1.
Keeping in view the 'fluid mosaic model' for the structure of cell membrane, which one of the following statements is correct with respect to the movement of lipids and proteins from one lipid monolayer to the other (described as flip-flop movement)?

1. Both lipids and proteins can flip-flop
2. While lipids can rarely flip-flop, proteins cannot
3. While proteins can flip-flop, lipids cannot
4. Neither lipids, nor proteins can flip-flop

2.
Which one of the following pairs of plant structures has haploid number of chromosomes?

1. Megaspore mother cell and antipodal cells
2. Egg cell and antipodal cells
3. Nucellus and antipodal cells
4. Egg nucleus and secondary nucleus

3.
The C4-plants are photosynthetically more efficient than C3-plants because

1. the CO_2 compensation point is more
2. CO_2 generated during photorespiration is trapped and recycled through PEP carboxylase
3. the CO_2 efflux is not prevented
4. they have more chloroplasts

4.
In human adult females, oxytocin

1. is secreted by anterior pituitary
2. stimulates growth of mammary glands
3. stimulates pituitary to secrete vasopressin
4. causes strong uterine contractions during parturition

5.
Gel electrophoresis is used for

1. cutting of DNA into fragments
2. separation of DNA fragments according to their size
3. construction of recombinant DNA by joining with cloning vectors
4. isolation of DNA molecule

6.
Polysome is formed by

1. several ribosomes attached to a single mRNA
2. many ribosomes attached to a strand of endoplasmic reticulum
3. a ribosome with several subunits
4. ribosomes attached to each other in a linear arrangement

7.
Given below are four methods(A-D) and their modes of action(1--4) in achieving contraception. Select their correct matching from the four options that follow

	Method		Mode of action
A.	The pill	1.	Prevents sperms reaching cervix
B.	Condom	2.	Prevents implantation
C.	Vasectomy	3.	Prevents ovulation
D.	Copper-T	4.	Semen contain no sperms

1. A-3 B-1 C-4 D-2
2. A-4 B-1 C-2 D-3
3. A-3 B-4 C-1 D-2
4. A-2 B-3 C-1 D-4

8.
What is vital capacity of our lungs?

1. Inspiratory reserve volume plus tidal volume
2. Total lung capacity minus expiratory reserve volume
3. Inspiratory reserve volume plus expiratory reserve volume
4. Total lung capacity minus residual volume

9.
In which one of the following, the male and female gametophytes don't have free-living independent existence?

1. Pteris
2. Funaria
3. Polytrichum
4. Cedrus

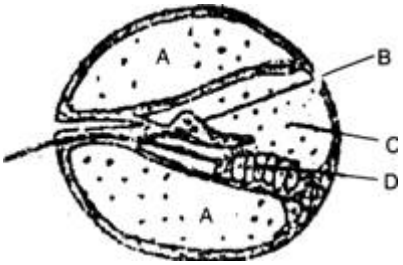
10.
A transgenic food crop, which may help in solving the problem of night blindness in developing countries is

1. Flavr savr tomatoes
2. Starlink maize
3. Bt soybean
4. Golden rice

11.
A lake near a village suffered heavy mortality of fishes within a few days. Consider the following reasons for this
(1) Lots of urea and phosphate fertilizer were used in the crops in the vicinity.
(2) The area was sprayed with DDT by an aircraft.
(3) The lake water turned green and stinky.
(4) Phytoplankton populations in the lake declined initially thereby greatly reducing photosynthesis.
Which two of above were the main causes of fish mortality in the lake?

1. 2, 3
2. 3, 4
3. 1, 3
4. 1, 2

12.
Given below is a diagrammatic cross section of a single loop of human cochlea.



Which one of the following options correctly represents the names of three different parts?

1. B: Tectorial membrane
   C: Perilymph
   D: Secretory cells
2. C: Endolymph
   D: Sensory hair cells
   A: Serum
3. D: Sensory hair cells
   A: Endolymph
   B: Tectorial membrane
4. A: Perilymph
   B: Tectorial membrane
   C: Endolymph

13.
Senescence as an active developmental cellular process in the growth and functioning of a flowering plant, is indicated in

1. vessels and tracheid differentiation
2. leaf abscission
3. annual plants
4. floral parts.

14.
Vascular tissues in flowering plants develop from

1. phellogen
2. plerome
3. periblem
4. dermatogen

15.
Nitrogen-fixation in root nodules of Alnus is brought about by

1. Bradyrhizobium
2. Clostridium
3. Frankia
4. Azorhizobium

16.
What will happen if HCl secretion of parietal cells of gastric glands is blocked with an inhibitor?

1. Gastric juice will be deficient in chymosin
2. Gastric juice will be deficient in pepsinogen
3. in the absence of HCl secretion, inactive pepsinogen is not converted into the active enzyme pepsin
4. Enterokinase will not be released from the duodenal mucosa and so trypsinogen is not converted to trypsin

