Test Booklet Code

Q

DEF

No.: 4165746

This Booklet contains 20 pages.

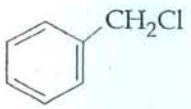
Do not open this Test Booklet until you are asked to do so.

Important Instructions :

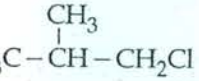
1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on **side-1** and **side-2** carefully with **blue/black** ball point pen only.
2. The test is of **3 hours** duration and Test Booklet contains **180** questions. Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, **one mark** will be deducted from the total scores. The maximum marks are **720**.
3. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must handover the Answer Sheet to the invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **Q**. Make sure that the CODE printed on **Side-2** of the Answer Sheet is the same as that on this Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your roll no. anywhere else except in the specified space in the Test Booklet/ Answer Sheet.
8. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
9. Each candidate must show on demand his/her Admission Card to the Invigilator.
10. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. Cases where a candidate has not signed the Attendance Sheet second time will be deemed not to have handed over Answer Sheet and dealt with as an unfair means case.
12. Use of Electronic/Manual Calculator is prohibited.
13. The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.
14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

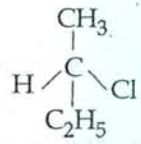
SEAL

1. Which of the following compounds will undergo racemisation when solution of KOH hydrolyses ?

(i) 

(ii) $CH_3CH_2CH_2Cl$

(iii) 

(iv) 

(1) (ii) and (iv)
(2) (iii)and (iv)
(3) (i) and (iv)
(4) (i) and (ii)

2. The reaction of aqueous $KMnO_4$ with H_2O_2 in acidic conditions gives :

(1) Mn^{2+} and O_2
(2) Mn^{2+} and O_3
(3) Mn^{4+} and MnO_2
(4) Mn^{4+} and O_2

3. Which one of the following is **not** a common component of Photochemical Smog ?

(1) Acrolein
(2) Peroxyacetyl nitrate
(3) Chlorofluorocarbons
(4) Ozone

4. Which of the following will be most stable diazonium salt $RN_2^+X^-$?

(1) $C_6H_5\ N_2^+\ X^-$
(2) $CH_3\ CH_2\ N_2^+\ X^-$
(3) $C_6H_5\ CH_2\ N_2^+\ X^-$
(4) $CH_3\ N_2^+\ X^-$

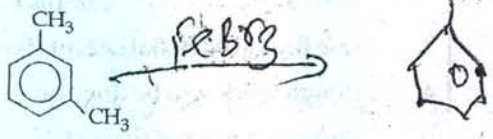
5. Which of the following hormones is produced under the condition of stress which stimulates glycogenolysis in the liver of human beings ?

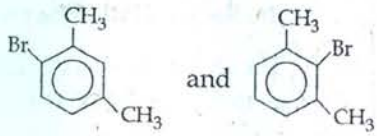
(1) Insulin
(2) Adrenaline
(3) Estradiol
(4) Thyroxin

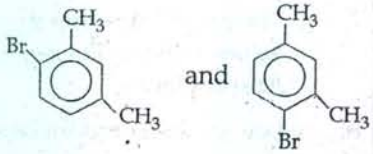
6. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reactant is left in excess and how much ?
(At. wt. Mg = 24 ; O = 16)

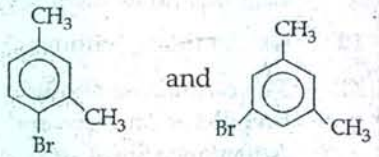
(1) O_2, 0.16 g
(2) Mg, 0.44 g
(3) O_2, 0.28 g
(4) Mg, 0.16 g

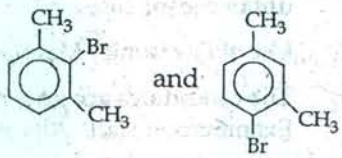
7. What products are formed when the following compound is treated with Br_2 in the presence of $FeBr_3$?



(1) 

(2) 

(3) 

(4) 

8. Which of the following organic compounds polymerizes to form the polyester Dacron ?

(1) Benzoic acid and ethanol
(2) Terephthalic acid and ethylene glycol
(3) Benzoic acid and para $HO-(C_6H_4)-OH$
(4) Propylene and para $HO-(C_6H_4)-OH$

9. In acidic medium, H_2O_2 changes $Cr_2O_7^{-2}$ to CrO_5 which has two (−O−O−) bonds. Oxidation state of Cr in CrO_5 is :

(1) +3
(2) +6
(3) −10
(4) +5

10. Which of the following orders of ionic radii is correctly represented ?

(1) $Na^+ > F^- > O^{2-}$

(2) $F^- > O^{2-} > Na^+$

(3) $Al^{3+} > Mg^{2+} > N^{3-}$

(4) $H^- > H^+ > H$

11. Which of the following salts will give highest pH in water ?

(1) NaCl

(2) Na_2CO_3

(3) $CuSO_4$

(4) KCl

12. Which of the following will **not** be soluble in sodium hydrogen carbonate ?

(1) Benzoic acid

(2) *o* - Nitrophenol

(3) Benzenesulphonic acid

(4) 2, 4, 6 - trinitrophenol

13. For the reaction :

$X_2O_4(l) \longrightarrow 2XO_2(g)$

$\Delta U = 2.1$ k cal, $\Delta S = 20$ cal K^{-1} at 300 K

Hence, ΔG is :

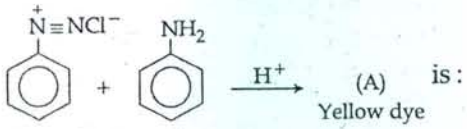
(1) -2.7 k cal

(2) 9.3 k cal

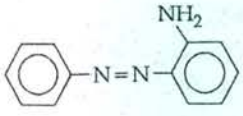
(3) -9.3 k cal

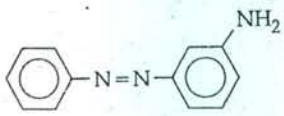
(4) 2.7 k cal

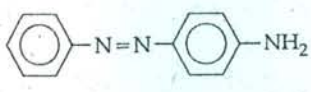
14. In the following reaction, the product (A)

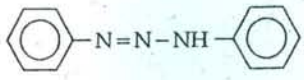


is :

(1) 

(2) 

(3) 

(4) 

15. Using the Gibbs energy change, $\Delta G^\circ = +63.3$ kJ, for the following reaction,

$Ag_2CO_3(s) \rightleftharpoons 2Ag^+(aq) + CO_3^{2-}(aq)$

the K_{sp} of Ag_2CO_3(s) in water at 25°C is :

($R = 8.314$ J K^{-1} mol^{-1})

