10^{-12}$
- (2)  $2.42 \times 10^{-8}$
- (3)  $2.66 \times 10^{-12}$
- (4)  $4.5 \times 10^{-11}$

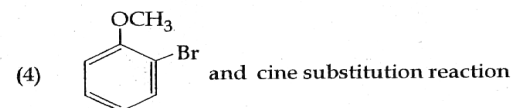
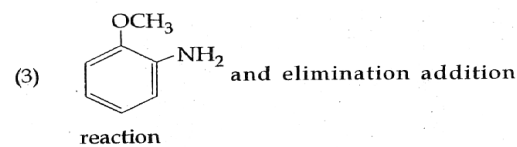
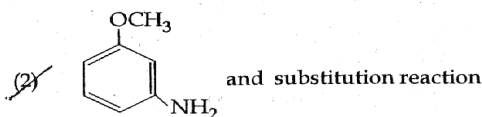
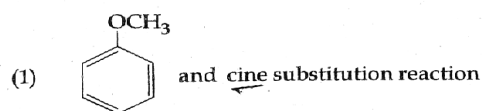
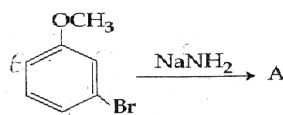
Ans : 1

10. With respect to the conformers of ethane, which of the following statements is true ?

- (1) Both bond angles and bond length remains same
- (2) Bond angle remains same but bond length changes
- (3) Bond angle changes but bond length remains same
- (4) Both bond angle and bond length Change

Ans : 1

11. Identify A and predict the type of reaction



Ans : 2

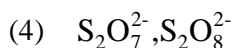
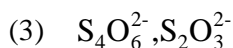
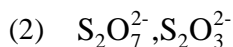
12. Which of the following is a sink for CO?

- (1) Plants
- (2) Haemoglobin
- (3) Micro organisms present in the soil
- (4) Oceans

Ans : 3

13. In which pair of ions both the species contains S-S bond ?

- (1)  $S_4O_6^{2-}, S_2O_7^{2-}$



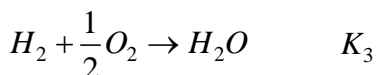
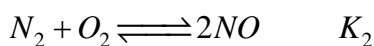
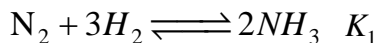
Ans : 3

14. Pick out the correct statement with respect to  $[Mn(CN)_6]^{3-}$

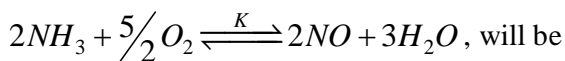
- (1) It is  $dsp^2$  hybridised and square planar
- (2) It is  $sp^3d^2$  hybridised and octahedral
- (3) It is  $sp^3d^2$  hybridised and tetrahedral
- (4) It is  $d^2sp^3$  hybridised and Octahedral

Ans : 4

15. The equilibrium constants of the following are :



The equilibrium constant (K) of the reaction



- (1)  $K_3^2 K_2 / K_1$
- (2)  $K_1 K_3^3 / K_2$
- (3)  $K_2 K_3^3 / K_1$
- (4)  $K_2 K_3 / K_1$

Ans : 3

16. Match the interhalogen compounds of column I with the geometry in column II and assign the correct

code.

Column I

Column II

- |             |                             |
|-------------|-----------------------------|
| (a) $XX'$   | (i) T-shap                  |
| (b) $XX_3'$ | (ii) Pentagonal bipyramidal |
| (c) $XX_5'$ | (iii) Linear                |
| (d) $XX_7'$ | (iv) Square-pyramidal       |
|             | (v) Tetrahedral             |

Code

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

Ans : 3

17. Mixture of chloroxylenol and terpineol acts as :

- (1) antibiotic
- (2) analgesic
- (3) antiseptic
- (4) antipyretic

Ans : 3

18. It is because of inability of  $ns^2$  electrons of the valence shell to participate in bonding that :

- (1)  $Sn^{4+}$  is reducing while  $Pb^{4+}$  is oxidising
- (2)  $Sn^{2+}$  is reducing while  $Pb^{4+}$  is oxidizing
- (3)  $Sn^{2+}$  is oxidising while  $Pb^{4+}$  is reducing
- (4)  $Sn^{2+}$  and  $Pb^{2+}$  are both oxidizing and reducing

Ans : 2

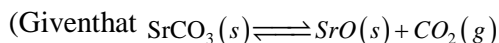
19. Extraction of gold and silver involved leaching with  $CN^-$  ions. Silver is later recovered by

- (1) Displacement with Zn

- (2) Liquation
- (3) Distillation
- (4) Zone refining

Ans : 1

20. A 20 litre container at 400K contains  $CO_2(g)$  at pressure 0.4 atm and an excess of SrO (neglect the volume of solid SrO) The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of  $CO_2$  attains its maximum value, will be



$$K_p = 16 \text{ atm} \quad K_p = 16 \text{ atm}$$

- (1) 2 litre
- (2) 5 litre
- (3) 10 litre
- (4) 4 litre

Ans : 2

21. Which is the incorrect statement?

- (1) Frenkel defect is favoured in those ionic compounds in which sizes of cation and anions are almost equal
- (2)  $FeO_{0.98}$  has none stoichiometric metal deficiency defect
- (3) Density decrease in case of crystals with Schottky's defect
- (4)  $NaCl$  (s) is insulator, silicon is semiconductor, silver is conductor, quartz is piezo electric crystal.

Ans : 1,2

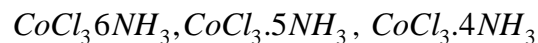
22. Which of the following is dependent on temperature ?

- (1) Weight percentage
- (2) Molality

- (3) Molarity
- (4) Mole fraction

Ans : 3

23. The correct order of the stoichiometers of  $AgCl$  formed when  $AgNO_3$  in excess is treated with the complexes.



respectively is :

- (1)  $2AgCl, 3AgCl, 1AgCl$
- (2)  $1AgCl, 3AgCl, 2AgCl$
- (3)  $3AgCl, 1AgCl, 2AgCl$
- (4)  $3AgCl, 2AgCl, 1AgCl$

Ans : 4

24. An example of a sigma bonded organometallic compounds is

- (1) Cobaltocene
- (2) Ruthenocene
- (3) Grignard's reagent
- (4) Ferrocene

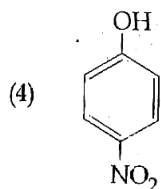
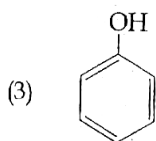
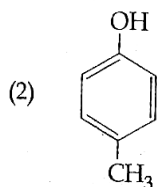
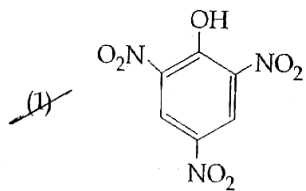
Ans : 3

25. Which one is the wrong statement ?

- (1) The energy of 2s orbitals less than the energy of 2p orbital in case of hydrogen like atoms
- (2) de-Broglie's wavelength is given by  $\lambda = \frac{h}{mv}$  where m=mass of the particle  
 $v$  = group velocity of the particle
- (3) The uncertainty principle is  $\Delta E \times \Delta t \geq \frac{h}{4\pi}$ .
- (4) Half filled and fully filled orbitals have greater stability due to greater exchange energy, greater symmetry and more balanced arrangement

Ans : 1

26. Which one is the most acidic compound ?



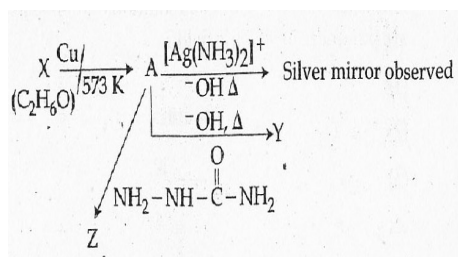
Ans : 1

27. A first order reaction has a specific reaction rate of  $10^{-2} \text{ sec}^{-1}$ . How much time will it take for 20g of the reactant to reduce to 5g ?

