1. Following compounds are given:

(a) CH_3CH_2OH

(b) CH_3COCH_3

(c) $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}}HOH$

(d) CH_3OH

Which of the above compound(s), on being warmed with iodine solution and NaOH, will give iodoform?

Options:

(1) (a), (b) and (c)

(2) (a) and (b)

(3) (a), (c) and (d)

(4) only (b)

Ans. (1)

2. Match List-I (substances) with List-II (processes) employed in the manufacture of the substances and select the correct option

List-I Substances		**List-II Processes**
(a)	Sulphuric acid	(i) Haber's Process
(b)	Steel	(ii) Bessemers' Process
(c)	Sodium hydroxide	(iii) Leblanc Process
(d)	Ammonia	(iv) Contact Process

Options:

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

Ans. (2)

3. Fructose reduces Tollen's reagent due to:

(1) secondary alcoholic group

(2) enolisation of fructose followed by conversion to aldehyde by base.

(3) asymmetric carbons

(4) primary alcoholic group

Ans. (2)

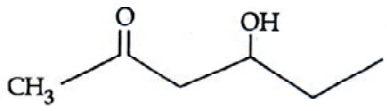
4. Which of the following oxidation states is the most common among the lanthanoids?

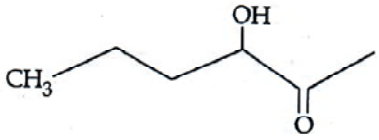
(1) 5 (2) 3

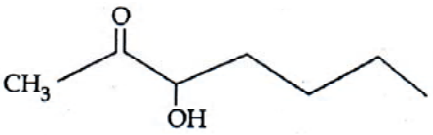
(3) 4 (4) 2

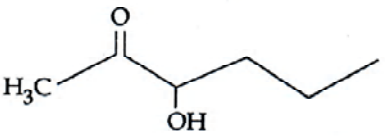
Ans. (2)

5. Which one of the following compounds will be most readily dehydrated?

(1) 

(2) 

(3) 

(4) 

Ans. (1)

6. Among the following four compounds

(a) phenol

(b) methyl phenol

(c) metanitrophenol

(d) paranitrophenol

the acidity order is:

(1) a > d > c > b (2) b > a > c > d

(3) d > c > a > b (4) c > d > a > b

Ans. (3)

7. A 0.66 kg ball is moving with a speed of 100 m/s. The associated wavelength will be

($h = 6.6 \times 10^{-34}$ Js) :

(1) 1.0×10^{-35} m

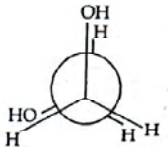
(2) 1.0×10^{-32} m

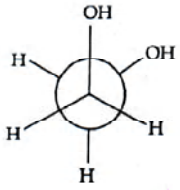
(3) 6.6×10^{-32} m

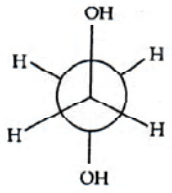
(4) 6.6×10^{-34} m

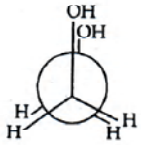
Ans. (1)

8. Which of the following conformers for ethylene glycol is most stable?

(1) 

(2) 

(3) 

(4) 

Ans. (2)

9. When glycerol is treated with excess of HI, it produces:

(1) propene (2) glycerol triiodide

(3) 2-iodopropane (4) allyl iodide

Ans. (3)

10. Some statements about heavy water are given below:

(a) Heavy water is used as moderator in nuclear reactors.

(b) Heavy water is more associated than ordinary water.

(c) Heavy water is more effective solvent than ordinary water.

Which of the above statements are correct?

(1) (b) and (c)

(2) (a) and (c)

(3) (a) and (b)

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

Ans. (2)

11. Some of the properties of the two species, NO_3^- and H_3O^+ are described below.

Which one of them is correct ?

(1) Isostructural with different hybridization for the central atom

(2) Similar in hybridization for the central atom with different structures

(3) Dissimilar in hybridization for the central atom with different structures.

(4) Isostructural with same hybridization for the central atom

Ans. (3)

12. The reaction

$$2A(g) + B(g) \rightleftharpoons 3C(g) + D(g)$$

is begun with the concentrations of A and B both at an initial value of 1.00 M. When equilibrium is reached, the concentration of D is measured and found to be 0.25 M. The value for equilibrium constant for this reaction is given by the expression.

(1) $[(0.75)^3\ (0.25)] \div [(0.50)^2 (0.25)]$

(2) $[(0.75)^3\ (0.25)] \div [(0.75)^2 (0.25)]$

(3) $[(0.75)^3\ (0.25)] \div [(1.00)^2 (1.00)]$

(4) $[(0.75)^3\ (0.25)] \div [(0.50)^2 (0.75)]$

Ans. (4)

13. For vaporization of water at 1 atmospheric pressure, the values of ΔH and ΔS are 40.63 kJ mol^{-1} and 108.8 Jk^{-1} mol^{-1}, respectively. The temperature when Gibbs energy change (ΔG) for this transformation will be zero, is

(1) 373.4 K (2) 293.4 K

(3) 273.4 K (4) 393.4 K

Ans. (1)

14. The following two reactions are known:

$$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g);$$

$\Delta H = -26.8$ kJ

$$FeO(s) + CO(g) \rightarrow Fe(s) + CO_2(g)$$

$\Delta H = -16.5$ kJ

The value of ΔH for the following reaction $Fe_2O_3(s) + CO_2(g) \rightarrow 2FeO(s) + CO_2(g)$ is

(1) –10.3 kJ (2) +6.2 kJ

(3) +10.3 kJ (4) –43.3 kJ

Ans. (2)

15. Among the following which one has the highest cation to anion size ratio?

(1) LiF (2) NaF

(3) CsI (4) CsF

Ans. (4)

16. Three moles of an ideal gas expanded spontaneously into vacuum. The work done will be:

(1) 9 Joules (2) Zero

(3) Infinite (4) 3 Joules

Ans. (2)

17. Which one of the following complexes is not expected to exhibit isomerism?

(1) $[Ni(NH_3)_2Cl_2]$

(2) $[Ni(en)3]^{2+}$

(3) $[Ni(NH_3)_4(H_2O)_2]^{2+}$

(4) $[Pt(NH_3)_2Cl_2]$

Ans. (2)

18. The rate of the reaction

$2NO + Cl_2 \rightarrow 2NOCl$ is given by the rate equation

$rate = k[NO]^2[Cl_2]$

The value of the rate constant can be increased by:

(1) increasing the concentration of the Cl_2

(2) increasing the temperature

(3) increasing the concentration of NO.