(1) 8.0×10^{-12}

(2) 2.9×10^{-3}

(3) 7.9×10^{-2}

(4) 3.2×10^{-26}

16. Identity Z in the sequence of reactions :

$CH_3CH_2CH=CH_2 \xrightarrow{HBr/H_2O_2} Y \xrightarrow{C_2H_5ONa} Z$

(1) $(CH_3)_2CH_2 - O - CH_2CH_3$

(2) $CH_3(CH_2)_4 - O - CH_3$

(3) $CH_3CH_2 - CH(CH_3) - O - CH_2CH_3$

(4) $CH_3 - (CH_2)_3 - O - CH_2CH_3$

17. In the Kjeldahl's method for estimatioin of nitrogen present in a soil sample , ammonia evolved from 0.75 g of sample neutralized 10 mL of 1M H_2SO_4. The percentage of nitrogen in the soil is :

(1) 45.33

(2) 35.33

(3) 43.33

(4) 37.33

18. Which property of colloids is **not** dependent on the charge on colloidal particles ?

(1) Electrophoresis

(2) Electro - osmosis

(3) Tyndall effect

(4) Coagulation

19. For a given exothermic reaction, K_p and K_p' are the equilibrium constants at temperatures T_1 and T_2, respectively. Assuming that heat of reaction is constant in temperature range between T_1 and T_2, it is readily observed that :

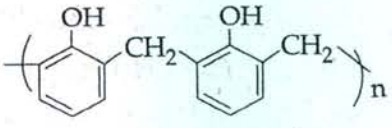
(1) $K_p < K_p'$

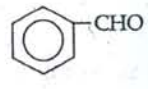
(2) $K_p = K_p'$

(3) $K_p = \frac{1}{K_p'}$

(4) $K_p > K_p'$

20. When 22.4 litres of $H_2(g)$ is mixed with 11.2 litres of $Cl_2(g)$, each at S.T.P., the moles of $HCl(g)$ formed is equal to :
(1) 2 mol of $HCl(g)$
(2) 0.5 mol of $HCl(g)$
(3) 1.5 mol of $HCl(g)$
(4) 1 mol of $HCl(g)$

21. Which one of the following is an example of a thermosetting polymer ?
(1) $+CH_2-\underset{Cl}{CH}+_n$
(2) $+N-(CH_2)_6-\overset{H}{N}-\overset{O}{\overset{\|}{C}}-(CH_2)_4-\overset{O}{\overset{\|}{C}}+_n$
(3) 
(4) $+CH_2-\underset{Cl}{C}=CH-CH_2+_n$

22. Which one is most reactive towards Nucleophilic addition reaction ?
(1) 
(2) 
(3) 
(4) 

23. Calculate the energy in joule corresponding to light of wavelength 45 nm : (Planck's constant $h = 6.63 \times 10^{-34}$ Js ; speed of light $c = 3 \times 10^8$ ms^{-1})
(1) 6.67×10^{11}
(2) 4.42×10^{-15}
(3) 4.42×10^{-18}
(4) 6.67×10^{15}

24. Which of the following organic compounds has same hybridization as its combustion product-(CO_2) ?
(1) Ethyne
(2) Ethene
(3) Ethanol
(4) Ethane

25. Be^{2+} is isoelectronic with which of the following ions ?
(1) Li^+
(2) Na^+
(3) Mg^{2+}
(4) H^+

26. Magnetic moment 2.83 BM is given by which of the following ions ?
(At. nos. Ti = 22, Cr = 24, Mn = 25, Ni = 28)
(1) Ni^{2+}
(2) Cr^{3+}
(3) Mn^{2+}
(4) Ti^{3+}

27. The weight of silver (at.wt. = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be :
(1) 10.8 g
(2) 54.0 g
(3) 108.0 g
(4) 5.4 g

28. For the reversible reaction :
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + \text{heat}$
The equilibrium shifts in forward direction :
(1) by decreasing the pressure
(2) by decreasing the concentrations of $N_2(g)$ and $H_2(g)$
(3) by increasing pressure and decreasing temperature
(4) by increasing the concentration of $NH_3(g)$

29. The pair of compounds that can exist together is :
(1) $HgCl_2$, $SnCl_2$
(2) $FeCl_2$, $SnCl_2$
(3) $FeCl_3$, KI
(4) $FeCl_3$, $SnCl_2$

30. Which of the following complexes is used to be as an anticancer agent ?
(1) cis - $[Pt\,Cl_2\,(NH_3)_2]$
(2) cis - $K_2[Pt\,Cl_2\,Br_2]$
(3) Na_2CoCl_4
(4) mer - $[Co\,(NH_3)_3\,Cl_3]$

31. Among the following complexes the one which shows **Zero** crystal field stabilization energy (CFSE) is :
(1) $[Fe(H_2O)_6]^{3+}$
(2) $[Co(H_2O)_6]^{2+}$
(3) $[Co(H_2O)_6]^{3+}$
(4) $[Mn(H_2O)_6]^{3+}$

32. If a is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be :

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

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

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

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

33. Which one of the following species has plane triangular shape ?

(1) NO_3^-

(2) NO_2^-

(3) CO_2

(4) N_3

34. Which of the following molecules has the maximum dipole moment ?

(1) CH_4

(2) NH_3

(3) NF_3

(4) CO_2

35. Acidity of diprotic acids in aqueous solutions increases in the order :

(1) $H_2Se < H_2S < H_2Te$

(2) $H_2Te < H_2S < H_2Se$

(3) $H_2Se < H_2Te < H_2S$

(4) $H_2S < H_2Se < H_2Te$

36. Reason of lanthanoid contraction is :

(1) Increasing nuclear charge

(2) Decreasing nuclear charge

(3) Decreasing screening effect

(4) Negligible screening effect of '*f*' orbitals

37. Which of the following statements is **correct** for the spontaneous adsorption of a gas ?

(1) ΔS is negative and therefore, ΔH should be highly negative.

(2) ΔS is positive and, therefore, ΔH should be negative.

(3) ΔS is positive and, therefore, ΔH should also be highly positive.

(4) ΔS is negative and, therefore, ΔH should be highly positive.