- (1) 693.0 sec
- (2) 238.6 sec
- (3) 138.6 sec
- (4) 346.5 sec

Ans : 3

28. Consider the reactions



Identify A, X, Y and Z

- (1) A-Ethanol, X-Acetaldehyde,

Y-Butanone

Z-Hydrazone

- (2) A-Methoxymethane, X-Ethanoic acid
- (3) A-Methoxymethane, X-Ethanol, Y-Ethanoic
- (4) A-Ethanal, X-Ethanol, Y-But-2-Enal  
Z-Semicarbazone

Ans : 4

29. Mechanism of a hypothetical reaction



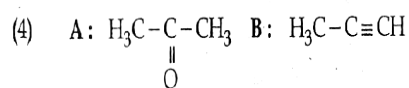
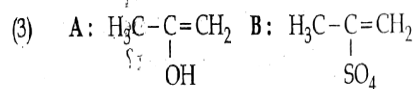
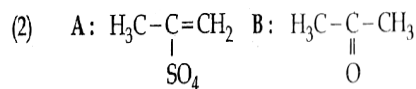
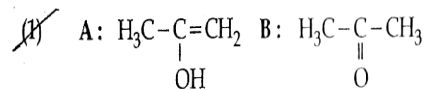
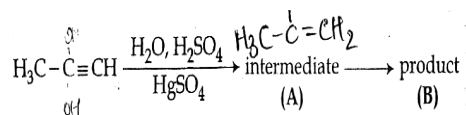
- (i)  $X_2 \rightarrow X + X$  (fast)
- (ii)  $X + Y_2 \rightleftharpoons XY + Y$  (Slow)
- (iii)  $X + Y \rightarrow XY$  (fast)

The overall order of the reaction will be

- (1) 15
- (2) 1
- (3) 2
- (4) 0

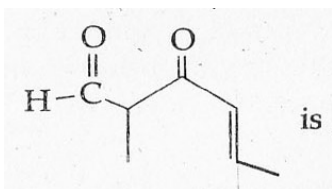
Ans : 1

30. Predict the correct intermediate and product in the following reaction



Ans : 1

31. The IUPAC name of the compound



- (1) 3- keto 2-methy thex-5-enal
- (2) 3-keto -2-methythex-4- enal
- (3) 5-formythex-2-en-3-one
- (4) 5-methyl-4-oxohex-2-en-5-al

Ans : 2

32. In the electrochemical cell

$Zn|ZnSO_4(0.01M)||CuSO_4(1.0M)|Cu$  the emf of this Daniel cell is  $E_1$ . When the concentration of  $ZnSO_4$  is changed to 1.0M and that of  $CuSO_4$  changed to 0.01M, the emf changes of  $E_2$ . From the following, which one is the relationship between

$E_1$  and  $E_2$  ? (Given  $\frac{RT}{F} = 0.059$ )

- (1)  $E_2 = 0 \neq E_1$
- (2)  $E_1 = E_2$
- (3)  $E_1 < E_2$
- (4)  $E_1 > E_2$

Ans : 4

33. A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50L to a final volume of 4.50L. The change in internal energy  $\Delta U$  of the gas in joules will be

- (1) + 505J
- (2) 113625J
- (3) -500J

(4) -505 J

Ans : 4

34. Correct increasing order for the wavelength of absorption in the visible region for the complexes of  $Co^{3+}$  is

- (1)  $[Co(NH_3)_6]^{3+}, [Co(En)_3]^{3+}, [Co(H_2O)_6]^{3+}$
- (2)  $[Co(en)_3]^{3+}, [Co(NH_3)_6]^{3+}, [Co(H_2O)_6]^{3+}$
- (3)  $[Co(H_2O)_6]^{3+}, [Co(en)_3]^{3+}, [Co(NH_3)_6]^{3+}$
- (4)  $[Co(H_2O)_6]^{3+}, [Co(NH_3)_6]^{3+}, [Co(en)_3]^{3+}$

Ans : 2

35. The correct statement regarding electrophile is

- (1) Electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile
- (2) Electrophile a negatively charged species and can form a bond by accepting a pair of electron from anucleophile
- (3) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from another electrophile
- (4) Electrophile are generally neutral species and can form a bond by accepting a pair of electrons from anucleophile.

Ans : 1

36. For a given reaction  $\Delta H = 35.5 kJ mol^{-1}$  and  $\Delta S = 83.6 JK^{-1} mol^{-1}$ . The reaction is spontaneous at : (Assume that  $\Delta H$  and  $\Delta S$  do not vary with temperature)

- (1)  $T > 298 K$
- (2)  $T < 425 K$

- (3)  $Tel_2, XeF_2$   
 (4) All Temperature

Ans : 3

37. Which of the following pairs of compounds is isoelectronic and isostructural ?

- (1)  $IF_3, XeF_2$   
 (2)  $BeCl_2, XeF_2$   
 (3)  $Tel_2, XeF_2$   
 (4)  $IBr_2^-, XeF_2$

Ans : 4

38.  $HgCl_2$  and  $I_2$  both when dissolved in water containing  $I^-$  ions the pair of species formed is

- (1)  $Hg_2I_2, I^-$   
 (2)  $HgI_2, I_3^-$   
 (3)  $HgI_2, I^-$   
 (4)  $HgI_4^{2-}, I_3^-$

Ans : 4

39. Which one of the following statements is not correct ?

- (1) Coenzymes increase the catalytic activity of enzyme  
 (2) Catalyst does not initiate any reaction  
 (3) The value of equilibrium constant is changed in the presence of a catalyst in the reaction at equilibrium  
 (4) Enzymes catalyse mainly bio-chemical Reactions

Ans : 3

40. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field

- (1) Li

- (2) Na  
 (3) K  
 (4) Rb

Ans : 1

41. The element  $Z=114$  has been discovered recently. It will belong to which of the following family /group and electric configuration ?

