AIPMT 2010 Paper

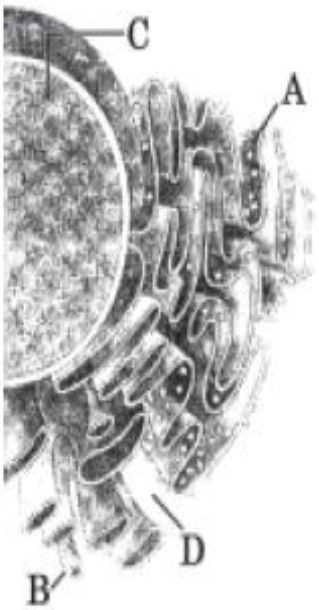
1. Which one of the following pairs of structures is correctly matched with their correct description?

	Structures		Description
(1)	Tibia and fibula	–	Both form parts of knee joint
(2)	Cartilage and cornea	–	No blood supply but do require oxygen for respiratory need
(3)	Shoulder joint and elbow joint	–	Ball and socket type of joint
(4)	Premolars and molars	–	20 in all and 3- rooted

Ans. (2)

Sol. Cartilage is avascular, as the blood vessels innervate only perichondrium. In the formation of knee joint, tibia is involved with femur.

2. 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)	(v)	(iv)	(viii)	(iii)
(2)	(i)	(iv)	(viii)	(vi)
(3)	(vi)	(v)	(iv)	(vii)
(4)	(v)	(i)	(iii)	(ii)

Ans. (1)

Sol. Golgi and ER are often found associated to nuclear membrane.

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

(1) Muscles (2) Arteries

(3) Veins (4) Lymph vessels

Ans. (3)

Sol. Intravenous injection is given for rapid distribution of drugs/substance. Intramuscular injection is given for producing local effect.

4. Which one of the following statements about the particular entity is true?

(1) *Centromere* is found in animal cells, which produces aster during cell division

(2) The *gene for producing insulin* is present in every body cell

(3) *Nucleosome* is formed of nucleotides

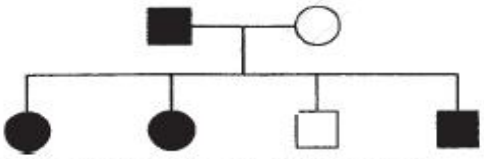
(4) *DNA* consists of a core of eight histones

Ans. (2)

Sol. 'Centromere' is found in chromosomes where two chromatids are attached.

'Insulin' gene is found in every body cell but is not expressed in all cells.

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



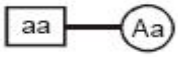
(1) The female parent is heterozygous

(2) The parents could not have had a normal daughter for this character

(3) The trait under study could not be colour-blindness

(4) The male parent is homozygous dominant

Ans. (1)

Sol. 

6. Leguminous plants are able to fix atmospheric nitrogen through the process of symbiotic nitrogen fixation. Which one of the following statements is **not** correct during this process of nitrogen fixation?

(1) Leghae moglobin scavenges oxygen and is pinkish in colour

(2) Nodules act as sites for nitrogen fixation

(3) The enzyme nitrogenase catalyses the conversion of atmospheric N_2 to NH_3

(4) Nitrogenase is insensitive to oxygen

Ans. (4)

Sol. Nitrogenase is sensitive against O_2.

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

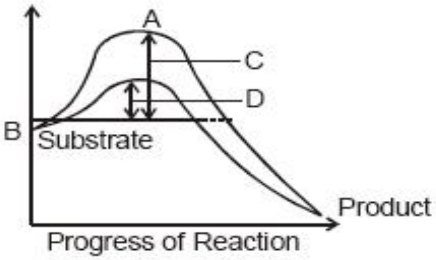
(1) *Opuntia* (2) *Casuarina*

(3) *Hydrilla* (4) *Acacia*

Ans. (1)

Sol. *Opuntia* – Phylloclade

8. 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)	Transition state	Potential energy	Activation energy *without* enzyme	Activation energy *with* enzyme
(3)	Potential energy	Transition state	Activation energy *with* enzyme	Activation energy *without* enzyme
(4)	Activation energy *with* enzyme	Transition state	Activation energy *without* enzyme	Potential energy

Ans. (2)

Sol. Activation energy is required for overcoming the energy barrier which gets reduced in the presence of enzyme.

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

(1) Nucleoids (2) Lomasomes

(3) Mesosomes (4) Plasmids

Ans. (4)

Sol. Plasmids are used as the vector in gene cloning.

10. When domestic sewage mixes with river water

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

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

(3) The increased microbial activity uses up dissolved oxygen

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

Ans. (3)

Sol. Any mixing of sewage will increase BOD and decrease of DO due to decomposing activity of microbes.