38. Artificial sweetner which is stable under cold conditions **only** is :

(1) Sucralose

(2) Aspartame

(3) Alitame

(4) Saccharine

39. Equal masses of H_2, O_2 and methane have been taken in a container of volume V at temperature 27°C in identical conditions. The ratio of the volumes of gases $H_2 : O_2$: methane would be :

(1) 16 : 8 : 1

(2) 16 : 1 : 2

(3) 8 : 1 : 2

(4) 8 : 16 : 1

40. (a) $H_2O_2 + O_3 \rightarrow H_2O + 2O_2$

(b) $H_2O_2 + Ag_2O \rightarrow 2Ag + H_2O + O_2$

Role of hydrogen peroxide in the above reactions is respectively :

(1) reducing in (a) and oxidizing in(b)

(2) reducing in (a) and (b)

(3) oxidizing in (a) and (b)

(4) oxidizing in (a) and reducing in (b)

41. Among the following sets of reactants which one produces anisole ?

(1) C_6H_5OH ; NaOH ; CH_3I

(2) C_6H_5OH ; neutral $FeCl_3$

(3) $C_6H_5 - CH_3$; CH_3COCl ; $AlCl_3$

(4) CH_3CHO ; RMgX

42. When 0.1 mol MnO_4^{2-} is oxidised the quantity of electricity required to completely oxidise MnO_4^{2-} to MnO_4^- is :

(1) 2×96500 C

(2) 9650 C

(3) 96.50 C

(4) 96500 C

43. Of the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression ?

(1) $C_6H_{12}O_6$

(2) $Al_2(SO_4)_3$

(3) K_2SO_4

(4) KCl

44. What is the maximum number of orbitals that can be identified with the following quantum numbers ?

n = 3, l = 1, m_l = 0

(1) 2

(2) 3

(3) 4

(4) 1

45. D(+) glucose reacts with hydroxyl amine and yields an oxime. The structure of the oxime would be :

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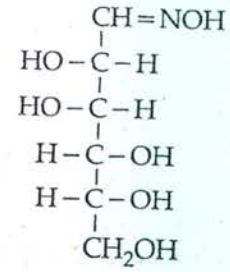

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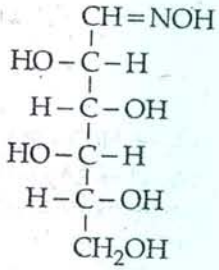

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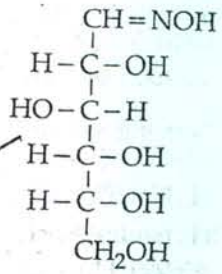

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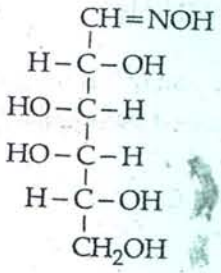


46. Five kingdom system of classification suggested by R.H. Whittaker is **not** based on :

(1) Mode of reproduction.
(2) Mode of nutrition.
(3) Complexity of body organisatoin.
(4) Presence or absence of a well defined nucleus.

47. The main function of mammalian corpus luteum is to produce :

(1) progesterone
(2) human chorionic gonadotropin
(3) relaxin only
(4) estrogen only

48. In which one of the following processes CO_2 is not released ?

(1) Aerobic respiration in animals
(2) Alcoholic fermentation
(3) Lactate fermentation
(4) Aerobic respiration in plants

49. Choose the correctly matched pair :

(1) Moist surface of buccal cavity - Glandular epithelium
(2) Tubular parts of nephrons - Cuboidal epithelium
(3) Inner surface of bronchioles - squamous epithelium
(4) Inner lining of salivary ducts - Ciliated epithelium

50. Which of the following shows coiled RNA strand and capsomeres ?

(1) Tobacco mosaic virus
(2) Measles virus
(3) Retrovirus
(4) Polio virus

51. Just as a person moving from Delhi to Shimla to escape the heat for the duration of hot summer, thousands of migratory birds from Siberia and other extremely cold northern regions move to :

(1) Meghalaya
(2) Corbett National Park
(3) Keolado National Park
(4) Western Ghat

52. You are given a fairly old piece of dicot stem and a dicot root. Which of the following anatomical structures will you use to distinguish between the two ?

(1) Secondary phloem
(2) Protoxylem
(3) Cortical cells
(4) Secondary xylem

53. In 'S' phase of the cell cycle :

(1) amount of DNA remains same in each cell.
(2) chromosome number is increased.
(3) amount of DNA is reduced to half in each cell.
(4) amount of DNA doubles in each cell.

54. A species facing extremely high risk of extinction in the immediate future is called :
(1) Endemic
(2) Critically Endangered
(3) Extinct
(4) Vulnerable

55. Fruit colour in squash is an example of :
(1) Dominant epistasis
(2) Complementary genes
(3) Inhibitory genes
(4) Recessive epistasis

56. Identify the hormone with its **correct** matching of source and function :
(1) Melatonin - pineal gland, regulates the normal rhythm of sleepwake cycle.
(2) Progesterone - corpus-luteum, stimulation of growth and activities of female secondary sex organs.
(3) Atrial natriuretic factor - ventricular wall increases the blood pressure.
(4) Oxytocin - posterior pituitary, growth and maintenance of mammary glands.

57. An example of edible underground stem is :
(1) Groundnut
(2) Sweet potato
(3) Potato
(4) Carrot

58. Which of the following causes an increase in sodium reabsorption in the distal convoluted tubule ?
(1) Increase in antidiuretic hormone levels
(2) Decrease in aldosterone levels
(3) Decrease in antidiuretic hormone levels
(4) Increase in aldosterone levels

59. Which structures perform the function of mitochondria in bacteria ?
(1) Ribosomes
(2) Cell wall
(3) Mesosomes
(4) Nucleoid

60. Select the option which is **not correct** with respect to enzyme action :
(1) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.
(2) A non - competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate.
(3) Malonate is a competitive inhibitor of succinic dehydrogenase.
(4) Substrate binds with enzyme at its active site.

61. Which is the particular type of drug that is obtained from the plant whose one flowering branch is shown below ?

(1) Depressant
(2) Stimulant
(3) Pain - killer
(4) Hallucinogen

62. Fructose is absorbed into the blood through mucosa cells of intestine by the process called :
(1) facilitated transport
(2) simple diffusion
(3) co-transport mechanism
(4) active transport

63. The solid linear cytoskeletal elements having a diameter of 6 nm and made up of a single type of monomer are known as :
(1) Microfilaments
(2) Intermediate filaments
(3) Lamins
(4) Microtubules

64. Which one of the following living organisms completely *lacks* a cell wall ?

(1) Sea - fan (*Gorgonia*)
(2) *Saccharomyces*
(3) Blue - green algae
(4) Cyanobacteria

65. Tracheids differ from other tracheary elements in :

(1) being imperforate
(2) lacking nucleus
(3) being lignified
(4) having casparian strips

66. Select the correct matching of the type of the joint with the example in human skeletal system :

	Type of joint		Example
(1)	Pivot joint	-	between third and fourth cervical vertebrae
(2)	Hinge joint	-	between humerus and pectoral girdle
(3)	Gliding joint	-	between carpals
(4)	Cartilaginous joint	-	between frontal and pariental

67. A man whose father was colour blind marries a woman who had a colour blind mother and normal father. What percentage of male children of this couple will be colour blind ?