- (1) Nitrogen family,  $[Rn]5f^{14}6d^{10}7s^27p^6$   
 (2) Halogen family,  $[[Rn]5f^{14}6d^{10}7s^27p^5]$   
 (3) Carbon family,  $[[Rn]5f^{14}6d^{10}7s^27p^2]$   
 (4) Oxygen family  $[[Rn]5f^{14}6d^{10}7s^27p^4]$

Ans : 3

42. Which one is the correct order of acidity ?

- (1)  $CH_3-CH_3 > CH_2=CH_2 > CH_3-C \equiv CH > CH \equiv CH$   
 (2)  $CH_2=CH_2 > CH_3-CH=CH_2 > CH_3-C \equiv CH > CH \equiv CH$   
 (3)  $CH=CH > CH_3-C \equiv CH > CH_2=CH_2 > CH_3-CH_3$   
 (4)  $CH \equiv CH > CH_2=CH_2 > CH_3-C \equiv CH > CH_3-CH_3$

Ans : 3

43. If molality of the dilute solution is doubled, the value of molal depression constant ( $K_f$ ) will be

- (1) Unchanged  
 (2) doubled  
 (3) halved  
 (4) tripled

Ans : 1

44. The species, having bond angles of  $120^\circ$  is
- (1)  $BCl_3$
  - (2)  $PH_3$
  - (3)  $ClF_3$
  - (4)  $NCl_3$

Ans : 1

45. Which of the following reactions is appropriate for converting acetamide to methamine?
- (1) Gabriels phthalamide synthesis
  - (2) Carbylamine reaction
  - (3) Hoffmam hypobromamide reaction
  - (4) Stephens reaction

Ans : 3

46. Asymptote in a logistic growth curve is obtained when
- (1)  $K < N$
  - (2) The value of 'r' approaches zero
  - (3)  $K = N$
  - (4)  $K > N$

Ans. 3

47. The vascular cambium normally gives rise to
- (1) Periderm
  - (2) Phelloderm
  - (3) Primary phloem
  - (4) Secondary xylem

Ans. 4

48. In case of poriferans, the spongocoel is lined with flagellated cells called
- (1) mesenchymal cells
  - (2) ostia
  - (3) oscula
  - (4) choanocytes

Ans. 4

49. Fruit and leaf drop at early stages can be prevented by the application of
- (1) Gibberellic acid
  - (2) Cytokinins
  - (3) Ethylene
  - (4) Auxins

Ans. 4

50. A gene whose expression helps to identify transformed cells is known as
- (1) Structural gene
  - (2) Selectable marker
  - (3) Vector
  - (4) Plasmid

Ans. 2

51. The final proof for DNA as the genetic material came from the experiments of
- (1) Hargobind Khorana
  - (2) Griffith
  - (3) Hershey and Chase
  - (4) Avery, Mcleod and McCarty

Ans. 3

52. With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct ?
- (1) Tomato is a green house crop which can be grown in  $CO_2$  - enriched atmosphere for higher yield
  - (2) Light saturation for  $CO_2$  fixation occurs at 10% of full sunlight
  - (3) Increasing atmospheric  $CO_2$  concentration up to 0.05% can enhance  $CO_2$  fixation rate



- (4)  $C_3$  plants respond to higher temperatures with enhanced photosynthesis while  $C_4$  plants have much lower temperature optimum

Ans. 4

53. The association of histone III with a nucleosome indicates

- (1) The DNA double helix is exposed
- (2) Transcription is occurring
- (3) DNA replication is occurring
- (4) The DNA is condensed into a chromatin fibre

Ans. 4

54. GnRH, a hypothalamic hormone, needed in reproduction, acts on

- (1) posterior pituitary gland and stimulates secretion of LH and relaxin
- (2) anterior pituitary gland and stimulates secretion of LH and oxytocin
- (3) anterior pituitary gland and stimulates secretion of LH and FSH
- (4) posterior pituitary gland and stimulates secretion of oxytocin and FSH

Ans. 3

55. DNA fragments are

- (1) Either positively or negatively charged depending on their size
- (2) Positively charged
- (3) Negatively charged
- (4) Neutral

Ans. 3

56. Which of the following options gives the correct sequence of events during mitosis ?

- (1) condensation → arrangement at equator → centromere division → segregation → telophase

- (2) condensation → nuclear membrane disassembly → crossing over → segregation → telophase

- (3) condensation → nuclear membrane disassembly → arrangement at equator → centromere division → segregation → telophase

- (4) condensation → crossing over → nuclear membrane disassembly → segregation → telophase

Ans. 3

57. Lungs are made up of air – filled sacs, the alveoli. They do not collapse even after forceful expiration, because of

- (1) Expiratory Reserve Volume
- (2) Residual Volume
- (3) Inspiratory Reserve Volume
- (4) Tidal Volume

Ans. 2

58. Which one of the following statements is correct, with reference to enzymes ?

- (1) Holoenzyme = Coenzyme + Co-factor
- (2) Apoenzyme = Holoenzyme + Coenzyme
- (3) Holoenzyme = Apoenzyme + Coenzyme
- (4) Coenzyme = Apoenzyme + Holoenzyme

Ans. 3

59. Which of the following are not polymeric ?

- (1) Lipids
- (2) Nucleic acids
- (3) Proteins
- (4) Polysaccharides

Ans. 1

60. Which of the following components provides sticky character to the bacterial cell ?

- (1) Glyocalyx
- (2) Cell wall
- (3) Nuclear membrane
- (4) Plamsa membrane

Ans. 1

61. An example of colonial alga is

- (1) *Spirogyra*
- (2) *Chlorella*
- (3) *Volvox*
- (4) *Ulothrix*

Ans. 3

62. A dioecious flowering plant prevents both

- (1) Cleistogamy and xenogamy
- (2) Autogamy and xenogamy
- (3) Autogamy and geitonogamy
- (4) Geitonogamy and xenogamy

Ans. 3

63. Plants which produce characteristic pneumatophores and show vivipary belong to

- (1) Hydrophytes
- (2) Mesophytes
- (3) Halophytes
- (4) Psammophytes

Ans. 3

64. Coconut fruit is a

- (1) Capsule
- (2) Drupe
- (3) Berry
- (4) Nut

Ans. 2

65. Which of the following is made up of dead cells ?

- (1) Phloem
- (2) Xylem parenchyma

(3) Collenchyma

(4) Phellem

Ans. 4

66. Root hairs develop from the region of

- (1) Meristematic activity
- (2) Maturation
- (3) Elongation
- (4) Root cap

Ans. 2

67. Which of the following options best represents the enzyme composition of pancreatic juice ?

- (1) lipase, amylase, typsinogen, procarboxypeptidase
- (2) amylase, peptidase, trypsinogen, rennin
- (3) amylase, pepsin, trypsinogen, maltase
- (4) peptidase, amylase, pepsin, rennin

Ans. 1

68. Zygotic meiosis is characteristic of

- (1) Chlamydomonas
- (2) Marchantia
- (3) Fucus
- (4) Funaria

Ans. 1

69. Which of the following are found in extreme saline conditions ?

- (1) Mycobacteria
- (2) Archaeobacteria
- (3) Eubacteria
- (4) Cyanobacteria

Ans. 2

70. In Bougainvillea thorns are the modifications of

- (1) Leaf
- (2) Stipules
- (3) Adventitious root
- (4) Stem

Ans. 4

71. Viroids differ from viruses in having
- (1) RNA molecules without protein coat
  - (2) DNA molecules with protein coat
  - (3) DNA molecules without protein coat
  - (4) RNA molecules with protein coat

Ans. 1

72. Adult human RBCs are enucleate. Which of the following statement(s) is/are most appropriate explanation for this feature ?