11. 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) (D) – (i) Small variations, (ii) Survival,
(A) – (i) Convergent

(2) (A) – (i) Convergent,
(B) – (i) Oxygen, (ii) nucleosides

(2) (B) – (i) Water vapour, (ii) Amino acids
(C) – (i) Rudimentary, (ii) Anatomical

(4) (C) – (i) Vestigial, (ii) Anatomical
(D) – (i) Mutations, (ii) Multiplication

Ans. (1)

Sol. According to Darwin, evolution took place due to small variations & survival of the fittest. Wings of butterfly & birds are analogous or convergent. Vermiform appendix is vestigial organ.

12. Aestivation of petals in the flower of cotton is correctly shown in1

(1) 

(2) 

(3) 

(4) 

Ans. (4)

Sol. Lady's finger, cotton and china rose, all shows twisted aestivation.

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

(1) Humans – Kidneys, sebaceous glands and tear glands

(2) Earthworm – Pharyngeal, integumentary and septal nephridia

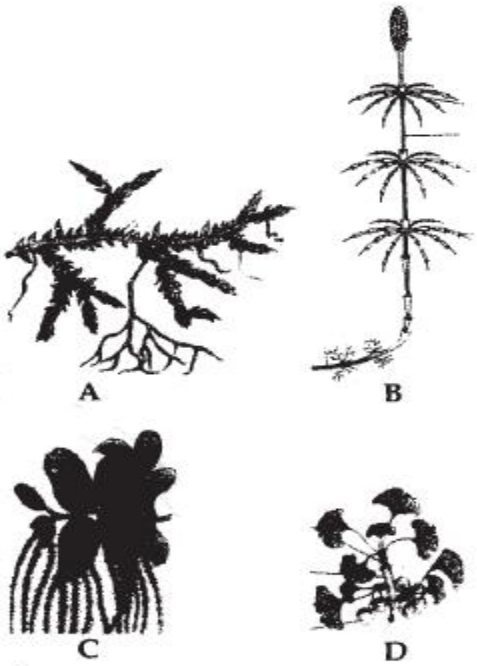
(3) Cockroach – Malpighian tubules and enteric caeca

(4) Frog – Kidneys, skin and buccal epithelium

Ans. (2)

Sol. Earthworm has 3 types of nephridia.

14. 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)	*Chara*	*Marchantia*	*Fucus*	*Pinus*
(2)	*Equisetum*	*Ginkgo*	*Selaginella*	*Lycopodium*
(3)	*Selaginella*	*Equisetum*	*Salvinia*	*Ginkgo*
(4)	*Funaria*	*Adiantum*	*Salvinia*	*Riccia*

Ans. (3)

Sol. A – *Selaginella*, B – *Equisetum*, C – *Salvinia*, D – *Ginkgo*

15. The most apparent change during the evolutionary history of *Homo sapiens* is traced in

(1) Loss of body hair

(2) Walking upright

(3) Shortening of the jaws

(4) Remarkable increase in the brain size

Ans. (4)

Sol. Brain size or cranial capacity shows gradual increases in history of *Homo sapiens*.

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

(1) Nicotine (2) Morphine

(3) Quinine (4) Insulin

Ans. (4)

Sol. Insulin is produced by synthesizing the polypeptide A and polypeptide B separately and then linking them.

17. The correct floral formula of soybean is

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

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

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

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

Ans. (3)

Sol. % ⚥ $K_{(5)}\ C_{1+2+(2)}\ A_{(9)+1}\ G_{\underline{1}}$ (w.r.t. NCERT)

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

(1) The pancreatic enzymes and specially the trypsin and lipase will not work efficiently

(2) The pH of stomach will fall abruptly

(3) Steapsin will be more effective

(4) Proteins will not be adequately hydrolysed by pepsin into proteoses and peptones

Ans. (4)

Sol. Parietal or oxyntic cells release HCl required for the activation of pepsin.

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

(1) Host is an organism which provides food to another organism

(2) *Amensalism* is a relationship in which one species is benefited whereas the other is unaffected

(3) *Predator* is an organism that catches and kills other organism for food

(4) *Parasite* is an organism which always lives inside the body of other organism and may kill it

Ans. (3)

Sol. Term 'Host' is specific to parasitic relation only.

20. 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 PSI 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 D (2) A and B

(3) B and C (4) C and D

Ans. (1)

Sol. It requires both PS-II and PS-I, where PS-II is more important. Stroma lamella contains PS-I only.