(1) 0%
(2) 50%
(3) 75%
(4) 25%

68. A few normal seedlings of tomato were kept in a dark room. After a few days they were found to have become white-coloured like albinos. Which of the following terms will you use to describe them ?

(1) Embolised
(2) Etiolated
(3) Defoliated
(4) Mutated

69. Function of filiform apparatus is to :

(1) Stimulate division of generative cell
(2) Produce nectar
(3) Guide the entry of pollen tube
(4) Recognize the suitable pollen at stigma

70. Choose the correctly matched pair :

(1) Adipose tissue - Dense connective tissue
(2) Areolar tissue - Loose connective tissue
(3) Cartilage - Loose connective tissue
(4) Tendon - Specialized connective tissue

71. Forelimbs of cat, lizard used in walking; forelimbs of whale used in swimming and forelimbs of bats used in flying are an example of :

(1) Adaptive radiation
(2) Homologous organs
(3) Convergent evolution
(4) Analogous organs

72. Which one of the following is a non - reducing carbohydrate ?

(1) Sucrose
(2) Lactose
(3) Ribose 5 - phosphate
(4) Maltose

73. At which stage of HIV infection does one usually show symptoms of AIDS ?

(1) When the infected retro virus enters host cells.
(2) When HIV damages large number of helper T - Lymphocytes.
(3) When the viral DNA is produced by reverse transcriptase.
(4) Within 15 days of sexual contact with an infected person.

74. What gases are produced in anaerobic sludge digesters ?

(1) Methane, Hydrogen Sulphide and CO_2
(2) Methane, Hydrogen Sulphide and O_2
(3) Hydrogen Sulphide and CO_2
(4) Methane and CO_2 only

75. Anoxygenic photosynthesis is characteristic of :

(1) *Spirogyra*
(2) *Chlamydomonas*
(3) *Ulva*
(4) *Rhodospirillum*

76. Match the following and select the **correct** option :

(a)	Earthworm	(i)	Pioneer species
(b)	Succession	(ii)	Detritivore
(c)	Ecosystem service	(iii)	Natality
(d)	Population growth	(iv)	Pollination

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

77. A location with luxuriant growth of lichens on the trees indicates that the :

(1) trees are heavily infested
(2) location is highly polluted
(3) location is not polluted
(4) trees are very healthy

78. In vitro clonal propagation in plants is characterized by :

(1) Northern blotting
(2) Electrophoresis and HPLC
(3) Microscopy
(4) PCR and RAPD

79. An alga which can be employed as food for human being is :

(1) *Chlorella*
(2) *Spirogyra*
(3) *Polysiphonia*
(4) *Ulothrix*

80. Which one of the following growth regulators is known as 'stress hormone' ?

(1) Ethylene
(2) GA_3
(3) Indole acetic acid
(4) Abscissic acid

81. The enzyme recombinase is required at which stage of meiosis :

(1) Zygotene
(2) Diplotene
(3) Diakinesis
(4) Pachytene

82. Assisted reproductive technology, IVF involves transfer of :

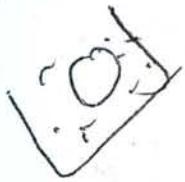
(1) Zygote into the fallopian tube.
(2) Zygote into the uterus.
(3) Embryo with 16 blastomeres into the fallopian tube.
(4) Ovum into the fallopian tube.

83. An example of *ex situ* conservation is :

(1) Seed Bank
(2) Wildlife Sanctuary
(3) Sacred Grove
(4) National Park

84. The osmotic expansion of a cell kept in water is chiefly regulated by :

(1) Vacuoles
(2) Plastids
(3) Ribosomes
(4) Mitochondria



85. Which one of the following is **wrong** about *Chara* ?

(1) Globule and nucule present on the same plant.
(2) Upper antheridium and lower oogonium
(3) Globule is male reproductive structure
(4) Upper oogonium and lower round antheridium.

86. The first human hormone produced by recombinant DNA technology is :

(1) Estrogen
(2) Thyroxin
(3) Progesterone
(4) Insulin

87. Which one of the following statements is **not correct** ?

(1) In retina the rods have the photopigment rhodopsin while cones have three different photopigments.
(2) Retinal is a derivative of Vitamin C.
(3) Rhodopsin is the purplish red protein present in rods only.
(4) Retinal is the light absorbing portion of visual photo pigments.

88. Which one of the following statements is **correct** ?
(1) Mango is a parthenocarpic fruit.
(2) A proteinaceous aleurone layer is present in maize grain.
(3) A sterile pistil is called a staminode.
(4) The seed in grasses is not endospermic.

89. Pollen tablets are available in the market for :
(1) Breeding programmes
(2) Supplementing food
(3) *Ex situ* conservation
(4) In vitro fertilization

90. Select the correct option :

	Direction of RNA synthesis	Direction of reading of the template DNA strand
(1)	3′ —— 5′	5′ —— 3′
(2)	5′ —— 3′	5′ —— 3′
(3)	3′ —— 5′	3′ —— 5′
(4)	5′ —— 3′	3′ —— 5′

91. The organization which publishes the Red List of species is :
(1) IUCN
(2) UNEP
(3) WWF
(4) ICFRE

92. A human female with Turner's syndrome :
(1) has one additional X chromosome.
(2) exhibits male characters.
(3) is able to produce children with normal husband.
(4) has 45 chromosomes with XO.

