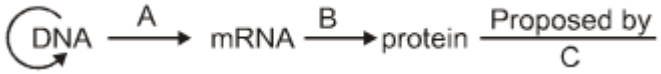
1.
The diagram shows an important concept in the genetic implication of DNA. Fill in the blanks A to C



1. A - translation B - transcription C - Erevin Chargaff

2. A -transcription B - translation C - Francis Crick

3. A - translation B - extension C - Rosalind Franklin

4. A - transcription B - replication C - James Watson

2.
Perisperm differs from endosperm in;

1. having no reserve food

2. being a diploid tissue

3. its formation by fusion of secondary nucleus with several sperms

4. being a haploid tissue

3.
Besides paddy fields, cyanobacteria are also found inside vegetative part of:

1. Cycas

2. Equisetum

3. Psilotum

4. Pinus

4.
Which of the following statements is correct in relation to the endocrine system?

1. Organs in the body like gastrointestinal tract, heart, kidney and liver do not produce any hormones.

2. Non - nutrient chemicals produced by the body in trace amount that act as intercellular messenger are known as hormones.

3. Releasing and inhibitory hormones are produced by the pituitary gland.

4. Adenohypophysis is under direct neural regulation of the hypothalamus.

5.
Megasporangium is equivalent to :

1. Fruit

2. Nucellus

3. Ovule

4. Embryo sac

6.
If two persons with' AB' blood group marry and have the sufficiently large number of children, these children could be classified as 'A' blood group: 'AB' blood group: 'B' blood group in 1: 2: 1 ratio. The modern technique of protein electrophoresis reveals the presence of both' A' and 'B' type proteins in 'AB' blood group individuals. This is an example of:

1. Incomplete dominance

2. Partial dominance

3. Complete dominance

4. Codominance

7.
A pregnant female delivers a baby who suffers from stunted growth, mental retardation/low intelligence quotient and abnormal skin. This is the result of :

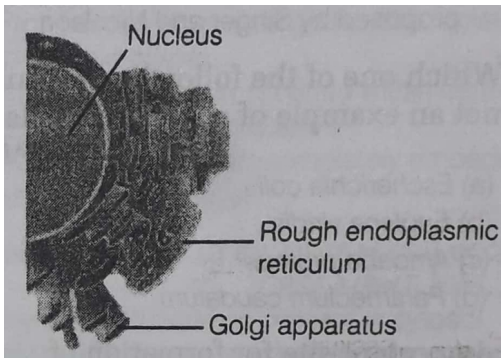
1. Low secretion of growth hormone

2. Cancer of the thyroid gland

3. Over secretion of pars distalis

4. Deficiency of iodine in diet

8.
Which one of the following organelle in the figure correctly matches with its function?



1. Golgi apparatus, protein synthesis

2. Golgi apparatus, formation of glycolipids

3. Rough endoplasmic reticulum, protein synthesis

4. Rough endoplasmic reticulum, formation of glycoproteins

9.
A phosphoglyceride is always made up of

1. only an unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.

2. a saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.

3. a saturated or unsaturated fatty acid esterified to a phosphate group which is also attached to a glycerol molecule.

4. only a saturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.

10.
During sewage treatment, biogases are produced which include:

1. methane, oxygen, hydrogen sulphide

2. hydrogen sulphide, methane, sulphur dioxide

3. hydrogen suIphide, nitrogen, methane

4. methane, hydrogen sulphide, carbon dioxide

11.
The eye of octopus and eye of cat show different patterns of structure, yet they perform similar function. This is an example of :

1. Homologous organs that have evolved due to divergent evolution.

2. Analogous organs that have evolved due to convergent evolution.

3. Analogous organs that have evolved due to divergent evolution.

4. Homologous organs that have evolved due to convergent evolution.

12.
Which of the following criteria does not pertain to facilitated transport?

1. High selectivity

2. Transport saturation

3. Uphill transport

4. Requirement of special membrane proteins

13.
The process by which organisms with different evolutionary history evolve similar phenotypic adaptations in response to a common environmental challenge, is called:

1. Convergent evolution

2. Non-random evolution

3. Adaptive radiation

4. Natural selection

14.
Infection of Ascaris usually occurs by :

1. Eating imperfectly cooked pork.

2. Tse - tse fly.

3. mosquito bite.

4. drinking water containing eggs of Ascaris.

15.
The Air Prevention and Control of Pollution Act came into force in:

1. 1981

2. 1985

3. 1990

4. 1975

16.
Which group of animals belong to the same phylum?

1. Earthworm, Pinworm, Tapeworm

2. Prawn, Scorpion, Locusta

3. Sponge, Sea anemone, Starfish

4. Malarial parasite, Amoeba, Mosquito

17.
Which of the following cannot be detected in a developing foetus by amniocentesis?

1. Sex of the foetus

2. Down syndrome

3. Jaundice

4. Klinefelter syndrome

18.
The Golgi complex plays a major role

1. in digesting proteins and carbohydrates

2. as energy transferring organelles

3. in post translational modification of proteins and glycosidation of lipids

4. in trapping the light and transforming it into chemical energy

19.

Select the correct match of the digested products in humans given in column-I with their' absorption site and mechanism in column-II

Column I	Column II
(1) Fructose, Na+	Small intestine, passive absorption
(2) Glycerol, fatty acids	Duodenum, move as chilomicrons
(3) Cholesterol, maltose	Large intestine, active absorption
(4) Glycine, glucose	Small intestine, active absorption

1. (1)

2. (2)

3. (3)

4. (4)

20.
Menstrual flow occurs due to lack of:

1. FSH

2. Oxytocin

3. Vasopressin

4. Progesterone

21.

The characteristics and an example of a synovial joint in humans is

	Characteristics	Examples
(1)	Fluid filled between two joints, provide cushion	Skull Bones
(2)	Lymph filled between two bones, limited motion	Gliding joint between carpals.
(3)	Fluid filled synovial cavity between two bones	Joint between atlas and axis.
(4)	Fluid cartilage between two bones, limited motion	Knee joint

1. (1)

2. (2)

3. (3)

4. (4)

22.
Isogamous condition with non-flagellated gametes is found in

1. Spirogyra

2. Volvox

3. Fucus

4. Chlamydomonas

23.
A stage in cell division is shown in the figure. Select the answer which gives correct identification of the stage with its characteristics.

