

1. Passage cells are thin-walled cells found in :
1. endodermis of roots facilitating rapid transport of water from cortex to pericycle
 2. phloem elements that serve as entry points for substances for transport to other plant parts
 3. testa of seeds to enable emergence of growing embryonic axis during seed germination
 4. central region of style through which the pollen tube grows towards the ovary
2. The opening of floral buds into flowers is a type of:
1. autonomic movement of locomotion
 2. autonomic movement of variation
 3. paratonic movement of growth
 4. autonomic movement of growth
3. Telomere repetitive DNA sequences control the function of eukaryotic chromosomes because they:
1. act as replicons
 2. are RNA transcription initiator
 3. help chromosome pairing
 4. prevent chromosome loss
4. Identify the odd combination of the habitat and the particular animal concerned.
1. Dachigam National Park-Snow Leopard
 2. Sunderbans-Bengal Tiger
 3. Periyar-Snow Leopard
 4. Rann of Kutch-Wild Ass
5. In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of :
1. mesophyll
 2. bundle sheath
 3. phloem
 4. epidermis
6. A human male produces sperms with the genotypes AB, Ab, aB and ab pertaining to two diallelic characters in equal proportions. What is the corresponding genotype of this person?
1. AaBb
 2. AaBB
 3. AABb
 4. AABB
7. Which of the following ecosystem types has the highest annual net primary productivity?
1. Tropical rain forest
 2. Tropical deciduous forest
 3. Temperate evergreen forest
 4. Temperate deciduous forest
8. In human body, which one of the following is anatomically correct?
1. Floating ribs-2 pairs
 2. Collar bones-3 pairs
 3. Salivary glands-1 pair
 4. Cranial nerves-10 pairs
9. Which of the following is a flowering plant with nodules containing filamentous nitrogen-fixing microorganism ?
1. Casuarina equisetifolia
 2. Croton juncea
 3. Cycas revoluta
 4. Ciceraria tinum
10. The population of an insect species shows an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does this show?
1. S-shaped or sigmoid growth of this insect
 2. the food plants mature and die at the end of the rainy season
 3. Its population growth curve is of J-type
 4. The population of its predators increases enormously

11. One of endangered species of Indian medicine plants is that of:
1. Podophyllum
 2. Ocimum
 3. Garlic
 4. Nepenthes
12. In the hexaploid wheat, the haploid (n) or basic (x) numbers of chromosomes are:
1. $n=7$ and $x=21$
 2. $n=21$ and $x=21$
 3. $n=21$ and $x=14$
 4. $n=21$ and $x=7$
13. In cloning of cattle a fertilized egg is taken out of the mother's womb and:
1. the egg is divided into 4 pairs of cells which are implanted into the womb of other cows
 2. in the eight cell stage, cells are separated and cultured until small embryos are formed which are implanted into the womb of other cows
 3. in the eight cell stage the individual cells are separated under electrical field for further development in culture media
 4. from this upto eight identical twins can be produced
14. Which one of the following statements is correct?
1. Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies
 2. Both Azotobacter and Rhizobium in root nodules of plants
 3. Cyanobacteria such as Anabaena and Nostoc are important mobilizers of phosphates and potassium for plant nutrition in soil
 4. At present it is not possible to grow maize without chemical fertilizers
15. One of the important consequences of geographical isolation is:
1. no change in the isolated fauna
 2. preventing speciation
 3. speciation through reproductive isolation
 4. random creation of new species
16. Flagellated male gametes are present in all the three of which one of the following sets?
1. Anthoceros, Funaria and Spirogyra
 2. Zygnema, Saprolegnia and Hydrilla
 3. Fucus, Marsilea and Calotropis
 4. Riccia, Dryopteris and Cycas
17. Molecular basis of organ differentiation depends on the modulation in transcription by:
1. RNA polymerase
 2. ribosome
 3. transcription factor
 4. anticodon
18. Increased asthmatic attacks in certain seasons are related to:
1. hot and humid environment
 2. eating fruits preserved in tin containers
 3. inhalation of seasonal pollen
 4. low temperature
19. Which of the following is a slime mould?
1. Rhizopus
 2. Physarum
 3. Thiobacillus
 4. Anabaena

20. Which one of the following is an example of negative feedback loop in humans?
1. Constriction of skin blood vessels and contraction of skeletal muscles when it is too cold
 2. Secretion of mouth after falling of sand particles into the eye
 3. Salivation of mouth at the sight of delicious food
 4. secretion of sweat glands and constriction of skin blood vessels when it is too hot
21. Ergot of rye is caused by a species of:
1. Phytophthora
 2. Uncinula
 3. Ustilago
 4. Claviceps
22. Geometric representation of age structure is a characteristic of:
1. Biotic community
 2. Population
 3. Landscape
 4. Ecosystem
23. Which one of the following mammalian cells is not capable of metabolising glucose to carbon-dioxide aerobically?
1. White blood cells
 2. Unstriated muscle cells
 3. Liver cells
 4. Red blood cells
24. Feeling the tremors of an earthquake a scared resident of seventh floor of a multistoreyed building starts climbing down the stairs rapidly. Which hormone initiated this act?
1. Thyroxine
 2. Adrenaline
 3. Glucagon
 4. Gastrin
25. Among the human ancestors the brain size was more than 1000 CC in :
1. Homo neanderthalensis
 2. Homo erectus
 3. Ramapithecus
 4. Homo habilis
26. The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. How is this DNA accommodated?
1. Deletion of non-essential genes
 2. Super-coiling in nucleosomes
 3. DNase digestion
 4. Through elimination of repetitive DNA
27. The wavelength of light absorbed by Pr form of phytochrome is :
1. 640 nm
 2. 680 nm
 3. 720 nm
 4. 620 nm
28. Which part of ovary in mammals acts as an endocrine gland after ovulation ?
1. Graaffian follicle
 2. Stroma
 3. Germinal epithelium
 4. Vitelline membrane
29. Which one of the following is not a constituent of cell membrane?
1. Cholesterol
 2. Glycolipids
 3. Proline
 4. Phospholipids