(4) doing all of these.

Ans. (2)

19. How many bridging oxygen atoms are present in P_4O_{10}?

(1) 2 (2) 5

(3) 6 (4) 4

Ans. (1)

20. Match List-I (Equations) with List-II (Type of process) and select the correct option.

List-I **Equations**		**List-II** **Type of processes**
(a)	$K_p > Q$	(i) Non spontaneous
(b)	$\Delta G° < RT\ln Q$	(ii) Equilibrium
(c)	$K_p = Q$	(iii) Spontaneous and endothermic
(d)	$T > \frac{\Delta H}{\Delta S}$	(iv) Spontaneous

Options:

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

Ans. (1)

21. Match the compounds given in List-I with their characteristic reactions given in List-II. Select the correct option.

List-I

Compounds

(a) $CH_3CH_2CH_2CH_2NH_2$

(b) $CH_3C \equiv CH$

(c) $CH_3CH_2COOCH_3$

(d) $CH_3CH(OH)CH_3$

List-II

Reactions

(i) alkaline hydrolysis

(ii) with KOH (alcohol) and $CHCl_3$ produces bad smell

(iii) Gives white ppt. with ammonical $AgNO_3$

(iv) with Lucas reagent cloudiness appears after 5 minutes

Options:

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

Ans. (1)

22. Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is:

(1) P < Cl < Ca < Mg

(2) Ca < Mg < P < Cl

(3) Mg < Ca < Cl < P

(4) Cl < P < Mg < Ca

Ans. (4)

23. Which of the following species is not electrophilic in nature?

(1) $\overset{\oplus}{H_3O}$ (2) $\overset{\oplus}{N}O_2$

(3) $\overset{\oplus}{Cl}$ (4) BH_3

Ans. (1)

24. The compound A on heating gives a colourless gas and a residue that is dissolved in water to obtain B. Excess of CO_2 is bubbled through aqueous solution of B, C is formed which is recovered in the solid form. Solid C on gentle heating gives back A. The compound is:

(1) K_2CO_3 (2) $CaSO_4.2H_2O$

(3) $CaCO_3$ (4) Na_2CO_3

Ans. (3)

25. In the following reaction

$$C_6H_5CH_2Br \xrightarrow[2.H_3O^+]{1.Mg,Ether} X,$$

the product `X' is:

(1) $C_6H_5CH_3$

(2) $C_6H_5CH_2CH_2C_6H_5$

(3) $C_6H_5CH_2OCH_2C_6H_5$

(4) $C_6H_5CH_2OH$

Ans. (1)

26. In which of the following molecules the central atom does not have sp^3 hybridization?

(1) BF_4^- (2) NH_4^+

(3) CH_4 (4) SF_4

Ans. (4)

27. The IUPAC name of the compound $CH_3CH{=}CHC{\equiv}CH$ is

(1) Pent - 2 - en -4 - yne

(2) Pent - 1 - yn - 3 - ene

(3) Pent - 4 - yn - 2 - ene

(4) Pent - 3 - en - 1 - yne

Ans. (4)

28. The pressure exerted by 6.0 g of methane gas in a 0.03 m^3 vessel at 129° C is (Atomic masses : C = 12.01, H = 1.01 and R = 8.314 JK^{-1} mol^{-1})

(1) 41648 Pa (2) 31684 Pa

(3) 215216 Pa (4) 13409 Pa

Ans. (1)

29. Consider the following relations for emf of a electrochemical cell:

(a) emf of cell = (Oxidation potential of anode) – (Reduction Potential of cathode)

(b) emf of cell = (Oxidation potential of anode) + (Reduction potential of cathode)

(c) emf of cell = (Reduction potential of anode) + (Reduction potential of cathode)

(d) emf of cell = (Oxidation potential of anode) – (Oxidation potential of cathode)

Which of the above relations are correct?

Options:

(1) (c) and (d) (2) (b) and (d)

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

Ans. (2)

30. Which of the following expressions correctly represents the equivalent conductance at infinite dilution of $Al_2(SO_4)_3$. Given that $\wedge^\circ_{Al^{3+}}$ and $\wedge^\circ_{SO_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions?

(1) $(\wedge^\circ_{Al^{3+}} + \wedge^\circ_{SO_4^{2-}}) \times 6$

(2) $\frac{1}{3}\wedge^\circ Al^{3+} + \frac{1}{2}\wedge^\circ SO_4^{2-}$

(3) $2\wedge^\circ_{Al^{3+}} + 3\wedge^\circ_{SO_4^{2-}}$

(4) $\wedge^\circ_{Al^{3+}} + \wedge^\circ_{SO_4^{2-}}$

Ans. (1)

31. Consider the following four statements A, B, C and D and select the right option for two **correct** statements.

Statements :

(A) In vexillary aestivation, the large posterior petal is called - *standard,* two lateral ones are *wings* and-two small anterior petals are termed *keel.*

(B) The floral formula for Liliaceae is

$$\oplus \, \overset{\uparrow}{\underset{+}{\bigcirc}} P_{3+3}A_{3+3}G_{\underline{3}}$$

(C) In pea flower the stamens are monoadelphous
(D) The floral formula for Solanaceae is

$\oplus$ ⚥ $K_{(3)}C_{(3)}A_{(4)}G_{(\underline{2})}$

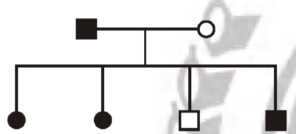
The correct statements are :
(1) (B)and(C) (2) (C)and(D)
(3) (A)and(C) (4) (A) and (B)

Ans. (4)

32. ABO blood grouping is controlled by gene I which has three alleles and show co-dominance. There are six genotypes. How many phenotypes in all are possible?
(1) Four (2) Five
(3) Six (4) Three

Ans. (1)

33. Study the pedigree chart of a certain family given below and select the correct conclusion which can be drawn for the character.