(1)	Late anaphase	Chromosomes move away from equatorial plate, golgi complex not present
(2)	cytokinesis	cell plate formed, mitochondria distributed between two daughter cells
(3)	Telophase	endoplasmic reticulum and nucleolus not reformed yet
(4)	Telophase	Nuclear envelop reforms, golgi complex reforms

1. (1)
2. (2)
3. (3)
4. (4)

24.
Seed coat is not thin, membranous in:

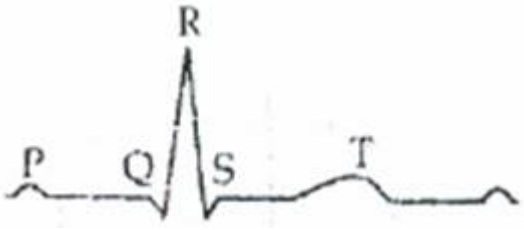
1. Coconut

2. Groundnut

3. Gram

4. Maize

25.
The diagram given here is the standard ECG of a normal person, The P - wave represents the



1. Initiation of the ventricular contraction

2. Beginning of the systole

3. End of systole

4. Contraction of both the atria

26.
Which Mendelian idea is depicted by a cross in which the F_1 generation resembles both the parents?

1. law of dominance

2. inheritance of one gene

3. co-dominance

4. incomplete dominance

27.
The tendency of population to remain in genetic equilibrium may be disturbed by:

1. lack of migration

2. lack of mutations

3. lack of random mating

4. random mating

28.
If both parents are carries for thalessemia, which is an autosomal recessive disorder,what are the chances of pregnancy resulting in an affected child ?

1. 50%

2. 25 %

3. 100%

4. no chance

29.
In plant breeding programmes, the entire collection (of plants/seeds) having all the diverse alleles for all genes in a given crop is called

1. cross-hybridisation among the selected parents.

2. evaluation and selection of parents.

3. germplasm collection

4. selection of superior recombinants.

30.

Kyoto-Protocol was endorsed at

(1) CoP-3

(2) CoP-5

(3) CoP-6

(4) CoP-4

31.
The cell-mediated immunity inside the human body is carried out by :

1. B-lymphocytes

2. Thrombocytes

3. Erythorcytes

4. T-lymphocytes

32.

Match the name of the animal (column I), with one characteristics (column II), and the phylum/class (column III) to which it belongs :

	Column I	Column II	Column III
(1)	Ichthyophis	terrestrial	Reptilia
(2)	Limulus	body covered by chitinous exoskeleton	Pisces
(3)	Adamsia	radially symmetrical	Porifera
(4)	Petromyzon	ectoparasite	Cyclostomata

1. (1)

2. (2)

3. (3)

4. (4)

33.
Pigment-containing membranous extensions in some cyanobacteria are:

1. Basal bodies

2. Pneumatophores

3. Chromatophores

4. Heterocysts

34.

Select the answer which correctly matches the endocrine gland with the hormone it secrets and its function/deficiency symptom:

	Endocrine	Hormone	Function/deficiency symptom
(1)	Posterior Pituitary	Growth Hormone (GH)	Oversec retion stimulates abnormal growth
(2)	Thyroid gland	Thyroxine	Lack of iodine in diet results in goitre
(3)	Corpus luteum	Testosterone	Stimulates spermatogenesis
(4)	Anterior pituatary	oxytocin	Stimulates uterus contraction during child birth

1. (1)
2. (2)
3. (3)
4. (4)

35.
The first stable product of fixation of atmospheric nitrogen in leguminous plants is:
1. Ammonia
2. BNitrite
3. Glutamate
4. NO_2^-

36.
Natural reservoir of phosphorus is:
1. Animal bones
2. Rock
3. Fossils
4. Sea water

37.
What external changes are visible after the last moult of a cockroach nymph ?
1. Anal cerci develop
2. Both fore wings and hind wings develop
3. Labium develops
4. Mandibles become harder

38.
What is the correct sequence of sperm formation ?
1. spermatogonia, spermatocyte, spermatozoa, spermatid
2. Spermatogonia, spermatozoa, spermatocyte, spermatid
3. Spermatogonia, spermatocyte, spermatid, spermatozoa
4. Spermatid, spermatocyte, spermatogonia, spermatozoa

39.

Select the wrong statement:

1. Anisogametes differ either in structure, function or behaviour

2. In Oomycetes female gamete is smaller and motile, while male gamete is larger and non-moltile

3. Chlamydomonas exhibits both isogamy and anisogamy and Focus shows oogamy

4. Isogametes are similar in structure, fuction and behaviour

40.

Monoecious plant of Chara shows the occurrence of :

1. Stamen and carpel of the same plant

2. upper antheridium and lower oogonium on the same plant

3. upper ooganium and lower antheridium on the same plant

4. antheridiophore and archegoniophore on the same plant

41.

The essential chemical components of many coenzymes are:

1. Nucleic acid

2. Carbohydrates

3. Vitamins

4. Proteins

42.

Which of the following statements is not true of two genes that show 50% recombination frequency?

1. The genes are tightly linked

2. The genes shows independent assortment.

3. If the genes are present on the same chromosome, they undergo more than one crossing over in every meiosis.

4. The genes may be on different chromosomes.

43.

Read the following statements (A-E) and answer the question which follows them.
(A) In liverworts, mosses, and ferns gametophytes are free-living
(B) Gymnosperms and some ferns are heterosperms
(C) Sexual reproduction in *Fucus*, Volvox and Albugo is oogamous
(D) The sporophyte in liverworts is more elaborate than that in mosses
(E) Both, Pinus and Marchantia are dioecious
How many of the above statements are correct?

1. Two
2. Three
3. Four
4. One

44.

The incorrect statement with regard to Haemophilia is :

1. It is a recessive disease
2. It is a dominant disease
3. A single protein involved in the clotting of blood is affected
4. it is a sex-linked disease.

45.

Advantage of cleistogamy is :

1. More vigorous offspring
2. No dependence of pollinatior
3. Vivipary
4. Higher genetic variability

46.

Transition state structure of the substrate formed during an enzymatic reaction is:

1. Permanent but unstable
2. transeint and unstable
3. permanent and stable
4. transeint but stable

47.

In china rose the flowers are :

1. Actiniomorphic, epigynous with valvel aestivation
2. Zygomorphic, hypogynous with imbricate aestivation
3. Zygomorphic, epigynous with twisted aestivation
4. Actinomorphic, hypogynous with twisted aestivation

48.

Age of a tree can be estimated by :

1. biomass
2. number of annual rings
3. diameter of its heartwood
4. its height and girth

49.

Which of the following are likely to be present in deep sea water?

1. Eubacteria
2. Blue-green algae
3. Saprophytic fungi
4. Archaebacteria

50.

Variation in gene frequencies within populations can occur by chance rather than by natural selection.
This is referred to as:

1. Genetic drift
2. Random mating
3. Genetic load
4. Genetic flow

51.