30. The concept of chemical evolution is based on:
1. crystallization of chemicals
 2. interaction of water, air and clay under intense heat
 3. effect of solar radiation on chemicals
 4. possible origin of life by combination of chemicals under suitable environment conditions
31. In maize, hybrid vigour is exploited by:
1. bombarding the seeds with DNA
 2. crossing of two inbred parental lines
 3. harvesting seeds from the most productive plants
 4. inducing mutations
32. In gymnosperms, the pollen chamber represents :
1. a cell in the pollen grain in which the sperms are formed
 2. a cavity in the ovule in which pollen grains are stored after pollination
 3. an opening in the megagametophyte through which the pollen tube approaches the egg
 4. the microsporangium in which pollen grains develop
33. During transcription, RNA polymerase holoenzyme binds to a gene promoter and assumes a saddle-like structure. What is its DNA-binding sequence?
1. TIAA
 2. AATI
 3. CACC
 4. TATA
34. In the prothallus of a vascular cryptogam, the antherozoids and eggs mature at different times. As a result:
1. there is no change in success rate of fertilization
 2. there is high degree of sterility
 3. one can conclude that the plant is apomictic
 4. self fertilization is prevented
35. Industrial melanism as observed in peppered moth proves that:
1. The true blackmelanic forms arise by a recurring Natural selection
 2. The melanic form of the moth has no selective advantage over lighter form in industrial area
 3. The lighter-form moth has no selective advantage either in polluted industrial area or non-polluted area
 4. Melanism is a pollution-generated feature
36. "Foolish seedling" disease of rice led to the discovery of:
1. GA
 2. ABA
 3. 2, 4-D
 4. IAA
37. Differentiation of organs and tissues in a developing organism is associated with:
1. developmental mutations
 2. differential expression of genes
 3. lethal mutations
 4. deletion of gene
38. The first acceptor of electrons from an excited chlorophyll molecule of photosystem II is :
1. cytochrome
 2. iron-sulphur protein
 3. ferredoxin
 4. quinone
39. Lysozyme that is present in perspiration, saliva and tears, destroys :
1. certain fungi
 2. certain types of bacteria
 3. all viruses
 4. most virus-infected cells

40. During the transmission of nerve impulse through a nerve fibre, the potential on the inner side of the plasma membrane has which type of electric charge ?
1. First negative, then positive and again back to negative
 2. First positive, then negative and continue to be negative
 3. First negative, then positive and continue to be positive
 4. First positive, then negative and again back to positive
41. The Okazaki fragments in DNA chain growth:
1. result in transcription
 2. polymerize in the 3'-to-5' direction and forms replication fork
 3. prove semi-conservative nature of DNA replication
 4. polymerize in the 5'-to-3' direction and explain 3'-to-5' DNA replication
42. The two polynucleotide chains in DNA are:
1. parallel
 2. discontinuous
 3. antiparallel
 4. semiconservative
43. Which one of the following is a viral disease of poultry?
1. Salmonellosis
 2. Coryza
 3. Newcastle disease
 4. Pasteurellosis
44. Inheritance of skin colour in humans is an example of:
1. chromosomal aberration
 2. point mutation
 3. polygenic inheritance
 4. codominance
45. One gene-one enzyme relationship was established for the first time in:
1. Neurosporacrassa
 2. Salmonella typhimurium
 3. Escherichia coli
 4. Diplococcus pneumonia
46. A genetically engineered micro-organism used successfully in bioremediation of oil spills is a species of:
1. Pseudomonas
 2. Trichoderma
 3. Xanthomonas
 4. Bacillus
47. In which one of the following preparations are you likely to come across cell junctions most frequently?
1. Ciliated epithelium
 2. Thrombocytes
 3. Tendon
 4. Hyaline cartilage
48. Which one of the following pairs is mismatched?
1. Pilaglobosa- pearl
 2. Apisindica- honey
 3. Kenialacca- lac
 4. Bombyxmori- silk
49. About 98 percent of the mass of every living organism is composed of just six elements including carbon, hydrogen, nitrogen, oxygen and:
1. phosphorus and sulphur
 2. sulphur and magnesium
 3. magnesium and sodium
 4. calcium and phosphorus

50. Two genes R and Y are located very close on the chromosomal linkage map of maize plant. When RRY Y and rry y genotypes are hybridized, then F₂ segregation will show:
1. higher number of the recombinant types
 2. segregation in the expected 9:3:3:1 ratio
 3. segregation in 3:1 ratio
 4. higher number of the parental types
51. What is common between parrot, platypus and kangaroo?
1. Homeothermy
 2. Toothless jaws
 3. Functional post-anal tail
 4. Oviparity
52. Which one of the following is being utilized as a source of bio-diesel in the Indian countryside?
1. Euphorbia
 2. Beetroot
 3. Sugarcane
 4. Pongamia
53. In which one of the following the BOD (Biochemical Oxygen Demand) of sewage (S), distillery effluent (DE), paper mill effluent (PE) and sugar mill effluent (SE) have been arranged in ascending order ?
1. SE < S < PE < DE
 2. SE < PE < S < DE
 3. PE < S < SE < DE
 4. S < DE < PE < SE
54. In the human female, menstruation can be deferred by the administration of :
1. LH only
 2. Combination of FSH and LH
 3. Combination of estrogen and progesterone
 4. FSH only
55. Select the correct statement from the following:
1. Darwin variations are small and directionless
 2. fitness is the end result of the ability to adapt and gets selected by nature
 3. all mammals except whales and have seven cervical vertebrae
 4. Mutations are random and directional
56. Two plants can be conclusively said to belong to the same species if they:
1. can reproduce freely with each other and form seeds
 2. have more than 90 per cent similar genes
 3. look similar and possess identical secondary metabolites
 4. have same number of chromosomes
57. A sequential expression of a set of human genes occurs when a steroid molecule binds to the:
1. transfer RNA
 2. messenger RNA
 3. DNA sequence
 4. ribosome
58. In a coal fired power plant electrostatic precipitators are installed to control emission of:
1. SO₂
 2. NO_x
 3. SPM
 4. CO
59. Probiotics are:
1. safe antibiotics
 2. cancer inducing microbes
 3. new kind of food allergens
 4. live microbial food supplement

60. Which pair of the following belongs to Basidiomycetes?
1. Bird's nest fungi and Puffballs
 2. Puffballs and Claviceps
 3. Peziza and Stinkhorns
 4. Morchella and Mushrooms
61. Spore dissemination in some liverworts is aided by:
1. elaters
 2. indusium
 3. calyptra
 4. peristome teeth
62. A person who is on a long hunger strike and is surviving only on water, will have :
1. more sodium in his urine
 2. less amino acids in his urine
 3. more glucose in his blood
 4. less urea in his urine
63. Which one of the following pairs, is not correctly matched?
1. Abscisic acid - Stomatal closure
 2. Gibberellic acid - Leaf fall
 3. Cytokinin - Cell division
 4. 1M - Cell wall elongation
64. A common test to find the genotype of a hybrid is by:
1. crossing of one F_2 progeny with male parent
 2. crossing of one F_2 progeny with female parent
 3. studying the sexual behaviour of F_1 progenies
 4. crossing of one F_1 progeny with male parent
65. Which one of the following is a matching pair of a body feature and the animal possessing it?
1. Post-anal-tail - Octopus
 2. Ventral Central nervous system - Leech
 3. Pharyngeal gills slits absent in embryo - Chamaeleon
 4. Ventral heart - Scorpion
66. Which of the following pairs are correctly matched?
- | Animals | Morphological features |
|---------------|------------------------|
| A. Crocodile | - 4-chambered heart |
| B. Sea urchin | - Parapodia |
| C. Obelia | - Metagenesis |
| D. Lemur | - Thecodont |
1. A, C and D
 2. B, C and D
 3. Only A and D
 4. Only A and B
67. If you suspect major deficiency of antibodies in a person, to which of the following would you look for confirmatory evidence?
1. Serum albumins
 2. Serum globulins
 3. Fibrinogen in the plasma
 4. Haemocytes
68. A person is having problems with calcium and phosphorus metabolism in his body. Which one of the following glands may not be functioning properly?
1. Parathyroid
 2. Parotid
 3. Pancreas
 4. Thyroid