(1) The trait under study could not be colour-blindness
(2) The male parent is homozygous dominant
(3) The female parent is heterozygous
(4) The parents could not have had a normal daughter for this character

Ans. (3)

34. Three of the following statements about enzymes are correct and one is wrong.?
Which one is wrong ?
(1) Enzymes are highly specific
(2) Most enzymes are proteins but some are lipids
(3) Enzymes require optimum pH for maximal activity
(4) Enzymes are denatured at high temperatures but in certain exceptional organisms they are effective even at temperatures 80° - 90°C.

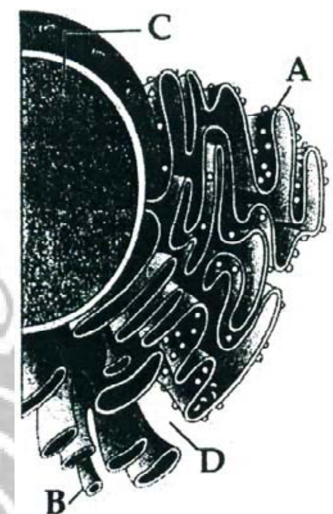
Ans. (2)

35. Select the correct combination of the statements (a-d) regarding the *characteristics* of certain organisms :
(a) Methanogens are Archaebacteria produce methane in marshy areas
(b) *Nostoc* is a filamentous blue-green alga which fixes atmospheric nitrogen
(c) Chemosynthetic autotrophic bacteria synthesize cellulose from glucose
(d) Mycoplasma lack a cell wall and can survive without oxygen

The correct statements are :
(1) (b), (c), (d) (2) (a), (b), (d)
(3) (b), (c) (4) (a),(b),(c)

Ans. (2)

36. Identify the components labelled A, B, C and D in the diagram below from the list (i) to (viii) given along with.



Components :
(i) Cristae of mitochondria
(ii) Inner membrane of mitochondria
(iii) Cytoplasm
(iv) Smooth endoplasmic reticulum
(v) Rough endoplasmic reticulum
(vi) Mitochondrial matrix
(vii) Cell vacuole
(viii) Nucleus

The correct components are :

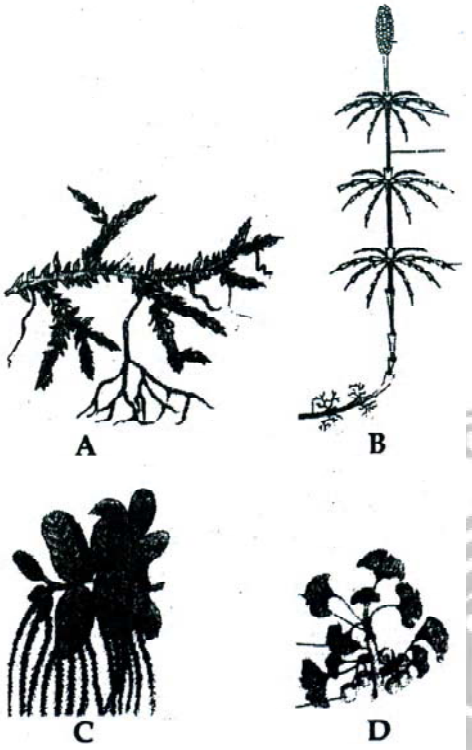
	A	B	C	D
(1)	(vi)	(v)	(iv)	(vii)
(2)	(v)	(i)	(iii)	(ii)
(3)	(v)	(iv)	(viii)	(iii)
(4)	(i)	(iv)	(viii)	(vi)

Ans. (3)

37. Signals from fully developed foetus and placenta ultimately lead to parturition which requires the release of :
(1) Oxytocin from foetal pituitary
(2) Relaxin from placenta
(3) Estrogen from placenta
(4) Oxytocin from maternal pituitary

Ans. (4)

38. Examine the figures A, B, C and D. In which one of the four options all the items, A, B, C and D are correct ?



Options :

	A	B	C	D
1	Selaginella	Equisetum	Salvinia	Ginkgo
2	Funaria	Adiantum	Salvinia	Riccia
3	Chara	Marchantia	Fucus	Pinus
4	Equisetum	Ginkgo	Selaginella	Lycopodium

Ans. **(1)**

39. Which one of the following is the *correct description* of a certain part of a normal human skeleton ?

(1) The 9^{th} and 10^{th} pairs of ribs are called the floating ribs

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

(3) Parietal bone and the temporal bone of the skull are joined by fibrous joint

(4) First vertebra is axis which articulates with the occipital condyles

Ans. **(3)**

40. Root development is promoted by :

(1) Gibberellin (2) Ethylene

(3) Abscisic acid (4) Auxin

Ans. **(4)**

41. Which of the following are used in gene cloning ?

(1) Mesosomes (2) Plasmids

(3) Nucleoids (4) Lomasomes

Ans. **(2)**

42. In genetic engineering, a DNA segment (gene) of interest, is transferred to the host cell through a vector. Consider the following four agents (A-D) in this regard and select the correct option about which one or more of these can be used as a vector/ vectors :

(A) a bacterium (B) Plasmid

(C) plasmodium (d) Bacteriphage

Options :

(1) (A) and (C) only

(2) (B) and (D) only

(3) (A), (B) and (D) only

(4) (A) only

Ans. **(2)**

43. Vegetative propagation in *Pistia* occurs by:

(1) Runner (2) Sucker

(3) Stolon (4) Offset

Ans. **(4)**

44. Secretions from which one of the following are rich in fructose, calcium and some enzymes ?

(1) Pancreas (2) Salivary glands

(3) Male accessory glands

(4) Liver

Ans. **(3)**

45. When domestic sewage mixes with river water :

(1) The increased microbial activity uses up dissolved oxygen

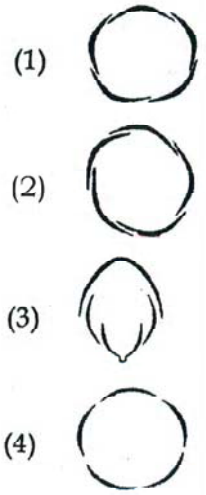
(2) The river water is still suitable for drinking as impurities are only about 0.1%

(3) Small animals like rats will die after drinking river water

(4) The increased microbial activity releases micro-nutrients such as iron

Ans. **(1)**

46. Aestivation of petals in the flower of cotton is correctly shown in :



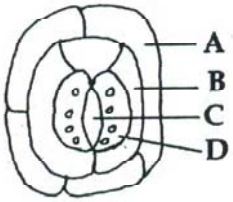
Ans. **(2)**

47. The fruit fly *Drosophila melanogaster* was found to be very suitable for experimental verification of chromosomal theory of inheritance by Morgan and his colleagues because:

(1) smaller female is easily recognisable from larger male
(2) it completes life cycle in about two weeks
(3) it reproduces parthenogenetically
(4) a single mating produces two young flies

Ans. (2)

48. Given below is the diagram of a stomatal apparatus. In which of the following all the four parts labelled as A, B, C and D are correctly identified ?