- (1) They do not need to produce
- (2) They are somatic cells
- (3) They do not metabolize
- (4) All their internal space is available for oxygen transport

Options :

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

Ans. 4

73. Which of the following RNAs should be most abundant in animal cell ?
- (1) mi – RNA
  - (2) r – RNA
  - (3) t – RNA
  - (4) m – RNA

Ans. 2

74. During DNA replication, Okazaki fragments are used to elongate
- (1) The lagging strand away from the replication fork
  - (2) The leading strand towards replication fork
  - (3) The lagging strand towards replication fork

- (4) The leading strand away from replication fork

Ans. 1

75. Select the correct route for the passage of sperms in male frogs

- (1) Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca
- (2) Testes → Bidder's canal → Kidney Vasa efferentia → Urinogenital duct → Cloaca
- (3) Testes → Vasa efferentia → Kidney → Seminal Vesicle → Urinogenital duct → Cloaca
- (4) Testes → Vasa efferentia → Bidder's canal → Ureter → Cloaca

Ans. 1 (or) 4

76. If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered ?

- (1) 333
- (2) 1
- (3) 11
- (4) 33

Ans. 4

77. Which of the following facilitates opening of stomatal aperture ?

- (1) Longitudinal orientation of cellulose microfibrils in the cell wall of guard cells
- (2) Contraction of outer wall of guard cells
- (3) Decrease in turgidity of guard cells
- (4) Radial orientation of cellulose microfibrils in the cell wall of guard cells

Ans. 4

78. Anaphase Promoting Complex (APC) is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, which of the following is expected to occur ?

- (1) Recombination of chromosome arms will occur
- (2) Chromosomes will not condense
- (3) Chromosomes will be fragmented
- (4) Chromosomes will not segregate

Ans. 4

79. Life cycle of Ectocarpus and Fucus respectively are

- (1) Haplodiplontic, Haplontic
- (2) Haplontic, Diplontic
- (3) Diplontic, Haplodiplontic
- (4) Haplodiplontic, Diplontic

Ans. 4

80. Which statement is wrong for Krebs's cycle ?

- (1) The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid
- (2) There are three points in the cycle where  $\text{NAD}^+$  is reduced to  $\text{NADH} + \text{H}^+$
- (3) There is one point in the cycle where  $\text{FAD}^+$  is reduced to  $\text{FADH}_2$
- (4) During conversion of succinyl CoA to succinic acid, a molecule of GTP is synthesized

Ans. 1

81. Transplantation of tissues/organs fails often due to non – acceptance by the patient's body. Which type of immune – response is responsible for such rejections ?

- (1) Physiological immune response

- (2) Autoimmune response
- (3) Cell – mediated immune response
- (4) Hormonal immune response

Ans. 3

82. Artificial selection to obtain cows yielding higher milk output represents

- (1) stabilizing followed by disruptive as it stabilizes the population to produce higher yielding cows
- (2) stabilizing selection as it stabilizes this character in the population
- (3) directional as it pushes the mean of the character in one direction
- (4) disruptive as it splits the population into two, one yielding higher output and the other lower output

Ans. 3

83. Select the mismatch

- (1) *Rhizobium* - Alfalfa
- (2) *Frankia* - Alnus
- (3) *Rhodospirillum* - Mycorrhiza
- (4) *Anabaena* - Nitrogen fixer

Ans. 3

84. Presence of plants arranged into well defined vertical layers depending on their height can be seen best in

- (1) Temperate Forest
- (2) Tropical Savannah
- (3) Tropical Rain Forest
- (4) Grassland

Ans. 3

85. Match the following sexually transmitted diseases (Column – I) with their causative agent (Column – II) and select the correct option

Column – I

Column – II

- |                   |                              |
|-------------------|------------------------------|
| (a) Gonorrhoea    | (i) HIV                      |
| (b) Syphilis      | (ii) Neisseria               |
| (c) Genital Warts | (iii) Treponema              |
| (d) AIDs          | (iv) Human Papilloma – Virus |

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

Ans. 2

86. Select the mismatch

- |                      |   |               |
|----------------------|---|---------------|
| (1) <i>Equisetum</i> | - | Homosporous   |
| (2) <i>Pinus</i>     | - | Dioecious     |
| (3) <i>Cycas</i>     | - | Dioecious     |
| (4) <i>Salvinia</i>  | - | Heterosporous |

Ans. 2

87. The region of Biosphere Reserve which is legally protected and where no human activity is allowed is known as

- (1) Restoration zone
- (2) Core zone
- (3) Buffer zone
- (4) Transition zone

Ans. 2

88. Identify the wrong statement in context of heartwood

- (1) It comprises dead elements with highly lignified cells
- (2) Organic compounds are deposited in it
- (3) It is highly durable
- (4) It conducts to water and minerals efficiently

Ans. 4

89. The function of copper ions in copper releasing IUD's is :

- (1) They inhibit ovulation
- (2) They suppress sperm motility and fertilising capacity of sperms
- (3) They inhibit gametogenesis
- (4) They make uterus unsuitable for implantation

Ans. 2

90. The process of separation and purification of expressed protein before marketing is called :

- (1) Postproduction processing
- (2) Upstream processing
- (3) Downstream processing
- (4) Bioprocessing

Ans. 3

91. Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen?

- (1) *Nostoc*
- (2) *Bacillus*
- (3) *Pseudomonas*
- (4) Mycoplasma

Ans. 4

92. Phosphoenol pyruvate (PEP) is the primary CO<sub>2</sub> acceptor in

- (1) C<sub>3</sub> and C<sub>4</sub> plants
- (2) C<sub>3</sub> plants
- (3) C<sub>4</sub> plants
- (4) C<sub>2</sub> plants

Ans. 3

93. MALT constitutes about \_\_\_\_\_ percent of the lymphoid tissue in human body

- (1) 10%
- (2) 50%

(3) 20%

(4) 70%

Ans. 2

94. The DNA fragments separated on an agarose gel can be visualised after staining with

(1) Ethidium bromide

(2) Bromophenol blue

(3) Acetocarmine

(4) Aniline blue

Ans. 1

95. Capacitation occurs in

(1) Female Reproductive tract

(2) Rete testis

(3) Epididymis

(4) Vas deferens

Ans. 1

96. Which of the following is correctly matched for the product produced by them?

(1) *Sacchromyces cerevisiae* : Ethanol

(2) *Acetobacter aceti* : Antibiotics

(3) *Methanobacterium* : Lactic acid

(4) *Penicillium notatum* : Acetic acid

Ans. 1

97. Which of the following statements is correct?

(1) The descending limb of loop of Henle is permeable to electrolytes

(2) The ascending limb of loop of Henle is impermeable to water

(3) The descending limb of loop of Henle is impermeable to water

(4) The ascending limb of loop of Henle is permeable to water

Ans. 2

98. The water potential of pure water is :

(1) More than one

(2) Zero

(3) Less than zero

(4) More than zero but less than one

Ans. 2

99. The genotypes of a Husband and Wife are  $I^A I^B$  and  $I^A I$

Among the blood types of their children, how many different genotypes and phenotypes are possible ?