69. What is true about Nereis, Scorpion, Cockroach and Silver fish?
1. They all have jointed paired appendages
 2. They all possess dorsal heart
 3. None of them is aquatic
 4. They all belong to the same phylum
70. The finches of Galapagos islands provide an evidence in favour of:
1. special creation
 2. evolution due to mutation
 3. retrogressive evolution
 4. biogeographical evolution
71. Two cells A and B are contiguous. Cell A has osmotic pressure 10 atm, turgor pressure-7 atm and diffusion pressure deficit 3 atm. Cell B has osmotic pressure 8 atm, turgor pressure 3 atm and diffusion pressure deficit 5 atm. The result will be:
1. Movement of water from cell B to A
 2. No movement of water
 3. Equilibrium between the two
 4. Movement of water from cell A to B
72. Which one of the following elements is not an essential micronutrient for plant growth?
1. Mn
 2. Zn
 3. Cu
 4. Ca
73. Male gametes in angiosperms are formed by the division of :
1. microspore
 2. generative cell
 3. vegetative cell
 4. microspore mother cell
74. Which one of the following is surrounded by a callose wall?
1. Microspore mother cell
 2. Male gemete
 3. Egg
 4. Pollen grain
75. Which one of the following statements about mycoplasma is wrong ?
1. They are also called PPLO
 2. They are pleomorphic
 3. They are sensitive to pencillin
 4. They cause disease in plants
76. Which one of the following is not a bioindicator of water pollution ?
1. Sludge-worms
 2. Blood-worms
 3. Stone files
 4. Sewage fungus
77. Select the wrong statement from the following:
1. both chloroplast and mitochondria contain an inner and an outer membrane
 2. both chloroplasts and mitochondria have an internal companment, the thylakoid space bounded by the thylakoid membrane
 3. both chloroplasts and mitochondria contain DNA
 4. the chloroplasts are generally much larger than mitochondria
78. Which one of the following pairs of organisms are exotic species introduced in India?
1. Ficusreligiosa. Lantana camara
 2. Lantana camara, Water hyacinth
 3. Water hyacinth, Prosopiscinereria
 4. Nile perch, Fricusreligiosa

79.

Which one of the following statement is correct?

1. Stem cells are specialized
2. There is no evidence of the existence of gills during embryogenesis of mammals
3. All plant and animal cells are totipotent
4. Ontogeny repeats phylogeny

80.

Bowman's glands are located in the:

1. proximal end of uriniferous tubules
2. anterior pituitary
3. female reproductive system of cockroach
4. olfactory epithelium of our nose

81.

The living organisms can be unexceptionally distinguished from the non-living things on the basis of their ability for:

1. responsiveness to touch
2. interaction with the environment and progressive evolution
3. reproduction
4. growth and movement

82.

Compared to a bull, a bullock is docile because of:

1. higher levels of thyroxin
2. higher levels of cortisone
3. lower levels of blood testosterone
4. lower levels of adrenalin/noradrenalin in its blood

83.

What is common to whale, seal and shark?

1. Seasonal migration
2. Thick subcutaneous fat
3. Convergent evolution
4. Homeothermy

84.

All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is:

1. lactate dehydrogenase
2. isocitrate dehydrogenase
3. malate dehydrogenase
4. succinate dehydrogenase

85.

Which one of the following pairs of structures distinguishes a nerve cell from other types of cell?

1. Perikaryon and dendrites
2. Vacuoles and fibres
3. Flagellum and medullary sheath
4. Nucleus and mitochondria

86.

Ultrasound of how much frequency is beamed into human body for sonography?

1. 30-40 MHz
2. 15-30 MHz
3. 1-15 MHz
4. 45-70 MHz

87.

The biological organisation starts with:

1. Submicroscopic molecular level
2. Cellular level
3. Organism level
4. Atomic level

88.

Which one of the following pairs is wrongly matched?

1. Methanogens - Gobar gas
2. Yeast - Ethanol
3. Streptomycetes - Antibiotic
4. Coliforms - Vinegar

89.

In pea plants, yellow seeds are dominant to green. If a heterozygous yellow seeded plant is crossed with a green seeded plant, what ratio of yellow and green seeded plants would you expect in F_1 generation ?

1. 50:50
2. 9:1
3. 1:3
4. 3:1

90.

Adaptive radiation refers to :

1. adaptations due to geographical isolation
2. evolution of different species from a common ancestor
3. migration of members of a species to different geographical areas
4. power of adaptation in an individual to a variety of environments

91.

If the mean and the median pertaining to a certain character of a population are of the same value, the following is most likely to occur :

1. a normal distribution
2. a bi-modal distribution
3. a T-shaped curve
4. a skewes curve

92.

When two species of different genealogy come to resemble each other as a result of adaptation, the phenomenon is termed :

1. divergent evolution
2. microevolution
3. co-evolution
4. convergent evolution

93.

Which one of the following is a fat-soluble vitamin and its related deficiency disease?

1. Ascorbic acid - Scurvy
2. Retinol - Xerophthalmia
3. Cobalamine - Beri-Beri
4. Calciferol - Penllagra

94.

ICBN stands for :

1. Indian Congress of Biological Names
2. International Code of Botanical Nomenclature
3. Indian Code of Botanical Nomenclature
4. International Congress of Biological Names

95.

If you are asked to classify the various algae into distinct groups, which of the following characters you should choose ?

1. Types of pigments present in the cell
2. Nature of stored food materials in the cell
3. Structural organisation of thallus
4. Chemical compositions of the cell wall

96.

A plant requires magnesium for :

1. holding cells together
2. protein synthesis
3. chlorophyll synthesis
4. cell wall development

97.

The overall goal of glycolysis, Krebs cycle and the electron transport system is the formation of :