	A	B	C	D
1	Epidermal cell	Guard cell	Stomatal aperture	Subsidiary cell
2	Epidermal cell	Subsidiary cell	Stomatal aperture	Guard cell
3	Subsidiary cell	Epidermal cell	Guard cell	Stomatal aperture
4	Guard cell	Stomatal aperture	Subsidiary cell	Epidermal cell

Ans. (2)

49. Read *the* following four statements, A, B, C and D and select the right option having both correct statements.

STATEMENTS :

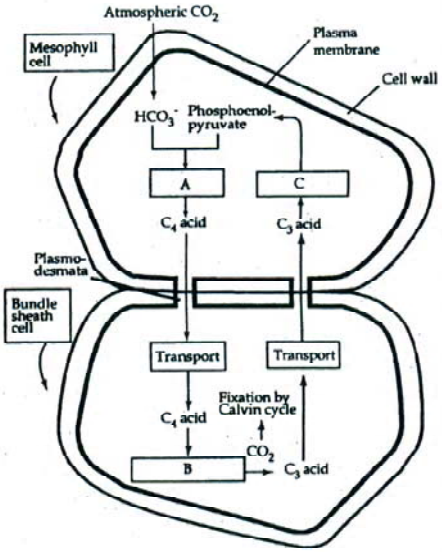
(A) Z scheme of light reaction takes place in presence of PS I only.
(B) Only PS I is functional in cyclic photophosphorylation.
(C) Cyclic photophosphorylation results into synthesis of ATP and $NADPH_2$
(D) Stroma lamellae lack PS II as well as NADP.

Options :

(1) B and C (2) C and D
(3) B and D (4) A and B

Ans. (3)

50. Study the pathway given below.



In which of the following options correct words for all the three blanks A, B and C are indicated ?

	A	B	C
1	Fixation	Decarboxylation	Regeneration
2	Carboxylation	Decarboxylation	Reduction
3	Decarboxylation	Reduction	Regeneration
4	Fixation	Transamination	Regeneration

Ans. (1)

51. In *Antirrhinum* two plants with pink flowers were hybridized. The F1 plants produced red, pink and white flowers in the proportion of 1 red, 2 pink and 1 white. What could be the genotype of the two plants used for hybridization? Red flower colour is determined by RR and white by rr genes.

(1) Rr (2) rr
(3) rrrr (4) RR

Ans. (1)

52. Select the answer with *correct matching* of the structure, its location and function.

	Structure	Location	Function
1	Hypothalamus	Fore brain	Controls body temperature, urge for eating and drinking
2	Blind spot	Near the place where optic nerve leaves the eye	Rods and cones are present but inactive here
3	Eustachian tube	Anterior part of internal ear	Equalizes air pressure on either sides of tympanic membrane
4	Cerebellum	Mid brain	Controls respiration and gastric secretions

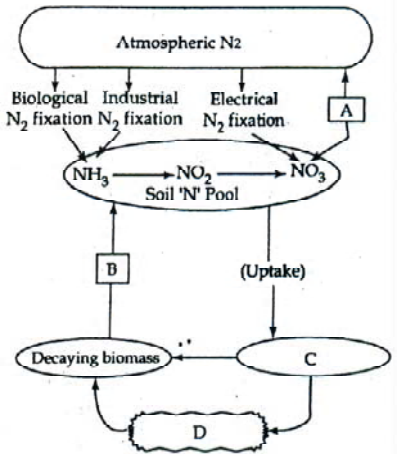
Ans. **(1)**

53. Which one of the following is a xerophytic plant in which the stem is modified into a flat, green and succulent structure ?

(1) *Hydrilla* (2) *Acacia*
(3) *Opuntia* (4) *Casuarina*

Ans. **(3)**

54. Study the cycle shown below and select the option which gives correct words for all the four blanks A, B, C and D.



Options :

	A	B	C	D
1	Nitrification	Denitrification	Animals	Plants
2	Denitrification	Nitrification	Plants	Animals
3	Nitrification	Ammonif ication	Animals	Plants
4	Denitrification	Ammonification	Plants	Animals

Ans. **(4)**

55. Which one of the following techniques is safest for the detection of cancers ?

(1) Computed tomography (CT) studies
(2) Histopathological studies
(3) Magnetic resonance imaging (MRI)
(4) Radiography (X-ray)

Ans. **(2)**

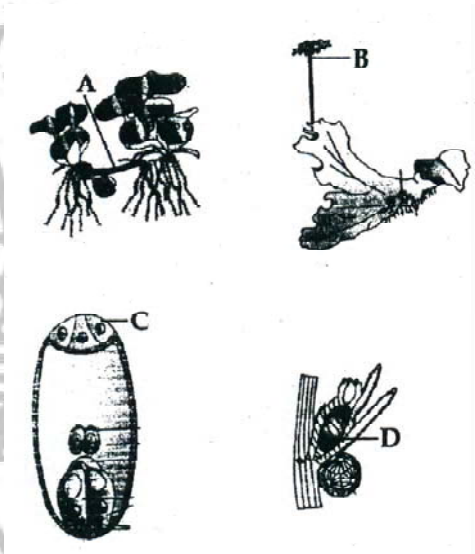
56. Black (stem) rust of wheat is caused by

(1) *Puccinia graminis*
(2) *Xanthomonas oryzae*
(3) *Alternaria solani*
(4) *Ustilago nuda*

Ans. **(1)**

57. Examine the figures (A-D) given below and select the right option out of 1-4, in which all the four structures A, B, C and D are identified correctly.