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

(1) Magnetic resonance imaging (MRI)

(2) Radiography (X-ray)

(3) Computed tomography (CT)

(4) Histopathological studies

Ans. (1)

Sol. Histopathological study is the invasive technique. Radiography and CT involves X-rays which are harmful.

22. Signals from fully developed foetus and placenta ultimately lead to parturition which requires the release of

(1) Estrogen from placenta

(2) Oxytocin from maternal pituitary

(3) Oxytocin from foetal pituitary

(4) Relaxin from placenta

Ans. (2)

Sol. Oxytocin or Pitocin released from maternal pituitary causes contractions in the uterine muscles to help in parturition.

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

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

Ans. (2)

Sol. Vasopressin decreases loss of water through urine. Glucagon is released from α-cells. Prolactin is released from anterior pituitary.

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

(1) Ribosomes (2) Nucleus

(3) Dictyosomes (4) ER

Ans. (2)

Sol. Mature mRNA comes out in cytoplasm only after completion of splicing, capping and tailing.

25. 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) (a) & (d) (2) (a) & (b)

(3) (b) & (c) (4) (c) & (d)

Ans. (1)

Sol. Angina is due to reduced blood supply to heart wall. Person with blood group AB is universal recepient.

26. In human female the *blastocyst*

(1) Forms placenta even before implantation

(2) Gets implanted into uterus 3 days after ovulation

(3) Gets nutrition from uterine endometrial secretion only after implantation

(4) Gets implanted in endometrium by the trophoblast cells

Ans. (4)

Sol. Blastocyst starts getting nutrition before implantation.

27. The haemoglobin content per 100 ml of blood of a normal healthy human adult is

(1) 5 - 11 g (2) 25 - 30 g

(3) 17 - 20 g (4) 12 - 16 g

Ans. (4)

28. An example of endomycorrhiza is

(1) *Nostoc* (2) *Glomus*

(3) *Agaricus* (4) *Rhizobium*

Ans. (2)

Sol. *Nostoc* -BGA, *Agaricus*- Basidiomycetes, *Rhizobium* - Eubacteria

29. One of the commonly used plant growth hormone is tea plantations is

(1) Ethylene

(2) Abscisic acid

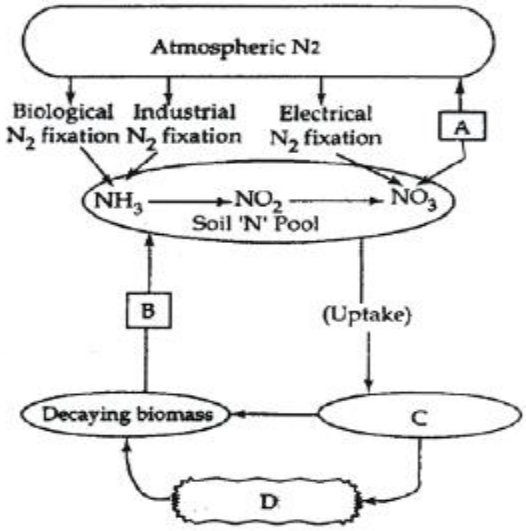
(3) Zeatin

(4) Indole - 3 - acetic acid

Ans. (4)

Sol. Auxins are commonly used in stem cutting.

30. 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	Ammonification	Animals	Plants
(2)	Denitrification	Ammonification	Plants	Animals
(3)	Nitrification	Denitrification	Animals	Plants
(4)	Denitrification	Nitrification	Plants	Animals

Ans. (2)

Sol. A – Denitrification, B – Ammonification, C – Plants, D-Animals

31. Jaundice is a disorder of

(1) Excretory system

(2) Skin and eyes

(3) Digestive system

(4) Circulatoy system

Ans. (3)

Sol. Jaundice can be due to blockage/inflammation of bile duct.

32. Kranz anatomy is one of the characteristics of the leaves of

(1) Potato (2) Wheat

(3) Sugarcane (4) Mustard

Ans. (3)

Sol. Sugarcane – C_4 plant

41. A person suffering from a disease caused by *Plasmodium*, experiences recurring chill and fever at the time when?

(1) The sporozoites released from RBCs are being rapidly killed and broken down inside spleen

(2) The trophozoites reach maximum growth and give out certain toxins

(3) The parasite after its rapid multiplication inside RBCs ruptures them, releasing the stage to enter fresh RBCs

(4) The microgametocytes and megagametocytes are being destroyed by the WBCs

Ans. (3)

Sol. In malaria chill and fever is due to the release of haemozoin, a toxic substance formed by breakdown of haemoglobin present in RBC. It will be released after the rupture of RBC, in erythrocytic schizogamy.