93. Match the following and select the **correct** answer :

(a)	Centriole	(i)	Infoldings in mitochondria
(b)	Chlorophyll	(ii)	Thylakoids
(c)	Cristae	(iii)	Nucleic acids
(d)	Ribozymes	(iv)	Basal body cilia or flagella

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

94. Approximately seventy percent of carbon-dioxide absorbed by the blood will be transported to the lungs :
(1) in the form of dissolved gas molecules
(2) by binding to R.B.C
(3) as carbamino - haemoglobin
(4) as bicarbonate ions

95. Which vector can clone only a small fragment of DNA ?
(1) Yeast artificial chromosome
(2) Plasmid
(3) Cosmid
(4) Bacterial artificial chromosome

96. The zone of atmosphere in which the ozone layer is present is called :
(1) Mesosphere
(2) Stratosphere
(3) Troposphere
(4) Ionosphere

97. Which one of the following fungi contains hallucinogens ?
(1) *Amanita muscaria*
(2) *Neurospora* sp.
(3) *Ustilago* sp.
(4) *Morchella esculenta*

98. A scrubber in the exhaust of a chemical industrial plant removes :
(1) particulate matter of the size 5 micrometer or above
(2) gases like ozone and methane
(3) particulate matter of the size 2.5 micrometer or less
(4) gases like sulphur dioxide

99. Select the Taxon mentioned that represents both marine and fresh water species :
(1) Ctenophora
(2) Cephalochordata
(3) Cnidaria
(4) Echinoderms

100. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed as :
(1) Imbricate
(2) Twisted
(3) Valvate
(4) Vexillary

101. An aggregate fruit is one which develops from :
(1) Multicarpellary apocarpus gynoecium
(2) Complete inflorescence
(3) Multicarpellary superior ovary
(4) Multicarpellary syncarpous gynoecium

102. Commonly used vectors for human genome sequencing are :
(1) BAC and YAC
(2) Expression Vectors
(3) T/A Cloning Vectors
(4) T - DNA

103. To obtain virus - free healthy plants from a diseased one by tissue culture technique, which part/parts of the diseased plant will be taken ?
(1) Palisade parenchyma
(2) Both apical and axillary meristems
(3) Epidermis only
(4) Apical meristem only

104. Fight-or-flight reactions cause activation of :
(1) the kidney, leading to suppression of renin-angiotensin-aldosterone pathway.
(2) the adrenal medulla, leading to increased secretion of epinephrine and norepinephrene.
(3) the pancreas leading to a reduction in the blood sugar levels.
(4) the parathyroid glands, leading to increased metabolic rate.

105. Stimulation of a muscle fiber by a motor neuron occurs at :
(1) the transverse tubules
(2) the myofibril
(3) the sacroplasmic reticulum
(4) the neuromuscular junction

106. *Planaria* possess high capacity of :
(1) regeneration
(2) alternation of generation
(3) bioluminescence
(4) metamorphosis

107. Placenta and pericarp are both edible portions in :
(1) Banana
(2) Tomato
(3) Potato
(4) Apple

108. Deficiency symptoms of nitrogen and potassium are visible first in :
(1) Young leaves
(2) Roots
(3) Buds
(4) Senescent leaves

109. Geitonogamy involves :
(1) fertilization of a flower by the pollen from the same flower.
(2) fertilization of a flower by the pollen from a flower of another plant in the same population.
(3) fertilization of a flower by the pollen from a flower of another plant belonging to a distant population.
(4) fertilization of a flower by the pollen from another flower of the same plant.

110. Viruses have :
(1) Prokaryotic nucleus
(2) Single chromosome
(3) Both DNA and RNA
(4) DNA enclosed in a protein coat

111. How do parasympathetic neural signals affect the working of the heart ?
(1) Heart rate is increased without affecting the cardiac output.
(2) Both heart rate and cardiac output increase.
(3) Heart rate decreases but cardiac output increases.
(4) Reduce both heart rate and cardiac output.

112. A marine cartilaginous fish that can produce electric current is :
(1) *Torpedo*
(2) *Trygon*
(3) *Scoliodon*
(4) *Pristis*

113. An analysis of chromosomal DNA using the Southern hybridization technique **does not** use :
(1) Blotting
(2) Autoradiography
(3) PCR
(4) Electrophoresis

114. Archaebacteria differ from eubacteria in :
(1) Mode of nutrition
(2) Cell shape
(3) Mode of reproduction
(4) Cell membrane structure

115. If 20 J of energy is trapped at producer level, then how much energy will be available to peacock as food in the following chain ?
plant → mice → snake → peacock
(1) 0.002 J
(2) 0.2 J
(3) 0.0002 J
(4) 0.02 J

116. Which one of the following are analogous structures?
(1) Gills of Prawn and Lungs of Man.
(2) Thorns of *Bougainvillea* and Tendrils of *Cucurbita*
(3) Flippers of Dolphin and Legs of Horse.
(4) Wings of Bat and Wings of Pigeon.

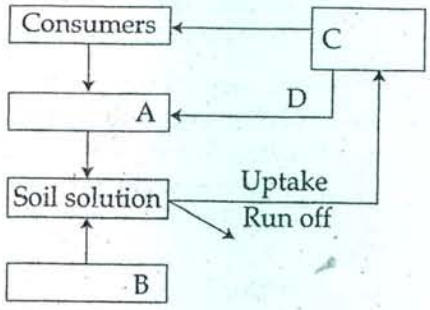
117. Dr. F. Went noted that if coleoptile tips were removed and placed on agar for one hour, the agar would produce a bending when placed on one side of freshly-cut coleoptile stumps. Of what significance is this experiment ?
(1) It is the basis for quantitative determination of small amounts of growth-promoting substances.
(2) It supports the hypothesis that IAA is auxin.
(3) It demonstrated polar movement of auxins.
(4) It made possible the isolation and exact identification of auxin.

118. Non-albuminous seed is produced in :
(1) Castor
(2) Wheat
(3) Pea
(4) Maize

119. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C ?
(1) G_1 and S
(2) Only G_2
(3) G_2 and M
(4) G_0 and G_1

120. Transformation was discovered by :
(1) Hershey and Chase
(2) Griffith
(3) Watson and Crick
(4) Meselson and Stahl

121. Given below is a simplified model of phosphorus cycling in a terrestrial ecosystem with four blanks (A-D). Identify the blanks.



Options :

	A	B	C	D
(1)	Litter fall	Producers	Rock minerals	Detritus
(2)	Detritus	Rock minerals	Producer	Litter fall
(3)	Producers	Litter fall	Rock minerals	Detritus
(4)	Rock minerals	Detritus	Litter fall	Producers

122. In a population of 1000 individuals 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population is :
(1) 0.5
(2) 0.6
(3) 0.7
(4) 0.4

123. Tubectomy is a method of sterilization in which :
(1) ovaries are removed surgically.
(2) small part of vas deferens is removed or tied up.
(3) uterus is removed surgically
(4) small part of the fallopian tube is removed or tied up.

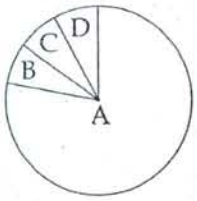
124. Which of the following is responsible for peat formation ?
(1) *Riccia*
(2) *Funaria*
(3) *Sphagnum*
(4) *Marchantia*

125. Which one of the following shows isogamy with non-flagellated gametes ?
(1) *Ectocarpus*
(2) *Ulothrix*
(3) *Spirogyra*
(4) *Sargassum*

126. Which one of the following is **wrongly** matched ?
(1) Translation - Using information in m-RNA to make protein.
(2) Repressor protein - Binds to operator to stop enzyme synthesis.
(3) Operon - Structural genes, operator and promoter.
(4) Transcription - Writing information from DNA to t-RNA.