1. ATP in small stepwise units.
2. ATP in one large oxidation reaction
3. Sugars
4. Nucleic acids

98. A high density of elephant population in an area can result in :
1. mutualism
 2. Intraspecific competition
 3. Interspecific completion
 4. Predation on one another
99. A drop of each of the following is placed separately on four slides. Which of them will not coagulate?
1. blood plasma
 2. blood serum
 3. Sample from the thoracic duct of lymphatic system
 4. Whole blood from pulmonary vein
100. For a critical study of secondary growth in plants, which one of the following pairs is suitable :
1. Sugarcane and sunflower
 2. Teak and pine
 3. Deodar and fern
 4. Wheat and maiden hair fern
101. Calculate the pOH of a solution at 25 °C that contains 1×10^{-10} M of hydronium ions.
1. 7.00
 2. 4.00
 3. 9.00
 4. 1.00
102. Which of the following will give a pair of enantiomorphs?
(en = $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$)
1. $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{NO}_2$
 2. $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$
 3. $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$
 4. $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_6]$
103. The correct order of increasing thermal stability of K_2CO_3 , MgCO_3 , CaCO_3 and BeCO_3 is:
1. $\text{BeCO}_3 < \text{MgCO}_3 < \text{K}_2\text{CO}_3 < \text{CaCO}_3$
 2. $\text{BeCO}_3 < \text{MgCO}_3 < \text{CaCO}_3 < \text{K}_2\text{CO}_3$
 3. $\text{MgCO}_3 < \text{BeCO}_3 < \text{CaCO}_3 < \text{K}_2\text{CO}_3$
 4. $\text{K}_2\text{CO}_3 < \text{MgCO}_3 < \text{CaCO}_3 < \text{BeCO}_3$
104. A weak acid, HA, has a K_a of 1.00×10^{-5} . If 0.100 mole of this acid is dissolved in one litre of water, the percentage of acid dissociated at equilibrium is closest to :
1. 99.0%
 2. 1%
 3. 99.9%
 4. 0.100%
105. The number of moles of KMnO_4 that will be needed to react with one mole of sulphite ion in acidic solution is :
1. $\frac{3}{5}$
 2. $\frac{4}{5}$
 3. $\frac{2}{5}$
 4. 1
106. Identify the incorrect statement among the following :
1. There is a decrease in the radii of the atoms or ions as one proceeds from La to Lu.
 2. Lanthanoid contraction is the accumulation of successive shrinkages
 3. As a result of lanthanoid contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements
 4. Shielding power of 4f electrons is quite weak.
107. Which of the following oxidation states are the most characteristic for lead and tin respectively?
1. +4, +2
 2. +2, +4
 3. +4, +4
 4. +2, +2

108.

The correct order of C-O bond length among CO, CO_3^{2-} , CO_2 is :

1. $\text{CO}_2 < \text{CO}_3^{2-} < \text{CO}$
2. $\text{CO} < \text{CO}_3^{2-} < \text{CO}_2$
3. $\text{CO}_3^{2-} < \text{CO}_2 < \text{CO}$
4. $\text{CO} < \text{CO}_2 < \text{CO}_3^{2-}$

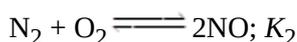
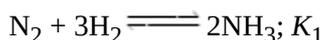
109.

Which of the following represents the correct order of the acidity in the given compounds?

1. $\text{CH}_3\text{COOH} > \text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{FCH}_2\text{COOH}$
2. $\text{FCH}_2\text{COOH} > \text{CH}_3\text{COOH} > \text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH}$
3. $\text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{CH}_3\text{COOH}$
4. $\text{FCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{CH}_3\text{COOH}$

110.

The following equilibrium constants are given :



The equilibrium constant for the oxidation of NH_3 by oxygen to give NO is:

1. $K_2K_3^3/K_1$
2. $K_2K_3^2/K_1$
3. $K_2^2K_3/K_1$
4. K_1K_2/K_3

111.

Which one of the following vitamins is water-soluble?

1. Vitamin-B
2. Vitamin-E
3. Vitamin-K
4. Vitamin-A

112.

If there is no rotation of plane polarized light by a compound in a specific solvent, thought to be chiral, it may mean that :

1. the compound is certainly a chiral
2. the compound is certainly meso
3. there is no compound in the solvent
4. the compound may be a racemic mixture

113.

Consider the following sets of quantum numbers :

	<i>n</i>	<i>l</i>	<i>m</i>	<i>s</i>
(i)	3	0	0	+1/2
(ii)	2	2	1	+1/2
(iii)	4	3	-2	-1/2
(iv)	1	0	-1	-1/2
(v)	3	2	3	+1/2

Which of the following sets of quantum number is not possible?

1. ii, iii and iv
2. i, ii, iii and iv
3. ii, iv and v
4. i and iii

114.

Which one of the following ions is the most stable in aqueous solution?

(At. No. Ti = 22, V = 23, Cr = 24, Mn = 25)

1. Cr^{3+}
2. V^{3+}
3. Ti^{3+}
4. Mn^{3+}

115.

Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 g mL^{-1} , volume of acid required to make one litre of 0.1 M H_2SO_4 solution is

1. 11.10 mL
2. 16.65 mL
3. 22.20 mL
4. 5.55 mL

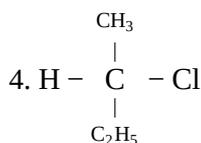
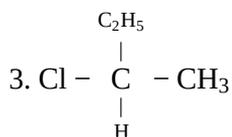
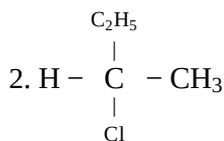
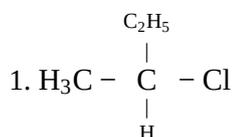
116.

Which one of the following ionic species has the greatest proton affinity to form stable compound?

1. HS^-
2. NH_2^-
3. F^-
4. I^-

117.

$\text{CH}_3-\text{CHCl}-\text{CH}_2-\text{CH}_3$ has a chiral center. Which one of the following represents its *R* configuration?



118.

0.5 molal aqueous solution of a weak acid (*HX*) is 20% ionised. If K_f for water is $1.86 \text{ K kg mol}^{-1}$, the lowering in freezing point of the solution is :

1. -1.12 K
2. 0.56 K
3. 1.12 K
4. -0.56 K

119.

Which one of the following polymers is prepared by condensation polymerization?

1. Nylon-66
2. Teflon
3. Rubber
4. Styrene

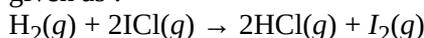
120.

The Langmuir adsorption isotherm is deduced using the assumption :

1. The adsorption takes place in multilayers
2. The adsorption sites are equivalent in their ability to adsorb the particles
3. The heat of adsorption varies with coverage
4. The adsorbed molecules interact with each other

121.

The reaction of hydrogen and iodine monochloride is given as :



This reaction is of first order with respect to $\text{H}_2(g)$ and $\text{ICl}(g)$, following mechanisms were proposed :

Mechanism A :



Mechanism B :



1. B Only
2. A and B both
3. Neither A nor B
4. A only

122.

RNA and DNA are chiral molecules, their chirality is due to :

1. L- sugar component
2. Chiral bases
3. chiral phosphate ester unit
4. D- sugar component

123.

In which of the following the hydration energy is higher than the lattice energy?

1. BaSO_4
2. MgSO_4
3. RaSO_4
4. SrSO_4

124.

Which one of the following on reduction with lithium aluminium hydride yield a secondary amine?

1. nitroethane
2. Methylisocyanide
3. Acetamide
4. Methyl cyanide

125.

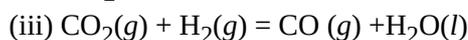
Consider the following reactions :



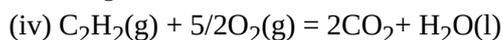
$$\Delta H = -x_1 \text{ kJmol}^{-1}$$



$$\Delta H = -x_2 \text{ kJmol}^{-1}$$



$$\Delta H = -x_3 \text{ kJmol}^{-1}$$



$$\Delta H = -x_4 \text{ kJmol}^{-1}$$

Enthalpy of formation of $\text{H}_2\text{O}(\text{l})$ is :

1. $-x_3 \text{ kJ mol}^{-1}$
2. $-x_4 \text{ kJ mol}^{-1}$
3. $-x_1 \text{ kJ mol}^{-1}$
4. $-x_2 \text{ kJ mol}^{-1}$

126.