(1) 4 genotypes ; 4 phenotypes

(2) 3 genotypes ; 3 phenotypes

(3) 3 genotypes ; 4 phenotypes

(4) 4 genotypes ; 3 phenotypes

Ans. 4

100. An important characteristic that Hemi chordates share with Chordates is

(1) pharynx without gill slits

(2) absence of notochord

(3) ventral tubular nerve cord

(4) pharynx with gill slits

Ans. 4

101. Which one of the following is related to Ex-situ conservation of threatened animals and plants

(1) Himalayan region

(2) Wildlife Safari parks

(3) Biodiversity hot spots

(4) Amazon rainforest

Ans. 2

102. Which of the following in sewage treatment removes suspended solids ?

(1) Sludge treatment

(2) Tertiary treatment

(3) Secondary treatment

(4) Primary treatment

Ans. 4

103. Out of 'X' pairs of ribs in humans only 'Y' pairs are true ribs. Select the option that correctly represents values of X and Y and provides their explanation

- (1) X=24, Y=12 True ribs are dorsally attached to vertebral column but are free on ventral side.
- (2) X=12, Y= 7 True ribs are attached dorsally to vertebral column and ventrally to the sternum
- (3) X=12, Y= 5 True ribs are attached dorsally to vertebral column and sternum on the two ends
- (4) X=24, Y=7 True ribs are dorsally attached to vertebral column but are free on ventral side

Ans. 2

104. Double fertilization is exhibited by

- (1) Angiosperms
- (2) Gymnosperms
- (3) Algae
- (4) Fungi

Ans. 1

105. Attractants and rewards are required for :

- (1) Cleistogamy
- (2) Anemophily
- (3) Entomophily
- (4) Hydrophily

Ans. 3

Sri Chaitanya

106. Which one from those given below is the period for Mendel's hybridization experiments

- (1) 1870 – 1877
- (2) 1856 – 1863
- (3) 1840 – 1850
- (4) 1857 – 1869

Ans. 2

107. Receptor sites for neurotransmitters are present on

- (1) post-synaptic membrane
- (2) membranes of synaptic vesicles
- (3) pre-synaptic membrane
- (4) tips of axons

Ans. 1

108. Which among these is the correct combination of aquatic mammals

- (1) *Trygon*, Whales, Seals
- (2) Seals, Dolphins, Sharks
- (3) Dolphins, Seals, *Trygon*
- (4) Whales, Dolphins, Seals

Ans. 4

109. Good vision depends on adequate intake of carotene-rich food.

Select the best option from the following statements.

- (a) Vitamin A derivatives are formed from carotene
- (b) The photopigments are embedded in the membrane discs of the inner segment
- (c) Retinal is a derivative of Vitamin A
- (d) Retinal is a light absorbing part of all the visual photopigments

Options :

- (1) (b), (c) and (d)

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

Ans. 3

110. What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis ?

- (1) Negatively charged fragments do not move
- (2) The larger the fragment size, the farther it moves
- (3) The smaller the fragment size, the farther it moves
- (4) Positively charged fragments move to farther end

Ans. 3

111. Hypersecretion of Growth Hormone in adults does not cause further increase in height, because

- (1) Muscle fibres do not grow in size after birth
- (2) Growth Hormone becomes inactive in adults
- (3) Epiphyseal plates close after adolescence
- (4) Bones loose their sensitivity to Growth Hormone in adults

Ans. 3

112. Which of the following represents order of 'Horse' ?

- (1) Ferus
- (2) Equidae
- (3) Perissodactyla
- (4) Caballus

Ans. 3

113. Thalassemia and sickle cell anemia are caused due to a problem in globin molecule synthesis. Select the correct statement

- (1) Sickle cell anemia is due to a quantitative problem of globin molecules
- (2) Both are due to a qualitative defect in globin chain synthesis
- (3) Both are due to a quantitative defect in globin chain synthesis
- (4) Thalassemia is due to less synthesis of globin molecules

Ans. 4

114. Myelin sheath is produced by

- (1) Osteoclasts and Astrocytes
- (2) Schwann Cells and Oligodendrocytes
- (3) Astrocytes and Schwann Cells
- (4) Oligodendrocytes and Osteoclasts

Ans. 2

115. Homozygous purelines in cattle can be obtained by

- (1) mating of individuals of different species
- (2) mating of related individuals of same breed
- (3) mating of unrelated individuals of same breed
- (4) mating of individuals of different breed

Ans. 2

116. Mycorrhizae are the example of

- (1) Mutualism
- (2) Fungistasis
- (3) Ammensalism
- (4) Antibiosis

Ans. 1

117. A baby boy aged two years is admitted to play school and passes through a dental check - up. The dentist observed that the boy had twenty teeth. Which teeth were absent?

- (1) Molars
- (2) Incisors



- (3) Canines
- (4) Pre-molars

Ans. 4

118. Among the following characters, which one was not considered by Mendel in his experiments on pea

- (1) Pod - Inflated or Constricted
- (2) Stem - Tall or Dwarf
- (3) Trichomes - Glandular or non-glandular
- (4) Seed - Green or Yellow

Ans. 3

119. The hepatic portal vein drains blood to liver from

- (1) Intestine
- (2) Heart
- (3) Stomach
- (4) Kidneys

Ans. 1

120. Which cells of 'Crypts of Lieberkuhn' secrete antibacterial lysozyme ?

- (1) Kupffer cells
- (2) Argentaffin cells
- (3) Paneth cells
- (4) Zymogen cells

Ans. 3

121. Spliceosomes are not found in cells of

- (1) Bacteria
- (2) Plants
- (3) Fungi
- (4) Animals

Ans. 1

122. Frog's heart when taken out of the body continues to beat for sometime

Select the best option from the following statements

- (a) Frog is a poikilotherm

- (b) Frog does not have any coronary circulation

- (c) Heart is "myogenic" in nature

- (d) Heart is autoexcitable

Options :

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

Ans. 1

123. Functional megaspore in an angiosperm develops into

- (1) Embryo
- (2) Ovule
- (3) Endosperm
- (4) Embryosac

Ans. 4

124. Alexander Von Humbolt described for the first time

- (1) Population Growth equation
- (2) Ecological Biodiversity
- (3) Laws of limiting factor
- (4) Species area relationships