Structures :



Options :

	A	B	C	D
1	Offset	Antheridiophore	Antipodals	Oogonium
2	Sucker	Seta	Megaspore mother cell	Gemma cup
3	Rhizome	Sporangiophore	Polar cell	Globule
4	Runner	Archegoniophore	Synergid	Antheridium

Ans. **(1)**

58. Which one of the following is *most appropriately* defined ?

(1) *Predator* is an organism that catches and kills other organism for food.
(2) *Parasite* is an organism which always lives inside the body of other organism and may kill it.
(3) Host is an organism which provides food to another organism.

(4) *Amensalism is* a relationship in which one species is benefited where as the other is unaffected.

Ans. (1)

59. Which one of the following is now being commercially produced by biotechnological procedures?

(1) Quinine (2) Insulin
(3) Nicotine (4) Morphine

Ans. (2)

60. Given below are four statements (a-d) regarding human blood circulatory system:

(a) Arteries are thick-walled and have narrow lumen as compared to veins
(b) Angina is acute chest pain when the blood circulation to the brain is reduced
(c) Persons with blood group AB can donate blood to any person with any blood group under ABO system
(d) Calcium ions play a very important role in blood clotting

Which two of the above statements are correct ?

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

Ans. (3)

61. If for some reason the parietal cells of the gut epithelium become partially non-functional, what is likely to happen ?

(1) Steapsin will be more effective
(2) Proteins will not be adequately *hydrolysed by* pepsin into proteoses and peptones
(3) The pancreatic enzymes and specially the trypsin and lipase will not work efficiently
(4) The pH of stomach will fall abruptly

Ans. (2)

62. An elaborate network of filamentous proteinaceous structures present in the cytoplasm which helps in the maintenance of cell shape is called :

(1) Plasmalemma
(2) Cytoskeleton
(3) Thylakoid
(4) Endosplasmic Reticulum

Ans. (2)

63. Jaundice is a disorder of :

(1) Digestive system (2) Circulatory system
(3) Excretory system (4) Skin and eyes

Ans. (1)

64. The correct floral formula of soyabean is

(1) % ♀♂ $K_{(5)}C_{1+2+(2)}A_{(9)+1}G_{\underline{1}}$

(2) % ♀♂ $K_{(5)}C_{1+2+(2)}A_{1+(9)}G_{\underline{1}}$

(3) % ♀♂ $K_{(5)}C_{1+(2)+(2)}A_{(9)+1}G_{\overline{1}}$

(4) % ♀♂ $K_{5}C_{1+(2)+2}A_{(9)+1}G_{\underline{1}}$

Ans. (1)

65. An example of endomycorrhiza is

(1) *Agaricus* (2) *Rhizobium*
(3) *Nostoc* (4) *Glomus*

Ans. (4)

66. One of the commonly used plant growth hormone in tea plantations is :

(1) Zeatin
(2) Indole -3 - acetic acid
(3) Ethylene
(4) Abscisic acid

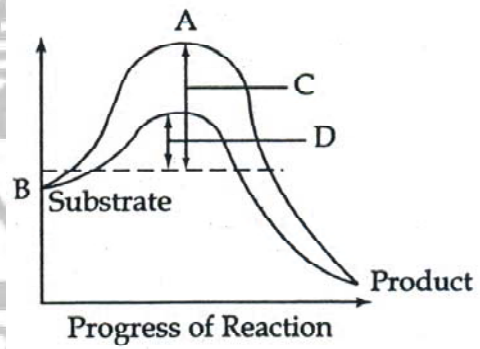
Ans. (2)

67. Transport of food material in higher plants takes place through :

(1) Tracheids (2) Sieve elements
(3) Companion cells (4) Transfusion tissue

Ans. (2)

68. The figure given below shows the conversion of a substrate into product by an enzyme. In which one of the four options (1-4) the components of reaction labelled as A, B, C and D are identified correctly ?



Options :

	A	B	C	D
1	Potential energy	Transition state	Activation energy with enzyme	Activation energy without enzyme
2	Activation energy with enzyme	Transition state	Activation energy without enzyme	Potential energy
3	Potential energy	Transition state	Activation energy with enzyme	Activation energy without enzyme
4	Transition–state	Potential energy	Activation energy without enzyme	Activation energy with enzymez

Ans. (4)

69. Given below are four statements (A-D) each with one or two blanks. Select the option which correctly fills up the blanks in two statements :

Statements :

(A) Wings of butterfly and birds look alike and are the results of __(i)__ , evolution

(B) Miller showed that CH_4, H_2, NH_3 and __(i)__, when exposed to electric discharge in a flask resulted in formation of ___(ii)__ .

(C) Vermiform appendix is a __(i)__ organ and an ___(ii)__ evidence of evolution

(D) According to Darwin evolution took place due to __(i)__ and __(ii)__ of the fittest.

Options :

(1) (B) - (i) water vapour (ii) amino acids,
(C) - (i) rudimentary (ii) anatomical

(2) (C) - (i) vestigial, (ii) anatomical,
(D) - (i) mutations (ii) multiplication

(3) (D) - (i) small variations, (ii) survival,
(A) - (i) convergent

(4) (A) - (i) convergent,
(B) - (i) oxygen, (ii) nucleosides

Ans. (3)

70. Fastest distribution of some injectible material/ medicine and with no risk of any kind can be achieved by injecting it into the :

(1) veins (2) lymph vessels
(3) muscles (4) arteries

Ans. (1)

71. In human female the *blastocyst :*

(1) gets nutrition from uterine endometrial secretion only after implantation

(2) gets implanted in endometrium by the trophoblast cells

(3) forms placenta even before implantation

(4) gets implanted into uterus 3 days after ovulation

Ans. (2)

72. Which one of the following pairs of structures is correctly matched with their correct description ?

	Structures		Description
1	Shoulder joint and elbow joint	—	Ball and socket type of joint
2	Premolars and molars	—	20 in all and 3 roote
3	Potential Tibia and fibula	—	Both form parts of knee joint
4	Cartilage andcornea	—	No blood supply but do require oxygen for respiratory need

Ans. (4)

73. The Indian Rhinoceros is a natural inhabitant of which one of the Indian states ?

(1) Himachal Pradesh (2) Assam
(3) Uttarakhand (4) Uttar Pradesh

Ans. (2)

74. Crocodile and Penguin are *similar* to Whale and Dogfish in which one of the following features?

(1) Possess bony skeleton.