A sedentary sea anemone gets attached to the shell lining of a hermit crab. The association is :

1. Symbiosis
2. Commensalism
3. Amensalism
4. Ectoparasitism

52.

Which of the following is not correctly matched for the organism and its cell wall degrading enzyme?

1. Plant cells- cellulose

2. Algae - Methylase

3. Fungi - Chitinase

4. Bacteria - Lysozyme

53.

Product of sexual reproduction generally generates :

1. Prolonged dormancy

2. New genetic combination leading to variation

3. Large biomass

4. Longer viability of seeds

54.

Which of the following represent maximum number of species among global biodiversity?

1. Litchens

2. Fungi

3. Mosses and Ferns

4. Algae

55.

One of the legal methods of birth control is

1. by abstaining from coitus from day 10 to 17 of the menstrual cycle

2. by having coitus at the time of day break

3. by a premature ejaculation during coitus

4. absorption by taking an appropriate medicine

56.

Which one of the following processes during decomposition is correctly described?

1. Humanification-Leads to the accumulation of a dark coloured substance humans which undergoes microbial acton at every fast rate

2. Catabolism-Last step decomposition under fully anaerobic condition

3. Leaching-Water soluble inorganic nutrients rise to the top layers of soil

4. Fragmentation-Carried out by organisms such as earthworm

57.

DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by :

1. Polymerase chain reaction

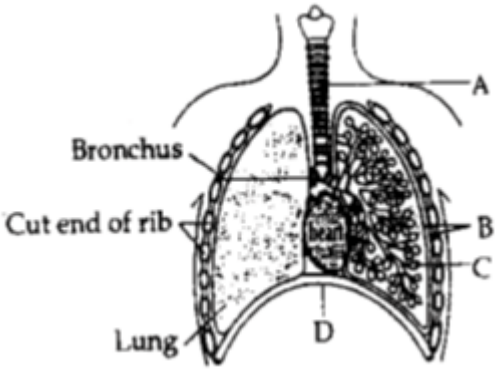
2. Electrophoresis

3. Restriction mapping

4. Centrifugation

58.

The figure shows a diagrammatic view of human respiratory system with labels A, B, C and D. Select the option which gives correct identification and main function and/or characteristics.



1. B-pleural membrane-surround ribs on both sides to provide cushion against rubbing.

2. C-Alveoli-thin walled vascular bag like structures for exchange of gases.

3. D-Lower end of lungs-diaphragm pulls it down during inspiration

4. A-trachea-ling tube supported by complete cartilagnous rings for conducting inspired air.

59.

Which one of the following is not used for ex situ plant conservation?

1. Seed banks

2. Shifting cultivation

3. Botanical Gardens

4. Field gene banks

60.

Lenticels are involved in:

1. Gaseous exchange

2. Food transfer

3. Photosynthesis

4. Transpiration

61.

Among bitter gourd, mustard, brinjal, pumpkin, china rose, lupin, cucumber, sunnhemp, gram, guava, bean, chilli, plum, petunia, tomato, rose, withania, potato, onion, aloe and tulip how many plants have hypogynous flower?

1. Ten

2. Fifteen

3. Eighteen

4. Six

62.

The complex formed by a pair of synapsed homologous chromosomes is called

1. Kinetochore

2. Bivalent

3. Axoneme

4. Equatorial plate

63.

Which one of the following statements is correct?

1. Sporogenous tissue is haploid

2. Endothecium produces the microspores

3. Tapetum nourishes the developing pollen

4. Hard outer layer of pollen is called intine

64.

A major site for synthesis of lipids is :

1. SER

2. Symplast

3. Nucleoplasm

4. RER

65.

Select the correct statement with respect to locomotion in humans:

1. Accumulation of uric crystals in joints causes their inflammation

2. The vertebral column has 10 thoracic vertebae.

3. The joint between adjacent vertebrae is a fibrous joint

4. The decreased level of progesterone causes osteoporosis in old people

66.

A biologist studied the population of rats in a barn. He found that the average natality was 250, average mortality 240, immigration 20 and emigration 30. The net increase in population is :

1. 15

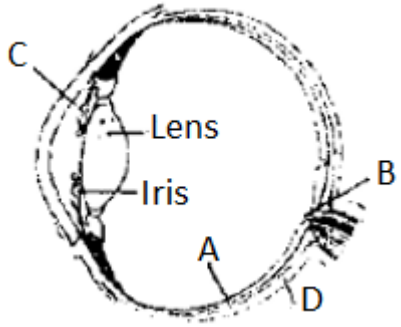
2. 05

3. zero

4. 10

67.

Parts A, B, C and D of the human eye are shown in the diagram. Select the option which gives correct identification along with its functions/characteristics:



1. B-blind spot-has only a few rods and cones

2. C-Aqueous chamber-reflects the light which does not pass through the lens

3. D-choroid- is anterior part forms ciliary body

4. A-retina - contains photo receptors - rods and cones

68.

Which of the following are correctly matched with respect to their taxonomic classification?

1. Centipede, millipede, spider, scorpion-Insecta

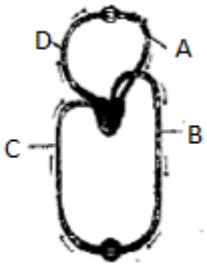
2. House fly, butterfly, tsetse fly, silverfish-Insecta

3. Spiny anteater, sea urchin, sea cucuber- Echinodermata

4. Flying fish, cuttle fish, silverfish- Pisces

69.

Figure shows schematic plan of blood circulation in humans with labels A to D. Identify the label and give its function/s.



1. B-pulmonary artery- takes blood from heart to lungs, PO_2 = 90mm Hg

2. C-Vena Cava- takes blood from body parts to rigjht auricle, PCO_2 = 40mm Hg

3. D-Dorsal aorta- takes blood from heart to body parts, PO_2 = 95mm Hg

4. A- pulmonary vein - takes impure blood from body parts, PO_2 = 60mm Hg

70.

The most abundant intracellular cation is :

1. Ca^{++}

2. H^{+}

3. K^{+}

4. NA^{+}

71.

During seed germination its stored food is mobilized by

1. Cytokinin

2. ABA

3. Gibberellin

4. Ethylene

72.

Secondary productivity is rate of formation of new organic matter by:

1. Parasite

2. Consumer

3. Decomposer

4. Producer

73.

The colonies of recombinant bacteria appear because of :

1. Insertional inactivation of alpha-galactosidase in non-recombinant bacteria

2. Insertional inactivation of beta-galactosidase in recombinant bacteria

3. Inactivation of glycosidase enzyme in recombinant bacteria

4. Non-recombinant bacteria containing beta-galactosidase

74.

Which of the following Bt crops is being grown in India by the farmers?