Ans. 4

125. The morphological nature of the edible part of coconut is

- (1) Pericarp
- (2) Perisperm
- (3) Cotyledon
- (4) Endosperm

Ans. 4

126. A temporary endocrine gland in the human body is

- (1) Corpus allatum
- (2) Pineal gland
- (3) Corpus cardiacum

(4) Corpus luteum

Ans. 4

127. Flowers which have single ovule in the ovary and are packed into inflorescence are usually pollinated by

- (1) Bat
- (2) Water
- (3) Bee
- (4) Wind

Ans. 4

128. The pivot joint between atlas and axis is a type of

- (1) saddle joint
- (2) fibrous joint
- (3) cartilaginous joint
- (4) synovial joint

Ans. 4

129. A decrease in blood pressure/volume will not cause the release of :

- (1) ADH
- (2) Renin
- (3) Atrial Natriuretic Factor
- (4) Aldosterone

Ans. 3

130. Which ecosystem has the maximum biomass?

- (1) Lake ecosystem
- (2) Forest ecosystem
- (3) Grassland ecosystem
- (4) Pond ecosystem

Ans. 2

131. A disease caused by an autosomal printer non-disjunction is

- (1) Sickle Cell Anaemia
- (2) Down's Syndrome
- (3) Klinefelter's Syndrome

(4) Turner's Syndrome

Ans. 2

132. Which of the following cell organelles is responsible for extracting energy from carbohydrates to for ATP?

- (1) Mitochondrion
- (2) Lysosome
- (3) Ribosome
- (4) Chloroplast

Ans. 1

133. DNA replication in bacteria occurs

- (1) Just before transcription
- (2) During S phase
- (3) Within nucleolus
- (4) Prior to fission

Ans. 4

134. In case of a couple where the male is having a very low sperm count, which technique will be suitable for fertilisation?

- (1) Intracytoplasmic sperm injection
- (2) Intrauterine transfer
- (3) Gamete intracytoplasmic fallopian transfer
- (4) Artificial Insemination

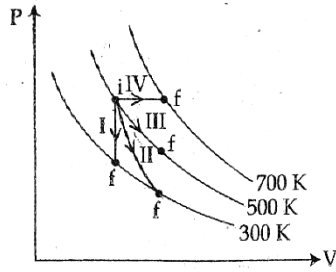
Ans. 1 (or) 4

135. Which one of the following statements is not valid for aerosols ?

- (1) They have negative impact on agricultural land
- (2) They are harmful to human health
- (3) They alter rainfall and monsoon patterns
- (4) They cause increased agricultural productivity

Ans. 4

136. Thermodynamic processes are indicated in the following diagram



Match the following

Column-1	Column-2
P. Process	a. Adiabatic
Q. Process II	b. Isobaric
R. Process III	c. Isochoric
S. Process IV	d. Isothermal

- (1)  $P \rightarrow d, Q \rightarrow b, R \rightarrow a, S \rightarrow c$   
 (2)  $P \rightarrow a, Q \rightarrow c, R \rightarrow d, S \rightarrow b$   
 (3)  $P \rightarrow c, Q \rightarrow a, R \rightarrow d, S \rightarrow b$   
 (4)  $P \rightarrow c, Q \rightarrow d, R \rightarrow b, S \rightarrow a$

Ans: 3

137. Consider a drop of rain water having mass 1g falling from a height of 1 km. It hits the ground with a speed of 50m/s. Take 'g' constant with a value  $10 \text{ m/s}^2$ . The work by the (i) gravitational force and the (ii) resistive force of air is:

- (1) (i) 10J (ii) -8.75 J  
 (2) (i) -10 J (ii) -8.25 J  
 (3) (i) 1.25 J (ii) -8.25 J  
 (4) (i) 100 J (ii) 8.75 J

Ans: 1

138. A 250- Turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of 85  $\mu\text{A}$  and subjected to a magnetic field of strength 0.85 T. work done for rotating the coil by  $180^\circ$  against the torque is:

- (1) 1.15  $\mu\text{J}$   
 (2) 9.1  $\mu\text{J}$   
 (3) 4.55  $\mu\text{J}$   
 (4) 2.3  $\mu\text{J}$

Ans: 2

139. Two Polaroids  $P_1$  and  $P_2$  are placed with their axis perpendicular to each other. Unpolarised light  $I_0$  is incident on  $P_1$ . A third polaroid  $P_3$  is kept in between  $P_1$  and  $P_2$  such that its axis makes an angle  $45^\circ$  with that of  $P_1$ . The intensity of transmitted light through  $P_2$  is :

- (1)  $\frac{I_0}{16}$   
 (2)  $\frac{I_0}{2}$   
 (3)  $\frac{I_0}{4}$   
 (4)  $\frac{I_0}{8}$

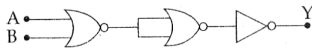
Ans: 4

140. Radioactive material 'A' has decay constant '8 X' and material 'B' has decay constant 'X'. Initially they have same number of nuclei. After what time, the ratio of number of nuclei of material 'B' to that 'A' will be  $\frac{1}{e}$  ?

- (1)  $\frac{1}{9\lambda}$   
 (2)  $\frac{1}{\lambda}$   
 (3)  $\frac{1}{7\lambda}$   
 (4)  $\frac{1}{8\lambda}$

Ans: 3

141. The given electrical network is equivalent to



- (1) NOT gate
- (2) AND gate
- (3) Or gate
- (4) Nor gate

Ans: 4

142. The ratio of resolving powers of an optical microscope for two wave lengths  $\lambda_1=4000 \text{ \AA}$

and  $\lambda_2=6000 \text{ \AA}$  is :

- (1) 16:81
- (2) 8:27
- (3) 9:4
- (4) 3:2

Ans: 4

143. In a common emitter transistor amplifier the audio signal voltage across the collector is 3 V. The resistance of collector is  $3k\Omega$ . If the current gain is 100 and the base resistance is  $2k\Omega$ , the voltage and power gain of the amplifier is:

- (1) 20 and 2000
- (2) 200 and 1000
- (3) 15 and 200
- (4) 150 and 15000

Ans: 4

144. Two cars moving in opposite directions approach each other with speed of  $22m/s$  and  $16.5m/s$  respectively. The driver of the first car blows a horn having a frequency 400 Hz. The frequency heard by the driver of the second car is [velocity of sound  $340m/s$ ]:

- (1) 448 Hz
- (2) 350 Hz

- (3) 361 Hz
- (4) 411 Hz

Ans: 1

145. The astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will:

- (1) Will become stationary
- (2) Keep floating at the same distance between them
- (3) Move towards from each other
- (4) Move away from each other

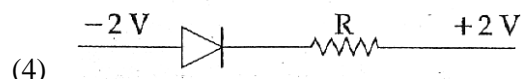
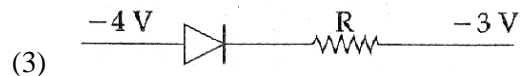
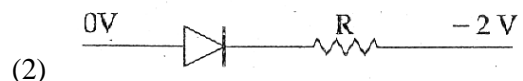
Ans: 2

146. A gas mixture consists of 2 moles of  $O_2$  and 4 moles of Ar at temperature T. Neglecting all vibrational modes, the total internal energy of the system is:

- (1) 11 RT
- (2) 4 RT
- (3) 15 RT
- (4) 9 RT

Ans: 1

147. Which one of the following represents forward bias diode?



Ans: 2

148. A long solenoid of diameter 0.1 m has  $2 \times 10^4$  turns per meter. At the centre of the solenoid a coil of 100 turns and radius 0.01 m is placed with its axis coinciding with the solenoid axis. The current in the solenoid reduces at a constant rate to 0A from 4A in 0.05s. If the resistance of the coil is  $10\pi^2\Omega$  the total charge flowing through the coil during this time is:

- (1)  $16\pi \mu C$
- (2)  $32\pi \mu C$
- (3)  $16\mu C$
- (4)  $32\mu C$

Ans: 4

149. A rope is wound around a hollow cylinder of mass 3 kg and radius 40cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30N?