(2) Have gill slits at some stage.

(3) Possess a solid single stranded central nervous system.

(4) Lay eggs and guard them till they hatch.

Ans. (2)

75. Kranz anatomy is one of the characteristics of the leaves of :

(1) Sugarcane (2) Mustard
(3) Potato (4) Wheat

Ans. (1)

76. A cross in which an organism showing a dominant phenotype in crossed with the recessive parent in order to know its genotype is called :

(1) Test cross (2) Dihybrid cross
(3) Monohybrid cross (4) Back cross

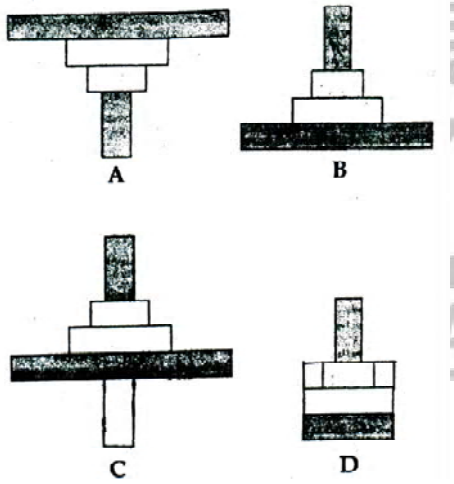
Ans. (1)

77. The haemoglobin content per 100 ml of blood of a normal healthy human adult is:
(1) 17 - 20 g (2) 12 - 16 g
(3) 5-ll g (4) 25 - 30 g
Ans. (2)

78. Leguminous plants are able to fix atmospheric nitrogen through the process of symbiotic nitrogen fixation. Which one of the following statements is not correct djuring this process of nitrogen fixation ?
(1) The enzyme nitrogenase catalyses the conversion of atmospheric N_2 to NH_3
(2) Nitrogenase is insensitive to oxygen
(3) Leghaemoglobin scavenges oxygen and is pinkish in colour
(4) Nodules act as sites for nitrogen fixation
Ans. (2)

79. The most apparent change during the evolutionary history of *Homo sapiens* is traced in :
(1) Shortening of the jaws
(2) Remarkable increase in the brain size
(3) Loss of body hair
(4) Walking upright
Ans. (2)

80. Which of the following representations shows the pyramid of numbers in a forest ecosystem ?



(1) B (2) C
(3) D (4) A
Ans. (2)

81. A person suffering from a disease caused by *Plasmodium,* experiences recurring chill and fever at the time when ?
(l) the parasite after its rapid rnultication inside RBCs ruptures them, releasing the stage to enter fresh RBCs.
(2) the microgametocytes and megagametocytes are being destroyed by the WBCs.
(3) the sporozoites released from RBCs are being rapidly killed and broken down inside spleen.
(4) the trophozoites reach maximum growth and give out certain toxins
Ans. (1)

82. Which one of the following is manoecious?
(1) Pinus (2) *Date palm*
(3) *Marchantia* (4) *Cycas*
Ans. (1)

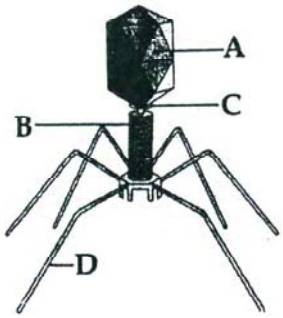
83. Select the *correct* matching of a hormone, its source and function.

	Hormone	Source	Function
1	Glucagon	Beta-cells of Islets of langerhans	Stimulates glycogenolysis
2	Prolactin	Posterior pituitary	Regulates growth of mammary glands and milk formation in females
3	Vasopressin	Posterior pituitary	Increases loss of water through urine
4	Norepinephrine	Adrenal medulla	Increases heart beat, rate of respiration and alertness

Ans. (4)

84. Which one of the following statements about the particular entity is **true ?**
(1) *Nucleosome* is formed of nucleotides
(2) DNA consists of a core of eight histones
(3) *Centromere* is found in animal cells, which produces aster during cell division
(4) The *gene for producing insulin* is present in every body cell
Ans. (4)

85. Given below is the diagram of bacteriophage. In which one of the option all the four parts A, B, C and D are correct ?



Options :

	A	B	C	D
1	Head	Sheath	Collar	Tail fibres
2	Collar	Tail fibres	Head	Sheath
3	Tail fibres	Head	Sheath	Collar
4	Sheath	Collar	Head	Tail fibres

Ans. (1)

86. In eukaryotic cell transcription, RNA splicing and RNA capping take place inside the :

(1) Dictyosomes (2) ER

(3) Ribosomes (4) Nucleus

Ans. **(4)**

87. The 3'-5' phosphodiester linkages inside a polynucleotide chain serve to join :

(1) One nucleotide with another nucleotide

(2) One nitrogenous base with pentose sugar.

(3) One DNA strand with the other DNA strand

(4) One nucleoside with another nucleoside

Ans. **(4)**

88. The lac operon consists of :

(1) Two regulatory genes and two structural genes

(2) Three regulatory genes and three structural genes

(3) Four regulatory genes only

(4) One regulatory gene and three structural genes

Ans. **(4)**

89. In which one of the following organisms its excretory organs are correctly stated ?

(1) Cockroach — Malpighian tubules and enteric caeca

(2) Frog — Kidneys, skin and buccal epithelium

(3) Humans — Kidneys, sebaceous glands and tear glands

(4) Earthworm — Pharyngeal, integumentary and septal nephridia

Ans. **(4)**

90. Which one of the following can not be used for preparation of vaccines against plague ?

(1) Synthetic capsular polysaccharide material

(2) Heat-killed suspensions of virulent bacteria

(3) Formalin-inactivated suspensions of virulent bacteria

(4) Avirulent live bacteria

Ans. **(4)**

91. The Magnetic moment of a diamagnetic atom is:

(1) between zero and one

(2) equal to zero

(3) much greater than one

(4) 1

Ans. (2)

92. If c_p and c_v denote the specific heats (per unit mass) of an ideal gas of molecular weight M.

(1) $c_p - c_v = R/M$ (2) $c_p - c_v = MR$

(3) $C_p - c_v = R/M$ (4) $c_p - c_v = R$

where R is the molar gas constant

Ans. (1)

93. The thermo e.m.f. E in volts of a certain thermo-couple is found to vary with temperature difference θ in °C between the two junctions according to the relation

$$E = 30\theta - \frac{\theta^2}{15}$$

The neutral temperature for the thermo-couple will be:

(1) 225°C (2) 30°C

(3) 450°C (4) 400°C

Ans. (1)

94. (a) Centre of gravity (C.G.) of a body is the point at which the weight of the body acts.