1. Cotton

2. Brinjal

3. Soybean

4. Maize

75.

Interfascicular cambium develops from the cells of

1. Xylem parenchyma

2. Endodermis

3. Pericycle

4. Medullary rays

76.

Which one of the following is not the function of placenta?

1. Secretes estogen

2. Facilitates removal of carbon dioxide and waste material from embryo

3. Secretes oxytocin during parturition

4. Facilitates supply of oxygen and nutrients to embryo

77.

Which of the metabolites is common to respiration mediated breakdown of fats, carbohydrates and proteins?

1. Frutose1, 6 - bisphosphate

2. Pyruvic acid

3. Acetyl CoA

4. Glucose- 6 -phopsphate

78.

According to Darwin, The organic evolution is due to:

1. Interspecific competition

2. Competition within closely related species.

3. Reduced feeding efficiency in one species due to the presence of interfering species.

4. Intraspecific competition

79.

Which enzyme/s will be produced in a cell in which there is a nonsense mutation in the lac Y gene?

1. Lactose permease

2. Transacetylase

3. Lactose permease and transacetylase

4. β- galactosidase

80.

A good producer of citric acid is:

1. Pseudomonas

2. Clostridium

3. Sachharomyces

4. Aspergillus

81.

Macro molecule chitin is:

1. Phosphorus containing sachharide

2. Sulphur containing polysachharide

3. Simple polysachharide

4. Nitrogen containing polysachharide

82.

The H-zone in the skeletal muscle fibre is due to:

1. The central gap between myosin filaments in the A-band.

2. The central gap between actin filaments extending through myosin filaments in the A-band.

3. Extension of myosin filaments in the central portion of the A-band

4. The absence of myofibrils in the central portion of A-band.

83.

Meiosis takes place in:

1. Conidia

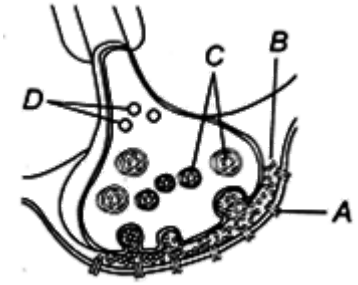
2. Gemmule

3. Megaspore

4. Meiocyte

84.

A diagram showing axon terminal and synapse is given. Identify correctly at least two of A-D.



1. B- Synaptic connection D- K^+

2. A- Neurotransmitter B- Synaptic cleft

3. C- Neurotransmitter D- Ca^{++}

4. A- Receptor C- Synaptic vesicles

85.

Which one of the following is not a correct statement?

1. Botanical Gardens have collection of living plants for reference.

2. A museum has collection of photographs of plants and animals

3. Key is taxonomic aid for identification of specimens.

4. herbarium houses dried, pressed and preserved plant specimens

86.

Global warming can be controlled by:

1. Reducing reforestation, increasing the use of fossil fuel.

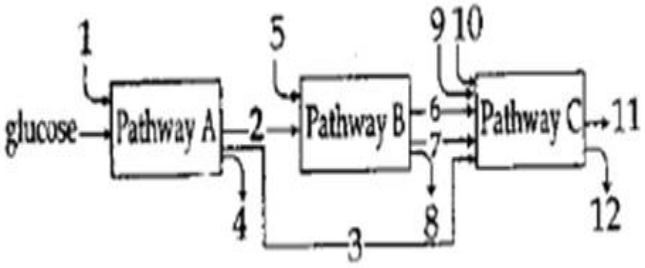
2. Increasing deforestation, slowing down the growth of human population

3. Increasing deforestation , reducing efficiency of energy usage.

4. Reducing deforestation, cutting down use of fossil fuel.

87.

The three boxes in this diagram represents the three major biosynthetic pathways in aerobic respiration Arrows represent net reactants or products.



Arrows numbered 4, 8 and 12 can all be:

1. ATP

2. A_2O

3. FAD^+ or $FADH_2$

4. NADH

88.

Artificial insemination mean

1. Transfer of sperms of husband to a test tube containing ova

2. Artificial introduction of sperms of a healthy donor into the vagina

3. Introduction of sperms of a healthy donor directly into the ovary

4. Transfer of sperms of healthy donor to a test tube containing ova

89.

One of the representatives of phylum Arthropoda is:

1. Silverfish

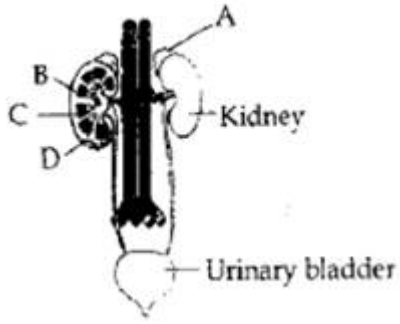
2. Pufferfish

3. Flying fish

4. Cuttlefish

90.

Figure shows human urinary system with structures labelled A to D. Select option which correctly identifies them and gives their characteristics and / or functions.



1. B-pelvis - broad funnel shaped space inner to hilum, directly connected to loops of Henle.

2. C- Medulla- inner zone of kidney and contains complex nephrons.

3. D- Cortex- outer part of kidney and do not contain any part of nephrons

4. A- Adernal gland- located at the anterior part of kidney. Secrete catecholamines which stimulate glycogen breakdown

91.

Which is the monomer of Neoprene in the following?

1. $CH_2 = \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} - CH = CH_2$

2. $CH_2 = \underset{\displaystyle Cl}{\overset{\displaystyle |}{C}} - CH = CH_2$

3. $CH_2 = CH - C \equiv H$

4. $CH_2 = CH - CH = CH_2$

92.

A magnetic moment of 1.73 BM will be shown by one among the following :

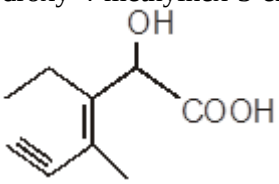
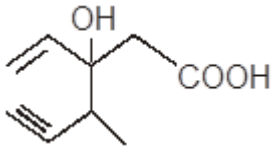
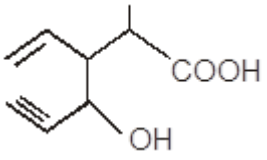
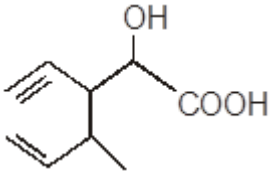
1. $[Ni(CN)_4]^{2-}$

2. $TiCl_4$

3. $[CoCl_6]^{4-}$

4. $[Cu(NH_3)_4]^{2+}$

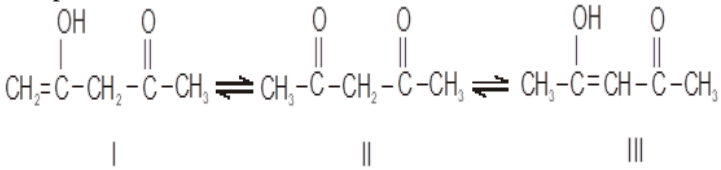
93.
A metal has a fcc lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72 g cm^{-3}. The molar mass of the metal is : (N_A Avogadro's constant = 6.02×10^{23} mol^{-1})
1. 30 g mol^{-1}
2. 27 g mol^{-1}
3. 20 g mol^{-1}
4. 40 g mol^{-1}

94.
Structure of the compound whose IUPAC name is 3-Ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid is :
1. 
2. 
3. 
4. 