127. Which of the following is a hormone releasing Intra Uterine Device (IUD) ?
(1) LNG -20
(2) Cervical cap
(3) Vault
(4) Multiload 375

128. Given below is the representation of the extent of global diversity of *invertebrates*. What groups the four portions (A-D) represent respectively ?



Options:

	A	B	C	D
(1)	Crustaceans	Insects	Molluscs	Other animal groups
(2)	Molluscs	Other animal groups	Crustaceans	Insects
(3)	Insects	Molluscs	Crustaceans	Other animal groups
(4)	Insects	Crustaceans	Other animal groups	Molluscs

129. Male gametophyte with least number of cells is present in :

(1) *Funaria*
(2) *Lilium*
(3) *Pinus*
(4) *Pteris*

130. The shared terminal duct of the reproductive and urinary system in the human male is :

(1) Ureter
(2) Vas deferens
(3) Vasa efferentia
(4) Urethra

131. Injury localized to the hypothalamus would most likely disrupt :

(1) co-ordination during locomotion.
(2) executive functions, such as decision making.
(3) regulation of body temperature.
(4) short - term memory.

132. Select the correct option describing gonadotropin activity in a normal pregnant female :

(1) High level of FSH and LH facilitate implantation of the embryo.
(2) High level of hCG stimulates the synthesis of estrogen and progesterone.
(3) High level of hCG stimulates the thickening of endometrium.
(4) High level of FSH and LH stimulates the thickening of endometrium.

133. The initial step in the digestion of milk in humans is carried out by ?

(1) Trypsin
(2) Rennin
(3) Pepsin
(4) Lipase

134. The motile bacteria are able to move by :

(1) flagella
(2) cilia
(3) pili
(4) fimbriae

135. Person with blood group AB is considered as universal recipient because he has :

(1) both A and B antibodies in the plasma.
(2) no antigen on RBC and no antibody in the plasma.
(3) both A and B antigens in the plasma but no antibodies.
(4) both A and B antigens on RBC but no antibodies in the plasma.

136. A conducting sphere of radius R is given a charge Q. The electric potential and the electric field at the centre of the sphere respectively are :

(1) $\frac{Q}{4\pi\epsilon_0 R}$ and Zero
(2) $\frac{Q}{4\pi\epsilon_0 R}$ and $\frac{Q}{4\pi\epsilon_0 R^2}$
(3) Both are zero
(4) Zero and $\frac{Q}{4\pi\epsilon_0 R^2}$

137. If n_1, n_2 and n_3 are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by :

(1) $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}}$

(2) $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$

(3) $n = n_1 + n_2 + n_3$

(4) $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$

138. Copper of fixed volume 'V' is drawn into wire of length 'l'. When this wire is subjected to a constant force 'F', the extension produced in the wire is 'Δl'. Which of the following graphs is a straight line ?

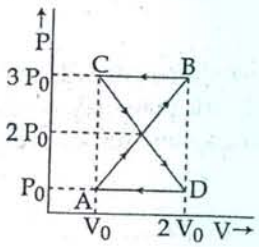
(1) Δl versus l^2

(2) Δl versus $1/l^2$

(3) Δl versus l

(4) Δl versus $1/l$

139. A thermodynamic system undergoes cyclic process ABCDA as shown in Fig. The work done by the system in the cycle is :



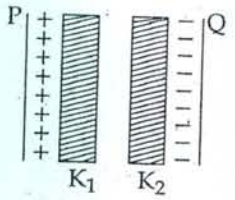
(1) $2P_0 V_0$

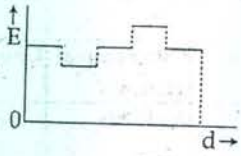
(2) $\frac{P_0 V_0}{2}$

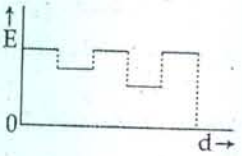
(3) Zero

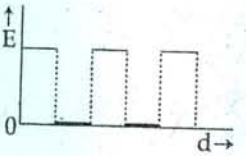
(4) $P_0 V_0$

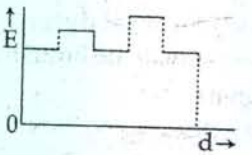
140. Two thin dielectric slabs of dielectric constants K_1 and K_2 ($K_1 < K_2$) are inserted between plates of a parallel plate capacitor, as shown in the figure. The variation of electric field 'E' between the plates with distance 'd' as measured from plate P is correctly shown by :



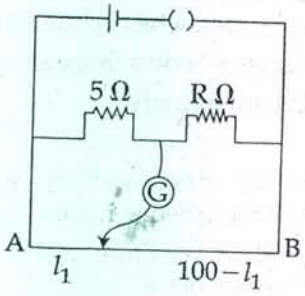
(1)


(2)


(3)


(4)


141. The resistances in the two arms of the meter bridge are 5 Ω and R Ω, respectively. When the resistance R is shunted with an equal resistance, the new balance point is at 1.6 l_1. The resistance 'R', is :



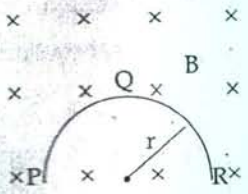
(1) 15 Ω

(2) 20 Ω

(3) 25 Ω

(4) 10 Ω

142. A thin semicircular conducting ring (PQR) of radius 'r' is falling with its plane vertical in a horizontal magnetic field B, as shown in figure. The potential difference developed across the ring when its speed is v, is :



(1) $Bv\pi r^2/2$ and P is at higher potential
(2) πrBv and R is at higher potential
(3) $2rBv$ and R is at higher potential
(4) Zero

143. A particle is moving such that its position coordinates (x, y) are
(2m, 3m) at time t = 0,
(6m, 7m) at time t = 2 s and
(13m, 14m) at time t = 5 s.