42. 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) Six (2) Three

(3) Four (4) Five

Ans. (3)

Sol. A, B, AB and O.

43. Three of the following statements about enzymes are correct and one is wrong. Which one is wrong?

(1) Enzymes require optimum pH for maximal activity

(2) Enzymes are denatured at high temperature but in certain exceptional organisms they are effective even at temperatures 80°-90°C

(3) Enzymes are highly specific

(4) Most enzymes are proteins but some are lipids

Ans. (4)

Sol. Most enzymes are proteins but some are RNA enzymes.

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

(1) Thylakoid

(2) Endoplasmic Reticulum

(3) Plasmalemma

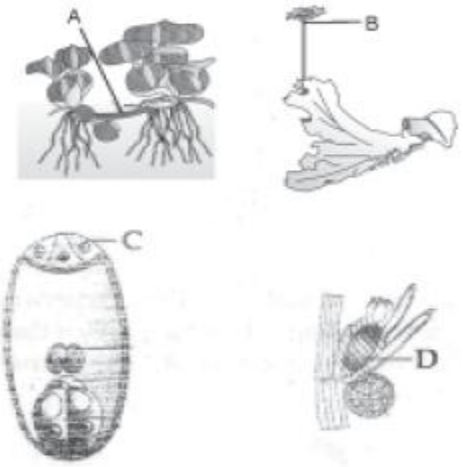
(4) Cytoskeleton

Ans. (4)

Sol. Cytoskelcton-Microtubule, Microfilament and Intermediate filaments.

45. 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)	Rhizome	Sporangiophore	Polar cell	Globule
(2)	Runner	Archegoniophore	Synergid	Antheridium
(3)	Offset	Antheridiophore	Antipodals	Oogonium
(4)	Sucker	Seta	Megaspore mother cell	Gemma cup

Ans. (3)

Sol. A – Offset of Eichhornia

B – Antheridiophore of *Marchantia*

C – Antipodals

D – Oogonium (Nucule) of *Chara*

46. Root development is promoted by

(1) Abscisic acid

(2) Auxin

(3) Gibberellin

(4) Ethylene

Ans. (4)

Sol. Root development and root hair formation C_2H_4.

47. 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

$\oplus \overset{\circ}{\underset{\circ}{\circ}} P_{3+3} A_{3+3} + G_{3}$

(C) In pea flower the stamens are monadelphous

(D) The floral formula for Solanaceae is

$\oplus \overset{\circ}{\underset{\circ}{\circ}} K_{(5)} C_{(5)} A_{(4)} + G_{(2)}$

The correct statements are

(1) (A) and (C)

(2) (A) and (B)

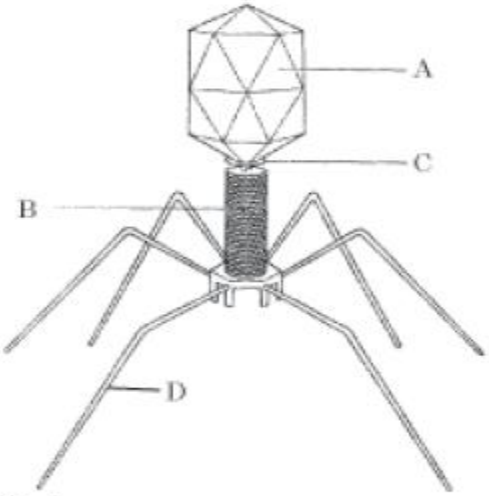
(3) (B) and (C)

(4) (C) and (D)

s. (2)

. Pea-Diadelphous.

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



Options :

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

s. (3)

. A - Head

B - Sheath

C - Collar

D - Tail fibre

49. 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

Statements

(A) A bacterium (B) Plasmid

(C) Plasmodium (D) Bacteriophage

Options :

(1) (A), (B) and (D) only (2) (A) only

(3) (A) and (C) only (4) (B) and (D) only

Ans. (4)

Sol. Plasmids and bacteriophages are used as vectors in genetic engineering.

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

(1) Formalin-inactivated suspensions of virulent bacteria

(2) Avirulent live bacteria

(3) Synthetic capsular polysaccharide material

(4) Heat-killed suspensions of virulent bacteria

Ans. (3)

Sol. Synthetic capsular polysaccharide vaccines are available for treatment of pneumonia caused by

Streptococcus pneumoniae

Hemophilus influenza

and for meningtidis caused by *Neisseria meningitids.*

They are not available for plague.