95.
Which of the following structure is similar to graphite ?
1. B
2. B_4C
3. B_2H_6
4. BN

96.
Some meta-directing substituents in aromatic substitution are given. Which one is most deactivating ?
1. $-SO_3H$
2. –COOH
3. $-NO_2$
4. –C≡N

97.
How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0M HNO_3? The concentrated acid is 70% HNO_3.
1. 90.0 g conc. HNO_3
2. 70.0 g conc. HNO_3
3. 54.0 g conc. HNO_3
4. 45.0 g conc. HNO_3

98.
The order of stability of the following tautomeric compounds is :

I II III
1. III > II > I
2. II > I > III
3. II > III > I
4. I > II > III

99.
Antiseptics and disinfectants either kill or prevent growth of microrganisms. Identify which of the following statements is not true :
1. Chlorine and Iodine are used as strong disinfectants.
2. Dilute solutions of Boric acid and Hydrogen Peroxide are strong antiseptics.
3. Disinfectants harm the living tissues.
4. A 0.2% solution of phenol is an antiseptic while 1% solution acts as a disinfectant.

100.
Nylon is an example of :
1. Polysaccharide
2. Polyamide
3. Polythene
4. Polyester

101.
Among the following ethers, which one will produce methyl alcohol on treatment with hot concentrated Hl ?
1. $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - O - CH_3$
2. $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}} - O - CH_3$
3. $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - O - CH_3$
4. $CH_3 - CH_2 - CH_2 - CH_2 - O - CH_3$

102.
Which of these is not a monomer for a high molecular mass silicone polymer ?
1. Me_2SiCl_2
2. Me_3SiCl
3. $PhSiCl_3$
4. $MeSiCl_3$

103.
Identify the correct order of solubility in aqueous medium :
1. $ZnS > Na_2S > CuS$
2. $Na_2S > CuS > ZnS$
3. $Na_2S > ZnS > Cus$
4. $Cus > ZnS > Na_2S$

104.
What is the activation energy for a reaction if its rate doubles when the temperature is raised from 20^oC to 35^oC? ($R = 8.314\ J\ mol^{-1}\ K^{-1}$)
1. 269 kJ mol^{-1}
2. 34.7 kJ mol^{-1}
3. 15.1 kJ mol^{-1}
3. 342 kJ mol^{-1}

105.
A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wiere at one atm pressure. The oxidation potential of electrode would be?
1. 0.59 V
2. 0.118 V
3. 1.18 V
4. 0.059 V

106.
The value of Planck's constant is 6.63×10^{-34} Js. The speed of light is 3×10^{17} nm s^{-1}. Which value is closest to the wavelength in nanometer of a quantum of light with frequency of $6 \times 10^{15}\ s^{-1}$?

1. 25
2. 50
3. 75
4. 10

107.
What is the maximum numbers of electrons that can be associated with the following set of quantum numbers?
n = 3, l = 1 and m = –1.
1. 6
2. 4
3. 2
4. 10

108.
Which of the following lanthanoid ions is diamagnetic ?
(At nos. Ce = 58, Sm = 62, Eu = 63, Yb = 70)
1. Sm^{2+}
2. Eu^{2+}
3. Yb^{2+}
4. Ce^{2+}

109.
6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of solution is:
1. 0.01 M
2. 0.001 M
3. 0.1 M
4. 0.02 M

110.
Based on equation $E = -2.178 \times 10^{-18} J, \frac{Z^2}{n^2}$ certain conclusions are written. Which of them is not correct ?
1. Larger the value of n, the larger is the orbit radius.
2. Equation can be used to calculate the change in energy when the electron changes orbit.
3. For n = 1, the electron has a more negative energy than it does for n = 6 which mean that the electron is more loosely bound in the smallest allowed orbit.
4. The negative sign in equation simply means that the energy or electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus.

111.
An excess of $AgNO_3$ is added to 100 mL of a 0.01M solution of dichlorotetraaquachromium (III) chloride. The number of moles of AgCl precipitated would be :
1. 0.002
2. 0.003
3. 0.01
4. 0.001

112.
$KMnO_4$ can be prepared from K_2MnO_4 as per the reaction:
$3\,MnO_4^{2-} + 2H_2O \rightleftharpoons 2\,MnO_4^- + MnO_2 + 4\,OH^-$
The reaction can go to completion by removing OH^- ions by adding:
1. KOH
2. CO_2
3. SO_2
4. HCl

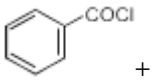
113.
Which of the following compounds will not undergo Friedal-Craft's reaction easily:
1. Xylene
2. Nitrobenzene
3. Toluene
4. Cumene

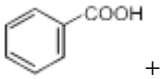
114.
Which of these is least likely to act as Lewis base?
1. F^-
2. BF_3
3. PF_3
4. CO

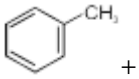
115.
The basic structural unit of silicates is :
1. SiO_4^{4-}
2. SiO_3^{2-}
3. SiO_4^{2-}
4. SiO

116.
Maximum deviation from ideal gas is expected from :
1. N_2 (g)
2. CH_4 (g)
3. NH_3 (g)
4. H_2 (g)

117.
Which is the strongest acid in the following :
1. $HClO_3$
2. $HClO_4$
3. H_2SO_3
4. H_2SO_4

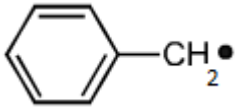
118.
Reaction by which Benzaldehyde cannot be prepared :
1. 

+ H_2 in presence of Pd-$BaSO_4$
2.  + CO + HCl in presence of anhydrous $AlCl_3$
3. 

+ Zn/Hg and conc. HCl
4. 

+ CrO_2Cl_2 in CS_2 followed by H_3O^+

119.

The radical,  is aromatic because it has:

1. 7 p-orbitals and 6 unpaired electrons

2. 7 p-orbitals and 7 unpaired electrons

3. 6 p-orbitals and 7 unpaired electrons

4. 6 p-orbitals and 6 unpaired electrons

120.