Average velocity vector $\left(\vec{V}_{av}\right)$ from t = 0 to t = 5 s is :

(1) $\frac{7}{3}\left(\hat{i}+\hat{j}\right)$

(2) $2\left(\hat{i}+\hat{j}\right)$

(3) $\frac{11}{5}\left(\hat{i}+\hat{j}\right)$

(4) $\frac{1}{5}\left(13\hat{i}+14\hat{j}\right)$

144. Two identical long conducting wires AOB and COD are placed at right angle to each other, with one above other such that 'O' is their common point for the two. The wires carry I_1 and I_2 currents, respectively. Point 'P' is lying at distance 'd' from 'O' along a direction perpendicular to the plane containing the wires. The magnetic field at the point 'P' will be :

(1) $\frac{\mu_o}{2\pi d}(I_1 + I_2)$

(2) $\frac{\mu_o}{2\pi d}\left(I_1^2 - I_2^2\right)$

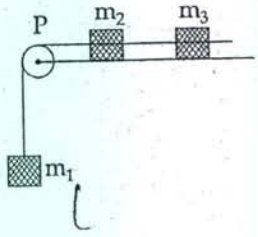
(3) $\frac{\mu_o}{2\pi d}\left(I_1^2 + I_2^2\right)^{1/2}$

(4) $\frac{\mu_o}{2\pi d}\left(I_1/I_2\right)$

145. A system consists of three masses m_1, m_2 and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ).

The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is :

(Assume $m_1 = m_2 = m_3 = m$)



(1) $\frac{2g\mu}{3}$

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

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

(4) $\frac{g(1-g\mu)}{9}$

146. In an ammeter 0.2% of main current passes through the galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be :

(1) $\frac{499}{500}$ G

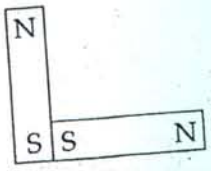
(2) $\frac{1}{500}$ G

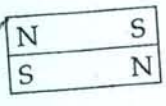
(3) $\frac{500}{499}$ G

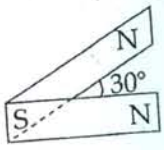
(4) $\frac{1}{499}$ G

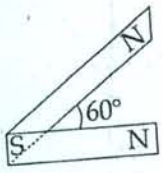
Q

147. Following figures show the arrangement of bar magnets in different configurations. Each magnet has magnetic dipole moment $\vec{m}$. Which configuration has highest net magnetic dipole moment?

(a) 

(b) 

(c) 

(d) 

(1) (b)

(2) (c)

(3) (d)

(4) (a)

148. If the focal length of objective lens is increased then magnifying power of :

(1) microscope and telescope both will increase.

(2) microscope and telescope both will decrease.

(3) microscope will decrease but that of telescope will increase.

(4) microscope will increase but that of telescope decrease.

149. The angle of a prism is 'A'. One of its refracting surfaces is silvered. Light rays falling at an angle of incidence 2A on the first surface returns back through the same path after suffering reflection at the silvered surface. The refractive index μ, of the prism is :

(1) 2 cos A

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

(3) tan A

(4) 2 sin A

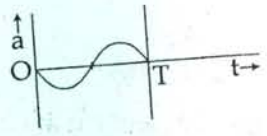
150. The oscillation of a body on a smooth horizontal surface is represented by the equation,

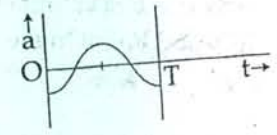
$$X = A \cos(\omega t)$$

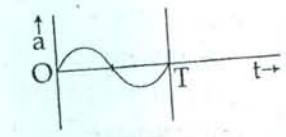
where X = displacement at time t

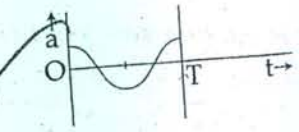
ω = frequency of oscillation

Which one of the following graphs shows correctly the variation 'a' with 't' ?

(1) 

(2) 

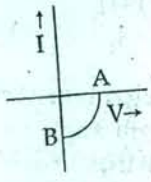
(3) 

(4) 

Here a = acceleration at time t

T = time period

151. The given graph represents V - I characteristic for a semiconductor device.



Which of the following statement is **correct** ?

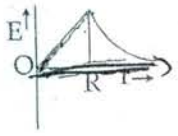
(1) It is for a solar cell and points A and B represent open circuit voltage and current, respectively.

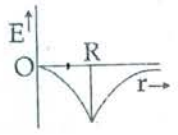
(2) It is for a photodiode and points A and B represent open circuit voltage and current respectively.

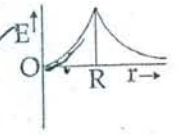
(3) It is for a LED and points A and B represent open circuit voltage and short circuit current respectively.

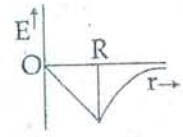
(4) It is V - I characteristic for solar cell where point A represents open circuit voltage and point B short circuit current.

52. Dependence of intensity of gravitational field (E) of earth with distance (r) from centre of earth is correctly represented by :

(1) 

(2) 

(3) 

(4) 

153. The number of possible natural oscillations of air column in a pipe closed at one end of length 85 cm whose frequencies lie below 1250 Hz are : (velocity of sound = 340 ms^{-1})
(1) 5
(2) 7
(3) 6
(4) 4

154. Two cities are 150 km apart. Electric power is sent from one city to another city through copper wires. The fall of potential per km is 8 volt and the average resistance per km is 0.5 Ω. The power loss in the wire is :
(1) 19.2 kW
(2) 19.2 J
(3) 12.2 kW
(4) 19.2 W

155. A beam of light of λ = 600 nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between first dark fringes on either side of the central bright fringe is :
(1) 1.2 mm
(2) 2.4 cm
(3) 2.4 mm
(4) 1.2 cm

156. If force (F), velocity (V) and time (T) are taken as fundamental units, then the dimensions of mass are :
(1) [F V T^{-2}]
(2) [F V^{-1} T^{-1}]
(3) [F V^{-1} T]
(4) [F V T^{-1}]

157. The barrier potential of a p-n junction depends on :
(a) type of semi conductor material
(b) amount of doping
(c) temperature
Which one of the following is correct ?
(1) (b) only
(2) (b) and (c) only
(3) (a), (b) and (c)
(4) (a) and (b) only

158. The Binding energy per nucleon of $^{7}_{3}Li$ and $^{4}_{2}He$ nuclei are 5.60 MeV and 7.06 MeV, respectively. In the nuclear reaction $^{7}_{3}Li + {}^{1}_{1}H \rightarrow {}^{4}_{2}He + {}^{4}_{2}He + Q$, the value of energy Q released is :
(1) −2.4 MeV
(2) 8.4 MeV
(3) 17.3 MeV
(4) 19.6 MeV

159. If the kinetic energy of the particle is increased to 16 times its previous value, the percentage change in the de-Broglie wavelength of the particle is :
(1) 75
(2) 60
(3) 50
(4) 25