51. 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) It reproduces parthenogenetically

(2) A single mating produces two young flies

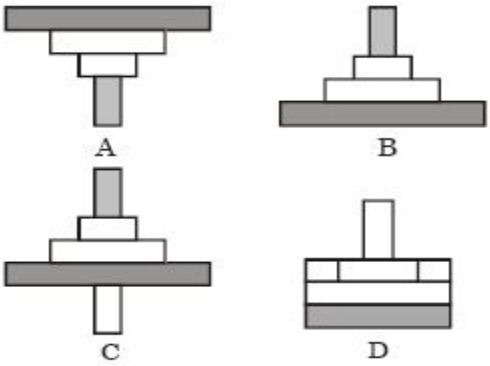
(3) Smaller female is easily recognisable from larger male

(4) It completes life cycle in about two weeks

Ans. (4)

Sol. Female is larger. Many offsprings are produced from single mating.

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



(1) D (2) A

(3) B (4) C

Ans. (3)

Sol. Pyramid of number is inverted in single tree ecosystem only.

60. The 3′-5′ phosphodiester linkages inside a polynucleotide chain serve to join

(1) One DNA strand with the other DNA strand

(2) One nucleoside with another nucleoside

(3) One nucleotide with another nucleotide

(4) One nitrogenous base with pentose sugar

Ans. (3)

Sol. 3′-5′ phosphodiester bond is formed between carbon 3 of one nucleotide and carbon 5 of the other nucleotide.

61. 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) $\frac{\mu_0 i}{2\sqrt{2}R}$ (2) $\frac{\mu_0 i}{2R}$

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

Ans. (1)

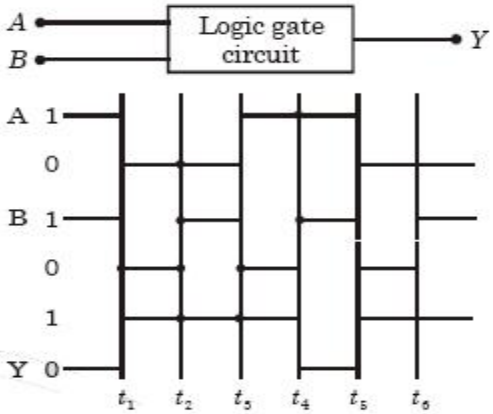
Sol. $\overline{B} = \overline{B_1} + \overline{B_2}$

$$|\overline{B_1}| = |\overline{B_2}| = \frac{\mu_0 i}{4R}$$

$$|\overline{B}| = \sqrt{B_1^2 + B_2^2}$$

$$|\overline{B}| = \frac{\mu_0 i}{4R}\sqrt{2} = \frac{\mu_0 i}{2\sqrt{2}R}$$

62. 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) NOR gate (2) OR gate

(3) AND gate (4) NAND gate

Ans. (4)

Sol.

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

63. 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) Become zero (2) Increase

(3) Decrease (4) Remain same

Ans. (3)

Sol. Electric field in vacuum

$$E_0 = \frac{\sigma}{\varepsilon_0}$$

In medium

$$E = \frac{\sigma}{\varepsilon_0 K}$$

$K > 1$

$E < E_0$

64. 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) Zero (2) E

(3) $\frac{E}{2}$ (4) $\frac{E}{3}$

Ans. (1)

Sol. Electric field inside shell is zero.

65. 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) $e_2 - e_1$ (2) $e_1 + 2e_2$

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

Ans. (2)

Sol. $\ln g = \ln h - 2 \ln t$

$$\left(\frac{\Delta g}{g} \times 100\right)_{max} = \frac{\Delta h}{h} \times 100 + 2\frac{\Delta t}{t} \times 100$$

$$= e_1 + 2e_2$$

66. 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) N and $2T$ (2) $2N$ and T

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

Ans. (2)

Sol. Number of photoelectrons $\propto$ Intensity

Maximum kinetic energy is independent of intensity

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

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

(d) The wave is propagating along $+x$ direction

Which one of the following pairs of statements is correct?

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

(3) (b) & (c) (4) (a) & (c)

Ans. (4)

Sol. Amplitude = 10 V/m

$$C = \frac{\omega}{k}$$

$$3 \times 10^8 = \frac{10^7}{k}$$

$$k = \frac{1}{30}$$

$$\frac{2\pi}{\lambda} = \frac{1}{30}$$

$\lambda = 188.4$ m

68. 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 $\sin^{-1}\left(\frac{2}{3}\right)$

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

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

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

Ans. (3)

Sol. $\mu_1 = 2$

$$\mu_2 = \frac{3}{2}$$

$$2\sin i > \frac{3}{2}\sin 90$$

$$\sin i > \frac{3}{4}$$

$$i > \sin^{-1}\left(\frac{3}{4}\right)$$