Roasting of sulphides gives the gas X as a by-product. This is a colorless gas with choking smell of burnt sulphur and caused great damage to respiratory organs as a result of acid rain. Its aqueous solution is acidic, acts as a oxidizing agent and its acid has never been isolated. The gas X is:

1. SO_2

2. CO_2

3. SO_3

4. H_2S

121.

At 25 ºC molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 $ohm^{-1}cm^2\ mol^{-1}$ and at infinite dilution, its molar conductance is 238 $ohm^{-1}\ cm^2\ mol^{-1}$. The degree of ionization of ammonium hydroxide at the same concentration and temperature is :

1. 20.800%

2. 4.008%

3. 40.800%

4. 2.080%

122.

Which of the following statements about the interstitial compounds is incorrect ?

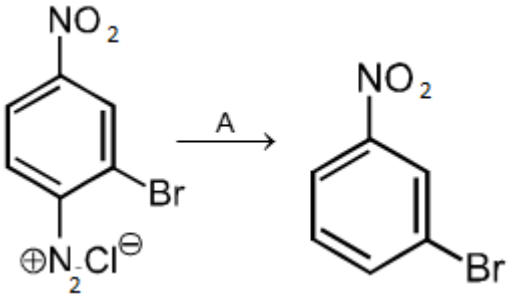
1. They are chemically reactive.

2. They are much harder than the pure metal.

3. They have higher melting points than the pure metal.

4. They retain metallic conductivity.

123.



In the above reaction, A is:

1. Cu_2Cl_2

2. H_3PO_2 and H_2O

3. H^+ / H_2O

4. $HgSO_4 / H_2SO_4$

124.

Which of the following is electron-deficient?

1. $(SiH_3)_2$

2. $(BH_3)_2$

3. PH_3

4. $(CH_3)_2$

125.

Which one of the following molecules contains no π bond?

1. H_2O

2. SO_2

3. NO_2

4. CO_2

126.

Which of the following does not give oxygen on heating?

1. $Zn(ClO_3)_2$

2. $K_2Cr_2O_7$

3. $(NH_4)_2Cr_2O_7$

4. $KClO_3$

127.
Which of the following is a polar molecule?

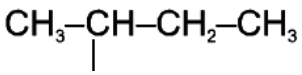
1. SF_4

2. SiF_4

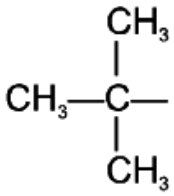
3. XeF_4

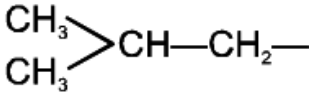
4. BF_3

128.
The structure of isobutyl group in an organic compound is:

1. 

2. $\mathbf{CH_3–CH_2–CH_2–CH_2–}$

3. 

4. 

129.
Which of the following is paramagnetic?

1. O_2^-

2. CN^-

3. NO^+

4. CO

130.
The number of carbon atoms per unit cell of diamond unit cell is:

1. 8

2. 6

3. 1

4. 4

131.
XeF_2 is isostructural with:

1. ICl_2^-

2. $SbCl_3$

3. $BaCl_2$

4. TeF_2

132.
A reaction having equal energies of activation for forward and reverse reaction has:

1. $\Delta G = 0$

2. $\Delta H = 0$

3. $\Delta H = \Delta G = \Delta S = 0$

4. $\Delta S = 0$

133.
Dipole-induced dipole interactions are present in which of the following pairs:

1. Cl_2 and CCl_4

2. HCl and He atoms

3. SiF_4 and He atoms

4. H_2O and alcohol

134.
A button cell used in watches functions as following
$Zn(s) + Ag_2O(s) + H_2O(l) \rightleftharpoons 2Ag(s) + Zn^{2+}(aq) + 2OH^-(aq)$
If half cell potentials are :
$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$; $E^o = -0.76$ V
$Ag_2O(s) + H_2O(l) + 2e^- \rightarrow 2Ag(s) + 2OH^-(aq)$; $E^o = 0.34$ V
The cell potential will be:

1. 0.42 V

2. 0.84 V

3. 1.34 V

4. 1.10 V

135.
Nitrobenzene on reaction with conc. HNO_3 /H_2SO_4 at 80 – 100 ºC forms which one of the following products?

1. 1, 3– Dinitrobenzene

2. 1, 4– Dinitrobenzene

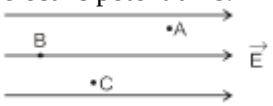
3. 1, 2, 4– Trinitobenzene

4. 1, 2– Dinitrobenzene

136.
A uniform force of $(3\hat{i} + \hat{j})$ newton acts on a particle of mass 2 kg. Hence the particle is displaced from position $(2\hat{i} + \hat{k})$ meter to position $(4\hat{i} + 3\hat{j} - \hat{k})$ meter. The work done by the force on the particle is:

1. 6 J
2. 13 J
3. 15 J
4. 9 J

137.
A, B and C are three points in a uniform electric field. The electric potential is:



1. maximum at B
2. maximum at C
3. same at all the three points A, B and C
4. maximum at A

138.
A coil of self-inductance L is connected in series with a bulb B and an AC source. The brightness of the bulb decreases when :

1. number of turns in the coil is reduced.
2. a capacitance of reactance $X_C = X_L$ is included in the same circuit
3. an iron rod is inserted in the coil
4. frequency of the AC source is decreased

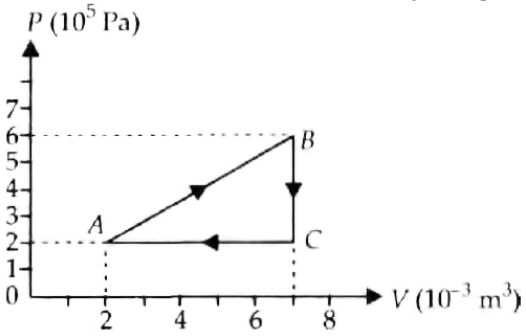
139.
The upper half of an inclined plane of inclination θ is perfectly smooth while lower half is rough. A block starting from rest at the top of the plane will again come to rest at the bottom, if the coefficient of friction between the block and lower half of the plane is given by:
1. $\mu = 2/\tan\theta$
2. $\mu = 2\tan\theta$
3. $\mu = \tan\theta$
4. $\mu = 1/\tan\theta$

140.
The wettability of a surface by a liquid depends primarily on:
1. surface tension
2. density
3. angle of contact between the surface and the liquid
4. viscosity

141.
The condition under which a microwave oven heats up a food item containing water molecules most efficiently is :

1. The frequency of the microwaves has no relation with the natural frequency of water molecules.
2. Microwaves are heatwaves, so always produce heating.
3. Infra-red waves produce heating in a microwave oven.
4. The frequency of the microwaves must match the resonant frequency of the water molecules.