Given that bond energy of H—H and Cl-Cl is 430 kJ mol^{-1} and 240 kJ mol^{-1} respectively and ΔH_f for HCl is -90 kJ mol^{-1} . Bond enthalpy of HCl is :

1. 290 kJ mol^{-1}
2. 380 kJ mol^{-1}
3. 425 kJ mol^{-1}
4. 245 kJ mol^{-1}

127.

Reduction of aldehydes and ketones into hydrocarbons using amalgam and conc. HCl is called :

1. Clemmensen reduction
2. Cope reduction
3. Dow reduction
4. Wolff-Kishner reduction

128.

Which one of the following anions is present in the chain structure silicates?

1. $\text{Si}_2\text{O}_7^{6-}$
2. $(\text{Si}_2\text{O}_5^{2-})_n$
3. $(\text{SiO}_3^{2-})_n$
4. SiO_4^{4-}

129.

The fraction of total volume occupied by the atoms present in a simple cube is :

1. $\frac{\pi}{6}$
2. $\frac{\pi}{3\sqrt{2}}$
3. $\frac{\pi}{4\sqrt{2}}$
4. $\frac{\pi}{4}$

130.

For the following :

- (i) I^-
- (ii) Cl^-
- (iii) Br^-

The increasing order of nucleophilicity in would be :

1. $\text{I}^- < \text{Br}^- < \text{Cl}^-$
2. $\text{Cl}^- < \text{Br}^- < \text{I}^-$
3. $\text{I}^- < \text{Cl}^- < \text{Br}^-$
4. $\text{Br}^- < \text{Cl}^- < \text{I}^-$

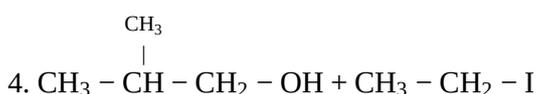
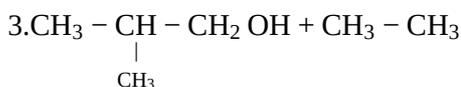
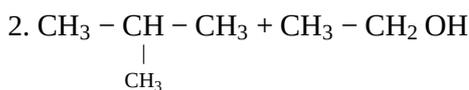
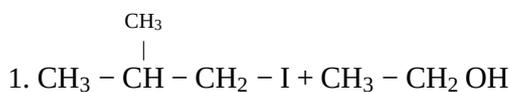
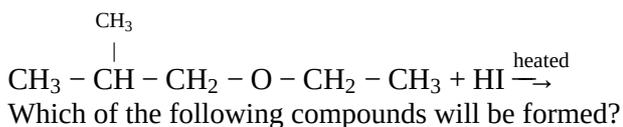
131.

Which one of the following orders correctly represents the increasing acid strengths of the given acids?

1. $\text{HOCl} < \text{HOClO} < \text{HOClO}_2 < \text{HOClO}_3$
2. $\text{HOClO} < \text{HOCl} < \text{HOClO}_3 < \text{HOClO}_2$
3. $\text{HOClO}_2 < \text{HOClO}_3 < \text{HOClO} < \text{HOCl}$
4. $\text{HOClO}_3 < \text{HOClO}_2 < \text{HOClO} < \text{HOCl}$

132.

The reaction :



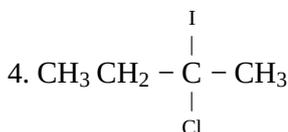
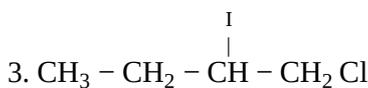
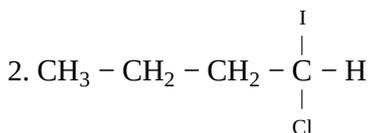
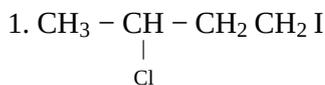
133.

With which of the following electronic configuration an atom has the lowest ionisation enthalpy?

1. $1s^2 2s^2 2p^5$
2. $1s^2 2s^2 2p^3$
3. $1s^2 2s^2 2p^5 3s^1$
4. $1s^2 2s^2 2p^6$

134.

Predict the product C obtained in the following reaction of butyne-1.



135.

An element, X has the following isotopic composition :

^{200}X : 90%

^{199}X : 8.0%

^{202}X : 2.0%

The weighted average atomic mass of the naturally-occurring element X is closest to:

1. 200 amu
2. 201 amu
3. 202 amu
4. 199 amu

136.

In a first order reaction $A \rightarrow B$, if k is rate constant and initial concentration of the reactant A is 0.5 M then the half-life is :

1. $\frac{0.693}{0.5k}$
2. $\frac{\log 2}{k}$
3. $\frac{\log 2}{k\sqrt{0.5}}$
4. $\frac{\ln 2}{k}$

137.

Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?

1. Carbon and hydrogen suitable reducing agents for metal sulphides
2. The $\Delta_f G^0$ of the sulphide is greater than those for CS_2 and H_2S
3. the $\Delta_f G^0$ is negative for roasting of sulphur ore to oxide.
4. Roasting of the sulphide to the oxide is thermodynamically feasible

138.

If 60% of a first order reaction was completed in 60 min, 50% of the same reaction would be completed in approximately:

($\log 4 = 0.60$, $\log 5 = 0.69$)

1. 50 min
2. 45 min
3. 60 min
4. 40 min

139.

The equilibrium constant of the reaction :



$E^0 = 0.46$ V at 298 K is :

1. 2.4×10^{10}
2. 2.0×10^{10}
3. 4.0×10^{10}
4. 4.0×10^{15}

140.

Which of the compounds with molecular formula C_5H_{10} yields acetone on ozonolysis?

1. 2-methyl-2-butene
2. 2-methyl-1-butene
3. Cyclopentane
4. 3-methyl-1-butene

141.

Sulphide ores of metals are usually concentrated by froth flotation process. Which one of the following sulphide ores offers an exception and is concentrated by chemical leaching?

1. Argentite
2. Galena
3. Copper pyrite
4. Sphalerite

142.

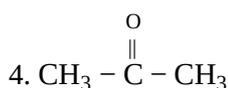
The efficiency of a fuel cell is given by :

1. $\frac{\Delta H}{\Delta G}$
2. $\frac{\Delta G}{\Delta S}$
3. $\frac{\Delta G}{\Delta H}$
4. $\frac{\Delta S}{\Delta G}$

143.

Which one of the following on treatment with 50% aqueous sodium hydroxide yields the corresponding alcohol and acid?

1. $C_6H_5CH_2CHO$
2. C_6H_5CHO
3. $CH_3CH_2CH_2CHO$



144.