160. Light with an energy flux of 25×10^{4} Wm^{-2} falls on a perfectly reflecting surface at normal incidence. If the surface area is 15 cm^2, the average force exerted on the surface is :
(1) 2.50×10^{-6} N
(2) 1.20×10^{-6} N
(3) 3.0×10^{-6} N
(4) 1.25×10^{-6} N

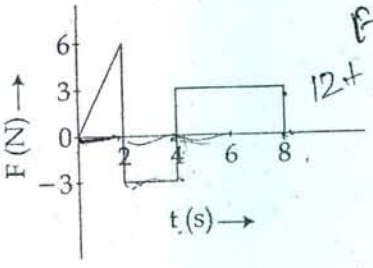
161. In a region, the potential is represented by $V(x, y, z) = 6x - 8xy - 8y + 6yz$, where V is in volts and x, y, z are in meters. The electric force experienced by a charge of 2 coulomb situated at point (1, 1, 1) is :
(1) 30 N
(2) 24 N
(3) $4\sqrt{35}$ N
(4) $6\sqrt{5}$ N

162. A speeding motorcyclist sees traffic jam ahead of him. He slows down to 36 km/hour. He finds that traffic has eased and a car moving ahead of him at 18 km/hour is honking at a frequency of 1392 Hz. If the speed of sound is 343 m/s, the frequency of the honk as heard by him will be :
(1) 1372 Hz
(2) 1412 Hz
(3) 1454 Hz
(4) 1332 Hz

163. The ratio of the acclerations for a solid sphere (mass 'm' and radius 'R') rolling down an incline of angle 'θ' without slipping and slipping down the incline without rolling is :

(1) 2 : 3
(2) 2 : 5
(3) 7 : 5
(4) 5 : 7

164. The force 'F' acting on a particle of mass 'm' is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 8 s is :



(1) 20 Ns
(2) 12 Ns
(3) 6 Ns
(4) 24 Ns

165. In the Young's double-slit experiment, the intensity of light at a point on the screen where the path difference is λ is K, (λ being the wave length of light used). The intensity at a point where the path difference is λ/4, will be :

(1) K/4
(2) K/2
(3) Zero
(4) K

166. A balloon with mass 'm' is descending *down* with an acceleration 'a' (where a < g). How much mass should be removed from it so that it starts moving *up* with an acceleration 'a' ?

(1) $\frac{2ma}{g-a}$
(2) $\frac{ma}{g+a}$
(3) $\frac{ma}{g-a}$
(4) $\frac{2ma}{g+a}$

167. A potentiometer circuit has been set up for finding the internal resistance of a given cell. The main battery, used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance. The potentiometer wire itself is 4 m long. When the resistance, R, connected across the given cell, has values of.

(i) infinity
(ii) 9.5 Ω,

the 'balancing lengths', on the potentiometer wire are found to be 3 m and 2.85 m, respectively.

The value of internal resistance of the cell is :

(1) 0.95 Ω
(2) 0.5 Ω
(3) 0.75 Ω
(4) 0.25 Ω

168. A monoatomic gas at a pressure P, having a volume V expands isothermally to a volume 2V and then adiabatically to a volume 16V. The final pressure of the gas is : (take $\gamma = 5/3$)

(1) 32P
(2) P/64
(3) 16P
(4) 64P

169. A certain number of spherical drops of a liquid of radius 'r' coalesce to form a single drop of radius 'R' and volume 'V'. If 'T' is the surface tension of the liquid, then :

(1) energy $= 3VT\left(\frac{1}{r}+\frac{1}{R}\right)$ is absorbed.
(2) energy $= 3VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is released.
(3) energy is neither released nor absorbed.
(4) energy $= 4VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is released.

170. A body of mass (4m) is lying in *x*-*y* plane at rest. It suddenly explodes into three pieces. Two pieces, each of mass (m) move perpendicular to each other with equal speeds (*v*). The total kinetic energy generated due to explosion is :

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

171. Hydrogen atom in ground state is excited by a monochromatic radiation of $\lambda = 975$ Å. Number of spectral lines in the resulting spectrum emitted will be :

(1) 2
(2) 6
(3) 10
(4) 3

172. A black hole is an object whose gravitational field is so strong that even light cannot escape from it. To what approximate radius would earth (mass = 5.98×10^{24} kg) have to be compressed to be a black hole ?

(1) 10^{-6} m
(2) 10^{-2} m
(3) 100 m
(4) 10^{-9} m

173. A projectile is fired from the surface of the earth with a velocity of 5 ms^{-1} and angle θ with the horizontal. Another projectile fired from another planet with a velocity of 3 ms^{-1} at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet is (in ms^{-2}) is : (given g = 9.8 ms^{-2})

(1) 5.9
(2) 16.3
(3) 110.8
(4) 3.5

174. Certain quantity of water cools from 70°C to 60°C in the first 5 minutes and to 54°C in the next 5 minutes. The temperature of the surroundings is :

(1) 20°C
(2) 42°C
(3) 10°C
(4) 45°C

175. A solid cylinder of mass 50 kg and radius 0.5 m is free to rotate about the horizontal axis. A massless string is wound round the cylinder with one end attached to it and other hanging freely. Tension in the string required to produce an angular acceleration of 2 revolutions s^{-2} is :

(1) 50 N
(2) 78.5 N
(3) 157 N
(4) 25 N

176. Steam at 100°C is passed into 20 g of water at 10°C. When water acquires a temperature of 80°C, the mass of water present will be :

[Take specific heat of water = 1 cal $g^{-1}\,°C^{-1}$ and latent heat of steam = 540 cal g^{-1}]

(1) 31.5 g
(2) 42.5 g
(3) 22.5 g
(4) 24 g

177. A radio isotope 'X' with a half life 1.4×10^9 years decays to 'Y' which is stable. A sample of the rock from a cave was found to contain 'X' and 'Y' in the ratio 1 : 7. The age of the rock is :

(1) 3.92×10^9 years
(2) 4.20×10^9 years
(3) 8.40×10^9 years
(4) 1.96×10^9 years

178. A transformer having efficiency of 90% is working on 200 V and 3 kW power supply. If the current in the secondary coil is 6 A, the voltage across the secondary coil and the current in the primary coil respectively are :

(1) 450 V, 15 A
(2) 450 V, 13.5 A
(3) 600 V, 15 A
(4) 300 V, 15 A

179. When the energy of the incident radiation is increased by 20%, the kinetic energy of the photoelectrons emitted from a metal surface increased from 0.5 eV to 0.8 eV. The work function of the metal is :

(1) 1.0 eV
(2) 1.3 eV
(3) 1.5 eV
(4) 0.65 eV

180. The mean free path of molecules of a gas, (radius 'r') is inversely proportional to :

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