- (1)  $5m/s^2$
- (2)  $25m/s^2$
- (3)  $0.25rad/s^2$
- (4)  $25rad/s^2$

Ans: 4

150. A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of resulting system:

- (1) Increases by a factor of 2
- (2) Increases by a factor of 4
- (3) Decreases by a factor of 2
- (4) Remains the same

Ans: 3

151. The acceleration due to gravity at a height 1 km above the earth is the same as at a depth of below the surface of earth. Then:

- (1)  $d=2km$
- (2)  $d=\frac{1}{2}km$
- (3)  $d = 1km$
- (4)  $d = \frac{3}{2}km$

Ans: 1

152. A particle executes linear simple harmonic motion with an amplitude of 3 cm. When the particle is at , 2 cm from the mean position, the magnitude of its velocity is equal to that of its acceleration. Then its time period in seconds is

- (1)  $\frac{2\pi}{\sqrt{3}}$
- (2)  $\frac{\sqrt{5}}{\pi}$
- (3)  $\frac{\sqrt{5}}{2\pi}$
- (4)  $\frac{4\pi}{\sqrt{5}}$

Ans: 4

153. A carnot engine having an efficiency of  $\frac{1}{10}$  as heat engine, is used as a refrigerator. if the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is':

- (1) 100 J
- (2) 1J
- (3) 90J
- (4) 99J

Ans: 3

154. The photoelectric threshold wavelength of silver is  $3250 \times 10^{-10} m$ . The velocity of the electron ejected from a silver surface by ultraviolet light of wavelength  $2536 \times 10^{-10} m$  is:

(Given  $h = 4.14 \times 10^{-15} eVs$  and  $c = 3 \times 10^8 ms^{-1}$ )

- (1)  $\approx 0.3 \times 10^6 ms^{-1}$
- (2)  $\approx 6 \times 10^5 ms^{-1}$
- (3)  $\approx 0.6 \times 10^6 ms^{-1}$
- (4)  $\approx 61 \times 10^3 ms^{-1}$

Ans: 2 or 3

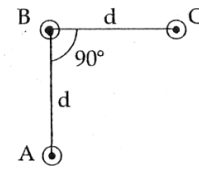
155. Suppose the charge of a proton and an electron differ slightly. One of them is  $-e$ , the other is  $(e + \Delta e)$ . If the net of electrostatic force and gravitational force between two hydrogen atoms placed at a distance  $d$  (much greater than atomic size) apart is zero, then  $\Delta e$  is of the order of

[Given mass of hydrogen  $m_h = 1.67 \times 10^{-27} kg$ ]

- (1)  $10^{-47} C$
- (2)  $10^{-20} C$
- (3)  $10^{-23} C$
- (4)  $10^{-37} C$

Ans: 0

156. An arrangement of three parallel straight wires placed perpendicular to plane of paper carrying same current 'I' along the same direction is shown in Fig. Magnitude of force per unit length on the middle wire 'B' is given by:



(1)  $\frac{\mu_0 i^2}{\sqrt{2\pi d}}$

(2)  $\frac{\mu_0 i^2}{2\pi d}$

(3)  $\frac{2\mu_0 i^2}{\pi d}$

(4)  $\frac{\sqrt{2}\mu_0 i^2}{\pi d}$

Ans: 1

157. The resistance of a wire is 'R' ohm. If it is melted and stretched to 'n' times its original length, its new resistance will be:

(1)  $\frac{R}{n^2}$

(2)  $nR$

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

(4)  $n^2 R$

Ans: 4

158. A beam of light from a source L is incident normally on a plane mirror fixed at a certain distance  $x$  from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirror is rotated through a small angle  $\theta$ , the spot of the light is found to move through a distance  $y$  on the scale. The angle  $\theta$  is given by :

(1)  $\frac{x}{y}$

(2)  $\frac{y}{2x}$

(3)  $\frac{y}{x}$

(4)  $\frac{x}{2y}$

Ans: 2

159. One end of string of length  $l$  is connected to a particle of mass  $m$  and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed  $v$ , the net force on the particle (directed towards center) will be ( $T$  represents the tension in the string)

(1) Zero

(2)  $T$

(3)  $T + \frac{mv^2}{l}$

(4)  $T - \frac{mv^2}{l}$

Ans: 2

160. A physical quantity of the dimensions of length that can be formed out of  $c$ ,  $G$  and  $\frac{e^2}{4\pi\epsilon_0}$  is [ $c$  is velocity of light,  $G$  is universal constant of gravitation and  $e$  is charge]:

(1)  $\frac{1}{c} G \frac{e^2}{4\pi\epsilon_0}$

(2)  $\frac{1}{c^2} \left[ G \frac{e^2}{4\pi\epsilon_0} \right]^{1/2}$

(3)  $c^2 \left[ G \frac{e^2}{4\pi\epsilon_0} \right]^{1/2}$

(4)  $\frac{1}{c^2} \left[ \frac{e^2}{G4\pi\epsilon_0} \right]^{1/2}$

Ans: 2

161. A thin prism having refracting angle  $10^\circ$  is made glass of refractive index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination produces dispersion with deviation. The refracting angle of second prism should be :

(1)  $10^\circ$

(2)  $4^\circ$

(3)  $6^\circ$

(4)  $8^\circ$

Ans: 3

162. The ratio of wavelengths of the last line of Balmer series and the last line of Lyman series is :

(1) 0.5

(2) 2

(3) 1

(4) 4

Ans: 4

163. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system

(1) 40 Hz

(2) 10 Hz

(3) 20 Hz

(4) 30 Hz

Ans: 3

164. A potentiometer is an accurate and versatile device to make electrical measurements of E.M.F. because the method involves:

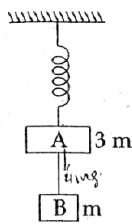
(1) A combination of cells, galvanometer and resistances

(2) Cells

- (3) Potential gradients  
 (4) A condition of no current flow through the galvanometer.