142.
A gas is taken through the cycle A → B → C → A, as shown. What is the network done by the gas?

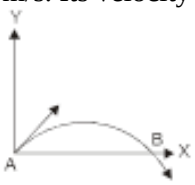


1. 1000 J
2. zero
3. –2000 J
4. 2000 J

143.
A wire loop is rotated in a magnetic field. The frequency of change of direction of the induced e.m.f. is:

1. twice per revolution
2. four times per revolution
3. six times per revolution
4. once per revolution

144.
The velocity of a projectile at the initial point A is $(2\hat{i} + 3\hat{j})$ m/s. Its velocity (in m/s) at point B is :



1. $-2\hat{i} + 3\hat{j}$
2. $2\hat{i} - 3\hat{j}$
3. $2\hat{i} + 3\hat{j}$
4. $-2\hat{i} - 3\hat{j}$

145.
The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied?

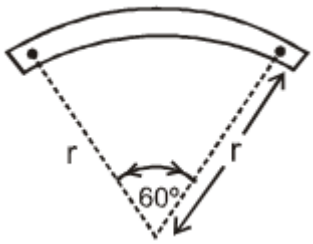
1. length = 100 cm, diameter = 1 mm
2. length = 200 cm, diameter = 2 mm
3. length = 300 cm, diameter = 3 mm
4. length = 50 cm, diameter = 0.5 mm

146.
A wire of resistance 4Ω is stretched to twice its original length. The resistance of stretched wire would be :
1. 4Ω
2. 8Ω
3. 16Ω
4. 2Ω

147.
A piece of iron is heated in a flame. It first becomes dull red, then becomes reddish yellow and finally turns to white-hot. The correct explanation for the above observation is possible by using:
1. Wien's displacement Law
2. Kirchoff's Law
3. Newton's Law of cooling
4. Stefan's Law

148.
A small object of uniform density rolls up a curved surface with an initial velocity 'v'. It reaches up to a maximum height $\frac{3v^2}{4g}$ with respect to the initial position. The object is:
1. Solid sphere
2. Hollow sphere
3. Disc
4. Ring

149.
A bar magnet of length '*l*' and magnetic dipole moment 'M' is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be:



1. $3M/\pi$
2. $2M/l\pi$
3. M/2
4. M

150.
A rod PQ of mass M and length L is hinged at end P. The rod is kept horizontal by a massless string tied to point Q as shown in the figure. When string is cut, the initial angular acceleration of the rod is:

1. g/L
2. 2g/L
3. 2g/3L
4. 3g/2L

151.
In an n-type semiconductor, which of the following statement is true:

1. Electron are minority carriers and pentavalent atoms are dopants.
2. Holes are minority carriers and pentavalent atoms are dopants.
3. Holes are majority carriers and trivalent atoms are dopants.
4. Electrons are majority carriers and trivalent atoms are dopants.

152.
In a common emitter (CE) amplifier having a voltage gain G, the transistor used has trans conductance 0.03 mho and current gain 25. If the above transistor is replaced with another one with trans conductance 0.02 mho and current gain 20, the voltage gain will be:

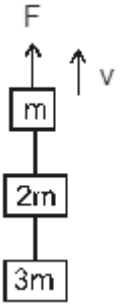
1. 1.5 G
2. $\frac{1}{3}$ G
3. $\frac{5}{4}$ G
4. $\frac{2}{3}$ G

153.
For photoelectric emission from certain metal, the cut off frequency is v. If radiation of frequency 2v impinges on the metal plate the maximum possible velocity of the emitted electron will be (m is the electron mass) :

1. $\sqrt{hv/m}$
2. $\sqrt{2hv/m}$
3. $2\sqrt{hv/m}$
4. $\sqrt{hv/(2m)}$

154.
In Young's double slit experiment, the slits are 2 mm apart and are illuminated by photons of two wavelength λ_1 = 12000 Å and λ_2 = 10000 Å. At what minimum distance from the common central bright fringe on the screen 2 m from the slit will a bright fringe from one interference pattern coincide with a bright fringe from the other?
1. 6 mm
2. 4 mm
3. 3 mm
4. 8 mm

155.
Three blocks with masses m, 2m, and 3m are connected by strings as shown in the figure. After an upward force, F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of mass 2m? (g is the acceleration due to gravity).



1. 2 mg
2. 3 mg
3. 6 mg
4. zero

156.
A certain mass of Hydrogen is changed to Helium by the process of fusion. The Mass defect in the fusion reaction is 0.02866 u. The energy liberated per u is : (given 1 u = 931 MeV)

1. 26.7 MeV
2. 6.675 MeV
3. 13.35 MeV
4. 2.67 MeV

157.
If we study the vibration of a pipe open at both ends, then the following statement is not true:
1. Odd harmonics of the fundamental frequency will be generated
2. All harmonics of the fundamental frequency will be generated
3. Pressure change will be maximum at both ends
4. Open end will be an antinode

158.
An explosion breaks a rock into three parts in a horizontal plane. Two of them go off at right angles to each other. The first part of mass 1kg moves with a speed of 12 ms^{-1} and the second part of mass 2 kg moves with 8 ms^{-1} speed. If the third part flies off with 4 ms^{-1} speed, then its mass is:

1. 5 kg
2. 7 kg
3. 17 kg
4. 3 kg

159.
In an experiment four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows :
$P = \frac{a^3b^2}{cd}$ % error in P is :
1. 10%
2. 7%
3. 4%
4. 14%

160.
A source of unknown frequency gives 4 beats/s when sounded with a source of known frequency 250 Hz. The second harmonic of the source of unknown frequency gives five beats per second when sounded with a source of frequency 513 Hz. The unknown frequency is :

1. 246 Hz
2. 240 Hz
3. 260 Hz
4. 254 Hz

161.
The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is :
1. 0.5Ω
2. 0.8Ω
3. 1.0Ω
4. 0.2Ω

162.
A current loop in a magnetic field:

1. can be in equilibrium in one orientation
2. can be in equilibrium in two orientations, both the equilibrium states are unstable
3. can be in equilibrium in two orientations, one stable while the other is unstable
4. experiences a torque whether the field is uniform or non-uniform in all orientations