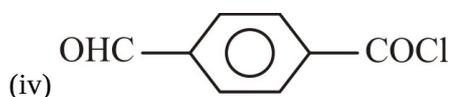
Identify the correct order of the size of the following :

1. $Ca^{2+} < K^+ < Ar < S^{2-} < Cl^-$
2. $Ca^{2+} < K^+ < Ar < Cl^- < S^{2-}$
3. $Ar < Ca^{2+} < K^+ < Cl^- < S^{2-}$
4. $Ca^{2+} < Ar^+ < K^+ < Cl^- < S^{2-}$

145.

Consider the following compounds :

(i) C_6H_5COCl



The correct decreasing order of their reactivity towards hydrolysis is :

- (ii) > (iv) > (iii) > (i)
- (i) > (ii) > (iii) > (iv)
- (iv) > (ii) > (i) > (iii)
- (ii) > (iv) > (i) > (iii)

146.

The product formed in aldol condensation is :

- a beta-hydroxy acid
- a beta-hydroxy aldehyde or a beta-hydroxy ketone
- an alpha-hydroxy aldehyde or ketone.
- an alpha, beta-unsaturated ester

147.

If NaCl is doped with 10^{-4} mol% of $SrCl_2$, the concentration of cation vacancies will be ($N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$) :

- $6.02 \times 10^{15} \text{ mol}^{-1}$
- $6.02 \times 10^{16} \text{ mol}^{-1}$
- $6.02 \times 10^{17} \text{ mol}^{-1}$
- $6.02 \times 10^{14} \text{ mol}^{-1}$

148.

The *d*-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Ni^{2+} are $3d^4$, $3d^5$, $3d^6$ and $3d^8$ respectively. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour?

(At. No. Cr = 24, Mn = 25, Fe = 26, Ni = 28)

- $[Mn(H_2O)_6]^{2+}$
- $[Fe(H_2O)_6]^{2+}$
- $[Ni(H_2O)_6]^{2+}$
- $[Cr(H_2O)_6]^{2+}$

149.

The order of decreasing reactivity towards an electrophilic reagent, for the following :

- Benzene
- Toluene
- Chlorobenzene
- Phenol

Would be :

- (i) > (ii) > (iii) > (iv)
- (ii) > (iv) > (i) > (iii)
- (iv) > (iii) > (ii) > (i)
- (iv) > (ii) > (i) > (iii)

150.

In which of the following pairs, the two species are isostructural?

- SF_4 and XeF_4
- SO_3^{2-} and NO_3^-
- BF_3 and NF_3
- BrO_3^- and XeO_3

151.

If the cold junction of a thermocouple is kept at $0^\circ C$ and the hot junction is kept at $T^\circ C$, then the relation between neutral temperature (T_n) and temperature of inversion (T_i) is:

- $T_n = \frac{T_i}{2}$
- $T_n = 2T_i$
- $T_n = T_i - T$
- $T_n = T_i + T$

152.

Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond Curie temperature, then it will show:

1. para magnetism
2. anti-ferromagnetism
3. no magnetic property
4. diamagnetism

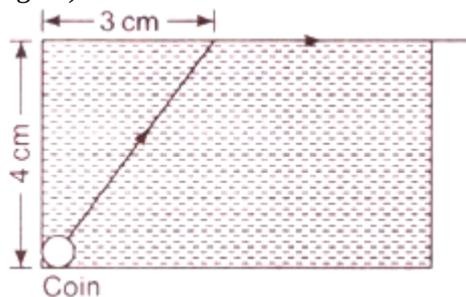
153.

In radioactive decay process, the negatively charged emitted β -particles are:

1. the electrons present inside the nucleus
2. the electrons produced as a result of the decay of neutrons inside the nucleus
3. the electrons produced as a result of collisions between atoms
4. the electrons orbiting around the nucleus

154.

A small coin is resting on the bottom of a beaker filled with a liquid. A ray of light from the coin travels up-to-the surface of the liquid and moves along its surface (see figure).



How fast is the light traveling in the liquid?

1. 1.8×10^8 m/s
2. 2.4×10^8 m/s
3. 3.0×10^8 m/s
4. 1.2×10^8 m/s

155.

What is the value of inductance L for which the current is a maximum in a series LCR circuit with $C = 10 \mu\text{F}$ and $\omega = 1000 \text{ s}^{-1}$?

1. 100 mH
2. 1 mH
3. cannot be calculated unless R is known
4. 10 mH

156.

Three-point charges $+q$ and $-2q$ and $+q$ are placed at points $(x=0, y = a, z = 0)$, $(x = 0, y = 0, z = 0)$ and $(x= a, y = 0, z = 0)$, respectively. The magnitude and direction of the electric dipole moment vector of this charge assembly are:

1. $\sqrt{2}qa$ along $+y$ direction
2. $\sqrt{2}qa$ along the line joining points $(x=0, y= 0, z= 0)$ And $(x=a, y=a, z=0)$
3. qa along the line joining points $(x= 0, y=0, z=0)$ And $(x=a, y=a, z=0)$
4. $\sqrt{2}qa$ along $+x$ direction

157.

A nucleus ${}_Z\text{X}^A$ has mass represented by $M(A, Z)$. If M_p and M_n denote the mass of proton and neutron respectively and BE the binding energy, then :

1. $\text{BE} = [M(A, Z) - ZM_p - (A - Z)M_n]c^2$
2. $\text{BE} = [ZM_p + (A - Z)M_n - M(A, Z)]c^2$
3. $\text{BE} = [ZM_p + AM_n - M - (A, Z)]c^2$
4. $\text{BE} = M(A, Z) - ZM_p - (A - Z)M_n$

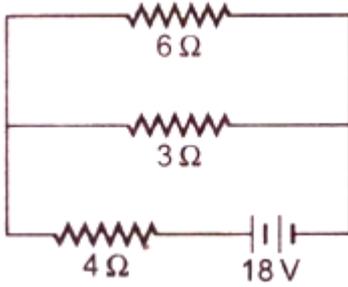
158.

The position x of a particle with respect to time t along the x -axis is given by $x = 9t^2 - t^3$ where x is in metre and t in second. What will be the position of this particle when it achieves maximum speed along the $+x$ direction?

1. 32 m
2. 54 m
3. 81 m
4. 24 m

159.

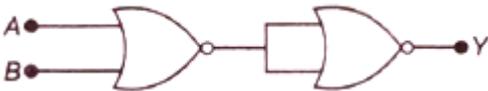
The total power dissipated in watts in the circuit shown here is:



1. 16
2. 40
3. 54
4. 4

160.

In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table:



1.

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

2.

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

3.

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

4.

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

161.

Assuming the sun to have a spherical outer surface of radius r , radiating like a black body at temperature t °C, the power received by a unit surface, (normal to the incident rays) at a distance R from the centre of the sun is:

Where σ is Stefan's constant.

1. $\frac{4\pi^2\sigma^4}{R^2}$
2. $\frac{r^2\sigma(t+273)^4}{4\pi R^2}$
3. $\frac{16\pi^2r^2\sigma^4}{R^2}$
4. $\frac{r^2\sigma(t+273)^4}{R^2}$

162.