Ans: 4

165. Two blocks A and B of masses  $3m$  and  $m$  respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively :



- (1)  $\frac{g}{3}, \frac{g}{3}$   
 (2)  $g, \frac{g}{3}$   
 (3)  $\frac{g}{3}, g$   
 (4)  $g, g$

Ans: 3

166. If  $\theta_1$  and  $\theta_2$  be the apparent angles of dip observed in two vertical planes at right angles to each other, Then the true angle of dip  $\theta$  is given by :

- (1)  $\tan^2 \theta = \tan^2 \theta_1 - \tan^2 \theta_2$   
 (2)  $\cot^2 \theta = \cot^2 \theta_1 - \cot^2 \theta_2$   
 (3)  $\tan^2 \theta = \tan^2 \theta_1 + \tan^2 \theta_2$   
 (4)  $\cot^2 \theta = \cot^2 \theta_1 + \cot^2 \theta_2$

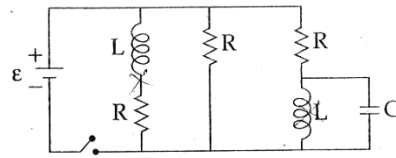
Ans: 2

167. The bulk modulus of a spherical is 'B'. If it is subjected to uniform pressure 'p' the fractional decrease in radius is:

- (1)  $\frac{P}{3B}$   
 (2)  $\frac{P}{B}$   
 (3)  $\frac{B}{3p}$   
 (4)  $\frac{3p}{B}$

Ans: 1

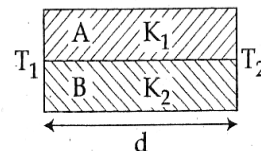
168. Figure shows a circuit that contains three identical resistors with resistance  $R = 9.0 \Omega$  each, two identical inductors with inductance  $L = 2.0 \text{ mH}$  each, and an ideal battery with emf  $E = 18 \text{ V}$ . The current 'I' through the battery just after the switch closed is,.....



- (1) 0 ampere  
 (2) 2mA  
 (3) 0.2 A  
 (4) 2 A

Ans: 4

169. Two rods A and B of different materials are welded together as shown in figure. Their thermal conductivities are  $K_1$  and  $K_2$ . The thermal conductivity of the composite rod will be :



- (1)  $2(K_1 + K_2)$



$$(2) \frac{K_1 + K_2}{2}$$

$$(3) \frac{3(K_1 + K_2)}{2}$$

$$(4) K_1 + K_2$$

Ans: 2

170. Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time  $t_1$ . On other days, if she remains stationary on the moving escalator, then the escalator takes her up in time  $t_2$ . The time taken by her to walk up on the moving escalator will be:

$$(1) t_1 - t_2$$

$$(2) \frac{t_1 + t_2}{2}$$

$$(3) \frac{t_1 t_2}{t_2 - t_1}$$

$$(4) \frac{t_1 t_2}{t_2 + t_1}$$

Ans: 4

171. Two discs of same moment of inertia rotating about their regular axis passing through centre and perpendicular to the plane of disc with angular velocities  $\omega_1$  and  $\omega_2$ . They are brought into contact face to face coinciding the axis of rotation. The expression for loss of energy during this process is :

$$(1) \frac{I}{8}(\omega_1 - \omega_2)^2$$

$$(2) \frac{1}{2}I(\omega_1 + \omega_2)^2$$

$$(3) \frac{1}{4}I(\omega_1 - \omega_2)^2$$

$$(4) I(\omega_1 - \omega_2)^2$$

Ans: 3

172. Which of the following statements are correct?

(a) Centre of mass of a body always coincides with the centre of gravity of the body.

(b) Centre of mass of a body is the point at which the total gravitational torque on the body is zero.

(c) A couple on a body produce both translational and rotational motion in a body

(d) Mechanical advantage greater than one means that small effort can be used to lift a large load.

(1) (c) and (d)

(2) (b) and (d)

(3) (a) and (b)

(4) (b) and (c)

Ans: 2

173. A spherical black body with a radius of 12 cm radiates 450 watt power at 500 K. If the radius were halved and the temperature doubled, the power radiated in watt would be:

(1) 1800

(2) 225

(3) 450

(4) 1000

Ans: 1

174. In an electromagnetic wave in free space the root mean square value of the electric field is  $E_{rms} = 6V/m$ . The peak value of the magnetic field is:

(1)  $4.23 \times 10^{-8} T$

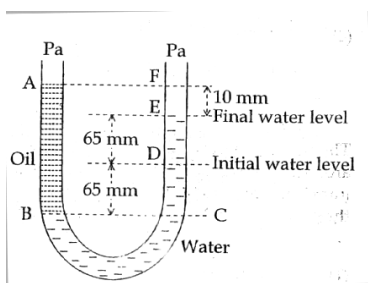
(2)  $1.41 \times 10^{-8} T$

(3)  $2.83 \times 10^{-8} T$

(4)  $0.70 \times 10^{-8} T$

Ans: 3

175. A U tube with both sides ends open to the atmosphere the partially filled with water. Oil, which is immiscible with water, is poured in to one side until it stands at a distance of 10 mm above the water level on the other side. Mean while the water rises by 65 mm from original level (see diagram). The density of the oil is:



- (1)  $928 \text{ kg m}^{-3}$
- (2)  $650 \text{ kg m}^{-3}$
- (3)  $425 \text{ kg m}^{-3}$
- (4)  $800 \text{ kg m}^{-3}$

Ans: 1

176. Young's double slit experiment in first performed in air and then in a medium other than air. it is found that  $8^{th}$  bright fringe in the medium lies where  $5^{th}$  dark fringe lies in air. The refractive index of the medium is nearly:

- (1) 1.78
- (2) 1.25
- (3) 1.59
- (4) 1.69

Ans: 1

177. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature  $T$ (Kelvin) and mass  $m$ , is:

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

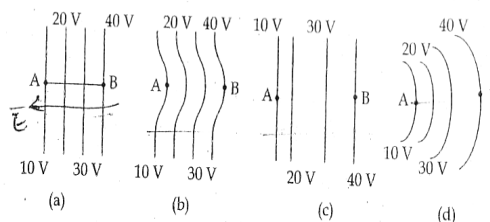
Ans: 3

178. The  $x$  and  $y$  coordinates of the particle at any time are  $x = 5t - 2t^2$  and  $y = 10t$  respectively, where  $x$  and  $y$  are in meters and  $t$  in seconds. The acceleration of the particle at  $t = 2s$  is :

- (1)  $-8m/s^2$
- (2) 0
- (3)  $5m/s^2$
- (4)  $-4m/s^2$

Ans: 4

179. The diagrams below show regions of equipotentials



A positive charge is moved from A to B in each diagram

- (1) Maximum work is required to move  $q$  in figure (b)
- (2) Maximum work is required to move  $q$  in figure (c)
- (3) In all the four cases the work done is the same.

(4) Minimum work is required to move  $q$  in figure (a)

Ans: 3

180. A spring of force constant  $k$  is cut in to lengths of ratio 1:2:3. They are connected in series and the new force constant is  $k'$ . Then they are connected in parallel and force constant is  $k''$ .

Then  $k':k''$  is:

(1) 1:14

(2) 1:6

(3) 1:9

(4) 1:11

Ans: 4