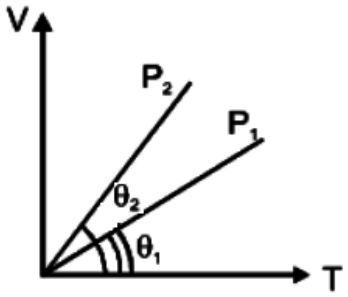
163.
The wavelength λ_e of an electron and λ_P of a photon of same energy E are related by :
1. $\lambda_P \propto \lambda_e$
2. $\lambda_P \propto \sqrt{\lambda_e}$
3. $\lambda_P \propto \frac{1}{\sqrt{\lambda_e}}$
4. $\lambda_P \propto \lambda_e^2$

164.
The half-life of a radioactive isotope ‘X’ is 20 years. It decays to another element ‘Y’ which is stable. The two elements ‘X’ and ‘Y’ were found to be in the ratio 1:7 in a sample of a given rock. The age of the rock is estimated to be:

1. 60 years
2. 80 years
3. 100 years
4. 40 years

165.
The resistances of the four arms P, Q, R and S in a Wheatstone’s bridge are 10 ohm, 30 ohm, 30 ohm and 90 ohm, respectively. The e.m.f. and internal resistance of the cell are 7 Volt and 5 ohm respectively. If the galvanometer resistance is 50 ohm, the current drawn from the cell will be :
1. 0.2 A
2. 0.1 A
3. 2.0 A
4. 1.0 A

166.
In the given (V–T) diagram, what is the relation between pressure P_1 and P_2?



1. $P_2 > P_1$
2. $P_2 < P_1$
3. Cannot be predicted
4. $P_2 = P_1$

167.
The molar specific heats of an ideal gas at constant pressure and volume are denoted by C_P and C_V, respectively. If $\gamma = \frac{C_P}{C_V}$ and R is the universal gas constant, then C_V is equal to:

1. $\frac{R}{(\gamma-1)}$
2. $\frac{(\gamma-1)}{R}$
3. γR
4. $\frac{(\gamma-1)R}{(\gamma+1)}$

168.
The amount of heat energy required to raise the temperature of 1 g of Helium at NTP, from T_1 K to T_2 K is:

1. $\frac{3}{2}N_a k_B(T_2 - T_1)$
2. $\frac{3}{4}N_a k_B(T_2 - T_1)$
3. $\frac{3}{4}N_a k_B \frac{T_2}{T_1}$
4. $\frac{3}{8}N_a k_B(T_2 - T_1)$

169.
A plano-convex lens fits exactly into a plano concave lens. Their plane surfaces are parallel to each other. If lenses are made of different materials of refractive indices μ_1 and μ_2 and R is the radius of curvature of the curved surface of the lenses, then the focal length of the combination is :

1. $\frac{R}{2(\mu_1-\mu_2)}$
2. $\frac{R}{(\mu_1-\mu_2)}$
3. $\frac{2R}{(\mu_2-\mu_1)}$
4. $\frac{R}{2(\mu_1+\mu_2)}$

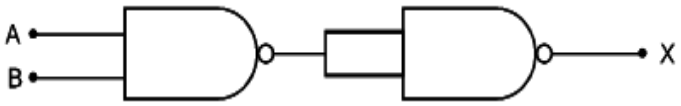
170.
During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its temperature. The ratio of $\frac{C_P}{C_V}$ for the gas is:

1. 2
2. 5/3
3. 3/2
4. 4/3

171.
A wave travelling in the +ve x-direction having displacement along y-direction as 1 m, wavelength 2π m and frequency of $\frac{1}{\pi}$ Hz is represented by:

1. $y = \sin(2\pi x - 2\pi t)$
2. $y = \sin(10\pi x - 20\pi t)$
3. $y = \sin(2\pi x + 2\pi t)$
4. $y = \sin(x - 2t)$

172.
The output(X) of the logic circuit shown in figure will be:



1. $X = \overline{A \cdot B}$
2. X = A.B
3. $X = \overline{A + B}$
4. $X = \overline{\overline{A} \cdot \overline{B}}$

173.
A body of mass 'm' is taken from the earth's surface to the height equal to twice the radius (R) of the earth. The change in potential energy of the body will be:

1. 2/3mgR
2. 3mgR
3. 1/3mgR
4. 2mgR

174.
Ratio of longest wave lengths corresponding to Lyman and Blamer series in hydrogen spectrum is :

1. 3/23
2. 7/29
3. 9/31
4. 5/27

175.
An infinite number of bodies, each of mass 2 kg are situated on the x-axis at distances 1m, 2m, 4m, 8m, ... respectively, from the origin. The resulting gravitational potential due to this system at the origin will be :

1. $-\frac{8}{3}G$
2. $-\frac{4}{3}G$
3. –4G
4. –G

176.

When a proton is released from rest in a room, it starts with an initial acceleration a_0 towards the east. When it is projected towards the north with a speed v_0, it moves with initial acceleration $3a_0$ towards east. The electric and magnetic fields in the room are -

1. $\frac{Ma_0}{e}$ west, $\frac{Ma_0}{ev_0}$ up
2. $\frac{Ma_0}{e}$ west, $\frac{2Ma_0}{ev_0}$ down
3. $\frac{Ma_0}{e}$ east, $\frac{2Ma_0}{ev_0}$ up
4. $\frac{Ma_0}{e}$ east, $\frac{3Ma_0}{ev_0}$ down

177.

For a normal eye, the cornea of eye provides a converging power of 40 D and the least converging power of the eye lens behind the cornea is 20 D. Using this information, the distance between the retina and the cornea - eye lens can be estimated to be :

1. 2.5 cm
2. 1.67 cm
3. 1.5 cm
4. 5 cm

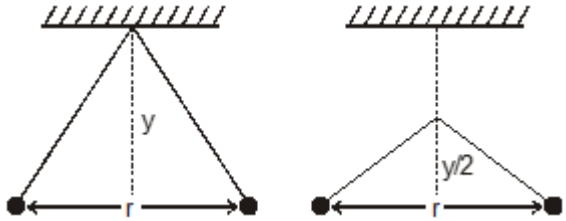
178.

A parallel beam of fast-moving electrons is incident normally on a narrow slit. A fluorescent screen is placed at a large distance from the slit. If the speed of the electrons is increased, which of the following statements is correct?

1. The angular width of the central maximum of the diffraction pattern will increase.
2. The angular width of the central maximum will decrease.
3. The angular width of the central maximum will be unaffected.
4. A diffraction pattern is not observed on the screen in the case of electrons.

179.

Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is r. Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now become:



1. $\frac{r}{\sqrt[3]{2}}$
2. $\frac{r}{\sqrt[2]{2}}$
3. $\frac{2r}{3}$
4. None of the above

180.

A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h_1, h_2 and h_3 is :

1. $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$
2. $h_2 = 3h_1$ and $h_3 = 3h_2$
3. $h_1 = h_2 = h_3$
4. $h_1 = 2h_2 = 3h_3$

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