(b) Centre of mass coincides with the centre of gravity if the earth is assumed to have infinitely large radius.

(c) To evaluate the gravitational field intensity due to any body at an external point, the entire mass of the body can be considered to be concentrated at its C.G.

(d) The radius of gyration of any body rotating about an axis is the length of the perpendicular dropped from the C.G. of the body to the axis.

Which one of the following pairs of statements is correct?

(1) (b) and (c) (2) (c) and (d)

(3) (d) and (a) (4) (a) and (b)

Ans. (4)

95. From a circular disc of radius R and mass 9M, a small disc of mass M and radius R/3 is removed concentrically. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through its centre is:

(1) $4\,MR^2$ (2) $\frac{4}{9}MR^2$

(3) $\frac{40}{9}MR^2$ (4) MR^2

Ans. (3)

96. The electric field of an electromagnetic wave in free space is given by:

$\vec{E} = 10\cos(10^7 t + kx)\hat{j}V/m$,

where t and x are in seconds and metres respectively. It can be inferred that:

(a) The wavelength λ is 188.4 m

(b) The wave number k is 0.33 rad/m

(c) The wave amplitude is 10V/m

(d) The wave is propagating along + x direction

Which one of the following pairs of statements is correct?

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

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

Ans. (2)

97. The speed of light in media M_1 and M_2 is 1.5×10^8 m/s and 2.0×10^8 m/s respectively. A ray of light enters from medium M_1 to M_2 at an incidence angle *i*. If the ray suffers total internal reflection, the value of *i* is:

(1) equal to or greater than $\sin^{-1}\left(\frac{3}{4}\right)$

(2) less than $\sin^{-1}\left(\frac{2}{3}\right)$

(3) equal to $\sin^{-1}\left(\frac{2}{3}\right)$

(4) equal to or less than $\sin^{-1}\left(\frac{3}{5}\right)$

Ans. (1)

98. The electric field at a distance $\frac{3R}{2}$ from the centre of a charged conducting spherical shell of radius R is E. The electric field at a distance $\frac{R}{2}$ from the centre of the sphere is:

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

(3) zero (4) E

Ans. (3)

99. A student measures the distance traversed in free fall of a body, initially at rest in a given time. He uses this data to estimate g, the acceleration due to gravity. If the maximum percentage errors in measurement of the distance and the time are e_1 and e_2 respectively, the percentage error in the estimation of g is:

(1) $e_1 + e_2$ (2) $e_1 - 2e_2$

(3) $e_2 - e_1$ (4) $e_1 + 2e_2$

Ans. (4)

100. A solid cylinder and a hollow cylinder, both of the same mass and same external diameter are released from the same height at the same time on an inclined plane. Both roll down without slipping. Which one will reach the bottom first?

(1) Hollow cylinder

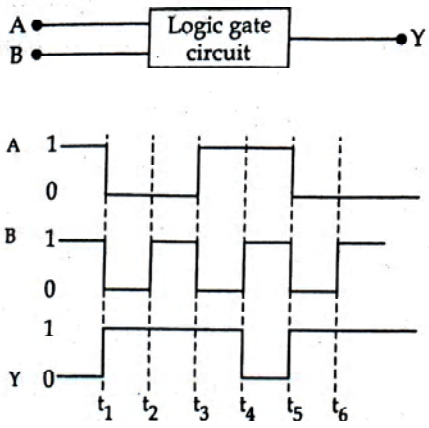
(2) Solid cylinder

(3) Both together only when angle of inclination of plane is 45°

(4) Both together

Ans. (2)

101. The following figure shows a logic gate circuit with two inputs A and B and the output Y. The voltage waveforms of A, B and Y are as given:



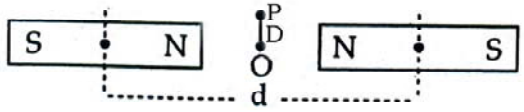
The logic gate is:

(1) AND gate (2) NAND gate

(3) NOR gate (4) OR gate

Ans. (2)

102. Two identical bar magnets are fixed with their centres at a distance d apart. A stationary charge Q is placed at P in between the gap of the two magnets at a distance D from the centre O as shown in the figure. The force on the charge Q is:



(1) directed along PO

(2) directed perpendicular to the plane of paper

(3) zero

(4) directed along OP

Ans. (3)

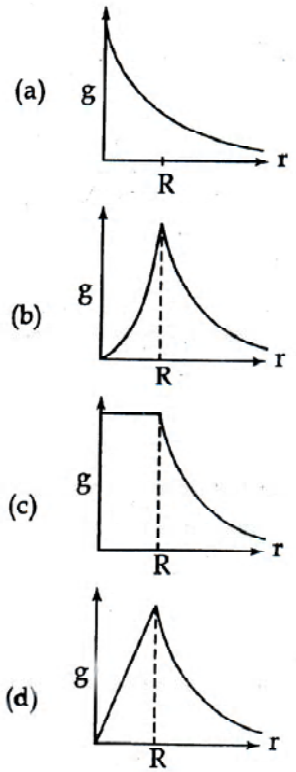
103. A thin circular ring of mass M and radius r is rotating about its axis with constant angular velocity ω. Two objects each of mass m are attached gently to the opposite ends of a diameter of the ring. The ring now rotates with angular velocity given by:

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

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

Ans. (2)

104. The dependence of acceleration due to gravity `g' on the distance `r' from the centre of the earth, assumed to be a sphere of radius R of uniform density is as shown in figures below:



The correct figure is:

(1) (b) (2) (c)

(3) (d) (4) (a)

Ans. (3)

105. A current loop consists of two identical semicircular parts each of radius R, one lying in the x-y plane and the other in x-z plane. If the current in the loop is *i*. The resultant magnetic field due to the two semicircular parts at their common centre is:

(1) $\frac{\mu_0 i}{4R}$ (2) $\frac{\mu_0 i}{\sqrt{2}R}$

(3) $\frac{\mu_0 i}{2\sqrt{2}R}$ (4) $\frac{\mu_0 i}{2R}$

Ans. (3)

106. When monochromatic radiation of intensity I falls on a metal surface, the number of photoelectron and their maximum kinetic energy are N and T respectively. If the intensity of radiation is 2I, the number of emitted electrons and their maximum kinetic energy are respectively:

(1) 2N and 2T (2) N and T

(3) N and 2T (4) 2N and T

Ans. (4)

107. A particle moves in x–y plane according to rule $x = a \sin \omega t$ and $y = \cos \omega t$. The particle follows:

(1) a parabolic path:

(2) a straight line path inclined equally to x and y-axis.

(3) an elliptical path

(4) a circular path

Ans. (4)

108. Two parallel metal plates having charges +Q and –Q face each other at a certain distance between them. If the plates are now dipped in kerosene oil tank, the electric field between the plates will

(1) decrease (2) remain same

(3) become zero (4) increase

Ans. (1)

109. A particle of mass M starting from rest undergoes uniform acceleration. If the speed acquired in time T is V, the power delivered to the particle is:

(1) $\frac{MV^2}{T^2}$ (2) $\frac{1}{2}\frac{MV^2}{T^2}$

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

Ans. (2)

110. A ray of light is incident on a 60° prism at the minimum deviation position. The angle of refraction at the first face (i.e., incident face) of the prism is:

(1) 45° (2) 60°

(3) zero (4) 30°

Ans. (4)

111. A particle having a mass of 10^{-2} kg carries a charge of 5×10^{-8}C. The particle is given an initial horizontal velocity of 10^5 ms^{-1} in the presence of electric field $\vec{E}$ and magnetic field $\vec{B}$. To keep the particle moving in a horizontal direction, it is necessary that:

(a) $\vec{B}$ should be perpendicular to the direction

of velocity and $\vec{E}$ should be along the direction velocity.

(b) Both $\vec{B}$ and $\vec{E}$ should be along the direction of velocity.

(c) Both $\vec{B}$ and $\vec{E}$ are mutually perpendicular and perpendicular to the direction of velocity.

(d) $\vec{B}$ should be along the direction of velocity and $\vec{E}$ should be perpendicular to the direction of velocity.

Which one of the following pairs of statements is possible?

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

Ans. (1)

(**NOTE :** *If gravity is not ignored then answer will be (c) & (d)*)

112. A monatomic gas at pressure P_1 and volume V_1 is compressed adiabatically to 1/8th its original volume. What is the final pressure of the gas?

(1) $16\ P_1$ (2) $32\ P_1$
(3) $64\ P_1$ (4) P_1

Ans. (2)

113. A closely wound solenoid of 2000 turns and area of cross-section $1.5 \times 10^{-4}\ m^2$ carries a current of 2.0 A. It is suspended through its centre and perpendicular to its length, allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} Tesla making an angle of 30° with the axis of the solenoid. The torque on the solenoid will be:

(1) 1.5×10^{-2} N.m (2) 3×10^{-2} N.m
(3) 3×10^{-3} N.m (4) 1.5×10^{-3} N.m

Ans. (1)

114. For transistor action:

(a) Base, emitter and collector regions should have similar size and doping concentrations .

(b) The base region must be very thin and lightly doped.

(c) The emitter-base junction is forward biased and base-collector junction are forward biased

(d) Both the emitter-base junction as well as the base collector junction are forward biased.

Which one of the following pairs of statements is correct?

(1) (b), (c) (2) (c), (d)
(3) (d), (a) (4) (a), (b)

Ans. (1)

115. The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is:

(1) 30° (2) 45°
(3) 60° (4) 15°

Ans. (3)

116. A condenser of capacity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor when the potential difference across the condenser reduces to V_2 is:

(1) $\frac{C(V_1^2 + V_2^2)}{L}$ (2) $\left(\frac{C(V_1^2 - V_2^2)}{L}\right)^{1/2}$

(3) $\left(\frac{C(V_1 - V_2)}{L}\right)^{1/2}$ (4) $\frac{C(V_1^2 - V_2^2)}{L}$

Ans. (2)

117. The electron in the hydrogen atom jumps from excited state (n = 3) to its ground state (n = 1) and the photons thus emitted irradiate a photosensitive material. If the work function of the material is 5.1 eV, the stopping potential is estimated to be (the energy of the electron in n^{th} state $E_n = -\frac{13.6}{n^2}$ eV) :

(1) 17.2 V (2) 7 V
(3) 5.1 V (4) 12.1 V

Ans. (2)

118. The binding energy per nucleon in deuterium and helium nuclei are 1.1 MeV and 7.0 MeV, respectively. When two deuterium nuclei fuse to form a helium nucleus the energy released in the fusion is:

(1) 28.0 MeV (2) 30.2 MeV
(3) 23.6 MeV (4) 2.2 MeV

Ans. (3)

119. The additional kinetic energy to be provided to a satellite of mass m revolving around a planet of mass M, to transfer it from a circular orbit of radius R_1 to another of radius R_2 ($R_2 > R_1$) is:

(1) $2\ GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

(2) $\frac{1}{2} GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

(3) $GmM\left(\frac{1}{R_1^2}-\frac{1}{R_2^2}\right)$

(4) $GmM\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

Ans. (2)

120. The decay constant of a radio isotope is λ. If A_1 and A_2 are its activities at times t_1 and t_2 respectively, the number of nuclei which have decayed during the time $(t_1 - t_2)$:

(1) $(A_1 - A_2)/\lambda$ (2) $\lambda(A_1 - A_2)$

(3) $A_1t_1 - A_2t_2$ (4) $A_1 - A_2$

Ans. (1)