A particle starting from the origin $(0,0)$ moves in a straight line in the (x, y) plane. Its coordinates at a later time are $(\sqrt{3}, 3)$. The path of the particle makes with the x -axis an angle of:

1. 30°
2. 45°
3. 60°
4. 0°

163.

If the nucleus ${}_{13}^{27}\text{Al}$ has a nuclear radius of about 3.6 fermi, then ${}_{52}^{125}\text{Te}$ would have its radius approximately as:

1. 6.0 fermi
2. 9.6 fermi
3. 12.0 fermi
4. 4.8 fermi

164.

A wheel has an angular acceleration of 3.0 rad/s^2 and an initial angular speed of 2.00 rad/s . In a time of 2 s, it has rotated through an angle (in radian) of:

1. 6
2. 10
3. 12
4. 4

165.

The resistance of an ammeter is 13Ω and its scale is graduated for a current up-to 100 A. After an additional shunt has been connected to this ammeter it becomes possible to measure currents up-to 750 A by this meter. The value of shunt resistance is:

1. 20Ω
2. 2Ω
3. 0.2Ω
4. $2 \text{ k}\Omega$

166.

Under the influence of a uniform magnetic field a charged particle is moving in a circle of radius R with constant speed v . The time period of the motion:

1. depends on v and not on R
2. depends on both R and v
3. is independent of both R and v
4. Depends on R and not on v

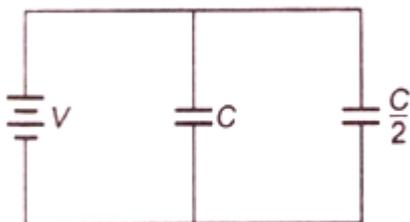
167.

The primary and secondary coils of a transformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coil is given by $\phi = \phi_0 + 4t$, where ϕ is in weber, t is time in second and ϕ_0 is a constant, the output voltage across the secondary coil is:

1. 90 V
2. 120 V
3. 220 V
4. 30 V

168.

Two condensers, one of capacity C and the other of capacity $C/2$ are connected to a V volt battery, as shown.

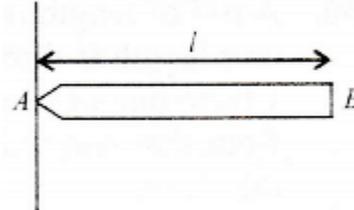


The work done in charging fully both the condensers is :

1. $2 CV^2$
2. $\frac{1}{4} CV^2$
3. $\frac{3}{4} CV^2$
4. $\frac{1}{2} CV^2$

169.

A uniform rod AB of length l and mass m is free to rotate about point A . The rod is released from rest in the horizontal position. Given that the moment of inertia of the rod about A is $\frac{ml^2}{3}$, the initial angular acceleration of the rod will be:



1. $\frac{2g}{3l}$
2. $mg/l/2$
3. $\frac{3}{2} g * l$
4. $\frac{3g}{2l}$

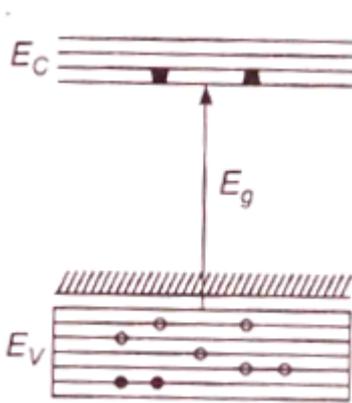
170.

The frequency of a light wave in a material is 2×10^{14} Hz and wavelength is 5000 \AA . The refractive index of material will be:

1. 1.40
2. 1.50
3. 3.00
4. 1.33

171.

In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is a/an:



1. p-type semiconductor
2. insulator
3. metal
4. n-type semiconductor

172.

A car moves from X to Y with a uniform speed v_u and returns to X with a uniform speed v_d . The average speed for this round trip is :

1. $\frac{2v_d v_u}{v_d + v_u}$
2. $\sqrt{v_u v_d}$
3. $\frac{v_d v_u}{v_d + v_u}$
4. $\frac{v_u + v_d}{2}$

173.

A particle executes simple harmonic oscillation with an amplitude a . The period of oscillation is T . The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is:

1. $\frac{T}{4}$
2. $\frac{T}{8}$
3. $\frac{T}{12}$
4. $\frac{T}{2}$

174.

A 5 W source emits monochromatic light of wavelength 5000 Å. When placed 0.5 m away, it liberates photoelectrons from a photosensitive metallic surface. When the source is moved to a distance of 1.0 m, the number of photoelectrons liberated, will be reduced by a factor of:

1. 4
2. 8
3. 16
4. 2

175.

A block B is pushed momentarily along a horizontal surface with an initial velocity v . If μ is the coefficient of sliding friction between B and the surface, block B will come to rest after a time:



1. $\frac{v}{g\mu}$
2. $\frac{g\mu}{v}$
3. $\frac{g}{v}$
4. $\frac{v}{g}$

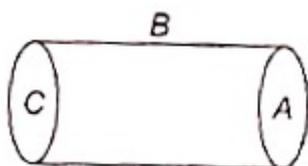
176.

Two radioactive substances A and B have decay constants 5λ and λ respectively. At $t = 0$ they have the same number of nuclei. The ratio of the number of nuclei of A to those of B will be $\frac{1}{e^2}$ after a time interval:

1. $\frac{1}{4\lambda}$
2. 4λ
3. 2λ
4. $\frac{1}{2\lambda}$

177.

A hollow cylinder has a charge q coulomb within it (at the geometrical centre). If ϕ is the electric flux in unit of Volt-meter associated with the curved surface B , the flux linked with the plane surface A in unit of Volt-meter will be:



1. $\frac{1}{2}(\frac{q}{\epsilon_0} - \phi)$
2. $\frac{q}{2\epsilon_0}$
3. $\frac{\phi}{3}$
4. $\frac{q}{\epsilon_0} - \phi$

178.

A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0.5 A, the efficiency of the transformer is approximately :

1. 30%
2. 50%
3. 90%
4. 10%

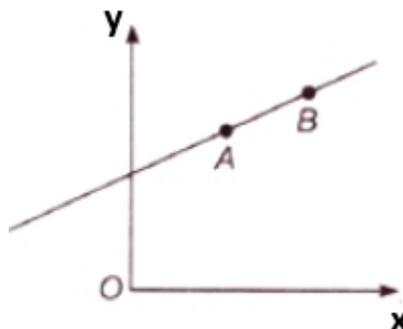
179.

A charged particle (charge q) is moving in a circle of radius R with uniform speed v . The associated magnetic moment μ is given by:

1. $\frac{qvR}{2}$
2. qvR^2
3. $\frac{qvR^2}{2}$
4. qvR

180.

A particle of mass m moves in the XY plane with a velocity v along the straight line AB . If the angular momentum of the particle with respect to origin O is L_A when it is at A and L_B when it is at B , then:



1. $L_A > L_B$
2. $L_A = L_B$
3. the relationship between L_A and L_B depends upon the slope of the line AB
4. $L_A < L_B$

181.

The total energy of electron in the ground state of hydrogen atom is -13.6 eV. The kinetic energy of an electron in the first excited state is:

1. 3.4 eV
2. 6.8 eV
3. 13.6 eV
4. 1.7 eV

182.

A steady current of 1.5 A flows through a copper voltmeter for 10 min. If the electrochemical equivalent of copper is $30 \times 10^{-5} \text{ gC}^{-1}$, the mass of copper deposited on the electrode will be:

1. 0.40 g
2. 0.50 g
3. 0.67 g
4. 0.27 g

183.

In a mass spectrometer used for measuring the masses of ions, the ions are initially accelerated by an electric potential V and then made to describe semi-circular paths of radius R using a magnetic field B . If V and B are kept constant, the ratio $\frac{\text{Charge on the ion}}{\text{mass of the ion}}$, will be proportional to:

1. $\frac{1}{R}$
2. $\frac{1}{R^2}$
3. R^2
4. R

184.

Three resistances P , Q , R each of 2Ω and an unknown resistance S form the four arms of a Wheatstone's bridge circuit. When the resistance of 6Ω is connected in parallel to S the bridge gets balanced. What is the value of S ?

1. 2Ω
2. 3Ω
3. 6Ω
4. 1Ω

185.

The particle executing simple harmonic motion has a kinetic energy $K_0 \cos^2 \omega t$. The maximum values of the potential energy and the total energy are respectively:

1. 0 and $2K_0$
2. $\frac{K_0}{2}$ and K_0
3. K_0 and $2K_0$
4. K_0 and K_0

186.

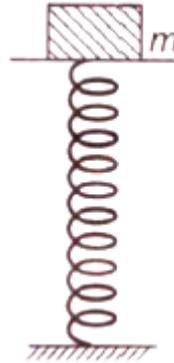
The electric and magnetic field of an electromagnetic wave are :

1. in phase and parallel to each other
2. in opposite phase and perpendicular to each other
3. in opposite phase and parallel to each other
4. in phase and perpendicular to each other

187.

A mass of 2.0 kg is put on a flat pan attached to a vertical spring fixed on the ground as shown in the figure. The mass of the spring and the pan is negligible. When pressed slightly and released, the mass executes a simple harmonic motion. The spring constant is 200 N/m . What should be the minimum amplitude of the motion, so that the mass gets detached from the pan?

(Take $g = 10\text{ m/s}^2$)



1. 8.0 cm
2. 10.0 cm
3. Any value less than 12.0 cm
4. 4.0 cm

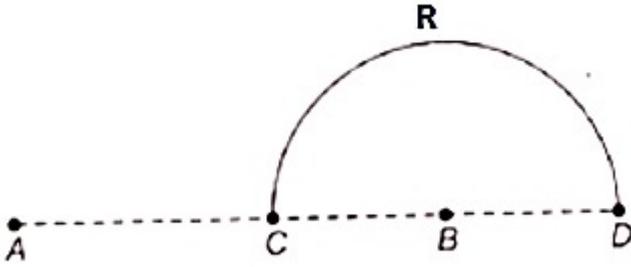
188.

Two satellites of earth, S_1 and S_2 , are moving in the same orbit. The mass of S_1 is four times the mass of S_2 . Which one of the following statements is true?

1. The time period of S_1 is four times that of S_2 .
2. The potential energies of the earth and satellite in the two cases are equal.
3. S_1 and S_2 are moving at the same speed.
4. The kinetic energies of the two satellites are equal.

189.

Charges $+q$ and $-q$ are placed at points A and B , respectively; which are at a distance $2L$ apart, C is the midpoint between A and B . The work done in moving a charge $+Q$ along the semicircle CRD is :



1. $\frac{qQ}{4\pi\epsilon_0 L}$
2. $\frac{qQ}{2\pi\epsilon_0 L}$
3. $\frac{qQ}{6\pi\epsilon_0 L}$
4. $-\frac{qQ}{6\pi\epsilon_0 L}$

190.

A beam of electrons passes un-deflected through mutually perpendicular electric and magnetic fields. If the electric field is switched off, and the same magnetic field is maintained, the electrons move:

1. in an elliptical orbit
2. in a circular orbit
3. along a parabolic path
4. along a straight line

191.

A black body is at 727°C . It emits energy at a rate that is proportional to:

1. $(727)^2$
2. $(1000)^4$
3. $(1000)^2$
4. $(727)^4$

192.

An engine has an efficiency of $\frac{1}{6}$. When the temperature of the sink is reduced by 62°C , its efficiency is doubled. the temperature of the source is:

1. 124°C
2. 37°C
3. 62°C
4. 99°C

193.

Monochromatic light of frequency 6.0×10^{14} Hz is produced by a laser. The power emitted is 2×10^{-3} W. The number of photons emitted, on the average, by the source per second is :

1. 5×10^{15}
2. 5×10^{16}
3. 5×10^{17}
4. 5×10^{14}

194.

For a cubic crystal structure which one of the following relations indicating the cell characteristic is correct?

1. $a \neq b \neq c$ and $\alpha \neq \beta$ and $\gamma \neq 90^\circ$
2. $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$
3. $a = b = c$ and $\alpha \neq \beta = \gamma = 90^\circ$
4. $a = b = c$ and $\alpha = \beta = \gamma = 90^\circ$

195.

A common emitter amplifier has a voltage gain of 50, an input impedance of 100Ω and an output impedance of 200Ω . The power gain of the amplifier is:

1. 500
2. 1000
3. 1250
4. 100

196.

The phase difference between the instantaneous velocity and acceleration of a particle executing simple harmonic motion is:

1. 0.5π
2. π
3. 0.707π
4. zero

197.

A vertical spring with force constant k is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring so that the spring is compressed by a distance d . The net work done in the process is:

1. $mg(h + d) + \frac{1}{2}kd^2$
2. $mg(h + d) - \frac{1}{2}kd^2$
3. $mg(h - d) - \frac{1}{2}kd^2$
4. $mg(h - d) + \frac{1}{2}kd^2$

198.

\vec{A} and \vec{B} are two vectors and θ is the angle between them, if $|\vec{A} \times \vec{B}| = \sqrt{3}(\vec{A} \cdot \vec{B})$ the value of θ is :

1. 60°
2. 45°
3. 30°
4. 90°

199.

Dimensions of resistance in an electrical circuit, in terms of dimension of mass M , length L , time T and current I , would be:

1. $[ML^2 T^{-3} I^{-1}]$
2. $[ML^2 T^{-2}]$
3. $[ML^2 T^{-1} I^{-1}]$
4. $[ML^2 T^{-3} I^{-2}]$

200.

A particle moving along x -axis has acceleration f , at time t , given by $f=f_0(1 - \frac{t}{T})$, where f_0 and T are constants. The particle at $t=0$ has zero velocity. In the time interval between $t = 0$ and the instant when $f = 0$, the particle's velocity (v_x) is:

1. $f_0 T$
2. $\frac{1}{2} f_0 T^2$
3. $f_0 T^2$
4. $\frac{1}{2} f_0 T$

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