17.
Electrons from excited chlorophyll molecule of photosystem-ll are accepted first by

1. cytochrome-b
2. cytochrome-f
3. quinone
4. ferredoxin

18.
Trichoderma harzianum has proved a useful micro-organism for

1. bioremediation of contaminated soils
2. reclamation of wastelands
3. gene transfer in higher plants
4. biological control of soil-borne plant pathogens

19.
Which type of white blood cells are concerned with the release of histamine and the natural anticoagulant heparin?

1. Neutrophils
2. Basophils
3. Eosinophils
4. Monocytes

20.
Which one of the following in birds, indicates their reptilian ancestry?

1. Scales on their hind limbs
2. Four chambered heart
3. Two special chambers crop and gizzard in their digestive tract
4. Eggs with a calcareous shell

21.
Endosperm is consumed by developing embryo in the seed of

1. coconut
2. castor
3. pea
4. maize

22.
In humans, at the end of the first meiotic division, the male germs cells differentiate into the

1. primary spermatocytes
2. secondary spermatocytes
3. spermatids
4. spermatogonia

23.
In the DNA molecule

1. the total amount of purine nucleotides and pyrimidine nucleotides is not always equal
2. there are two strands, which run parallel in the 5 -+ 3 direction
3. the proportion of adenine in relation to thymine. varies with the organism
4. there are two strands, which run antiparallel - one in 5' → 3’ direction and other in 3’→ 5’

24.
Consider the following four measures (A.D) that could be taken to successfully grow chickpea in an area where bacterial blight disease is common
(A) spray with Bordeaux mixture
(B) control of the insect vector of the disease pathogen
(C) use of only disease-free seeds
(D) use of varieties resistant to the disease
Which two of the above measures can control the disease?

1. B and C
2. A and B
3. C and D
4. A and D

25.
The rupture and fractionation do not usually occur in the water column in vessel/tracheids during the ascent of sap because of

1. lignified thick walls
2. cohesion and adhesion
3. weak gravitational pull
4. transpiration pull

26.
The blood calcium level is lowered by the deficiency of

1. parathormone
2. thyroxine
3. calcitonin
4. Both (A) and (C)

27.
About 70% of total global carbon is found in

1. grasslands
2. agro-ecosystems
3. oceans
4. forests

28.
Which one of the following is heterosporous?

1. Dryopteris
2. Salvinia
3. Adiantum
4. Equisetum

29.
Dry indehiscent single-seeded fruit formed from bicarpellary syncarpous inferior ovary is

1. caryopsis
2. cypsela
3. berry
4. cremocarp

30.
Which extra embryonic membrane in humans prevents desiccation of the embryo inside the uterus?

1. Chorion
2. Allantois
3. Yolk sac
4. Amnion

31.
The fleshy receptable of syconus of fig encloses a number of

1. achenes
2. samaras
3. berries
4. mericarps

32.
Which one of the following is linked to the discovery of Bordeaux mixture as a popular fungicide?

1. Bacterial leaf blight of rice
2. Downy mildew of grapes
3. Loose smut of wheat
4. Black rust of wheat

33.
Unisexuality of flowers prevents

1. autogamy, but not geitonogamy
2. Both geitonogamy and xenogamy
3. geitonogamy, but not xenogamy
4. autogamy and geitonogamy

34.
The length of different internodes in a culm of sugarcane is variable because of

1. shoot apical meristem
2. position of axillary buds
3. size of leaf lamina at the node below each internode
4. intercalary meristem

35.

Which one of the following is the correct difference between rod cells and cone cells of our retina?

Features	Rod cells	Cone cells
(a) visual acuity	High	Low
(b) Visual pigment contained	Iodopsin	Rhodopsin
(c) Overall function	Vision in poor light	Colour vision and detailed vision in bright light
(d) Distribution	More concentrated in centre of retina	Evenly distributed all over retina

1. a
2. b
3. c
4. d

36.

In leaves of C4-plants malic acid synthesis during CO_2-fixation occurs in

1. epidermal cells
2. mesophyll cells
3. bundle sheath
4. guard cells

37.

Which one of the following pairs of codons is correctly matched with their function or the signal for the particular amino acid?

1. GUU, GCU - Alanine
2. UAG, UGA - Stop
3. AUG, ACG - Start/methionine
4. UUA, UCA -Leucine

38.

Cellulose is the major component of cell walls of

1. pythium
2. Xanthomonas
3. Pseudomonas
4. Saccharomyces

39.

The slow rate of decomposition of fallen logs in nature is due to their

1. low moisture content
2. poor nitrogen content
3. anaerobic environment around them
4. low cellulose content

40.

Carbohydrates are commonly found as starch in plant storage organs. Which of the following five properties of starch(A-E) make it useful as a storage material?
(A) Easily translocated
(B) Chemically non-reactive
(C) Easily digested by animals
(D) Osmotically inactive
(E) Synthesized during photosynthesis
The useful properties are

1. (B) and (C)
2. (B) and (D)
3. (A), (C) and (E)
4. (A) and (E)

41.

Which one of the following pairs of organs includes only the endocrine glands?

1. Parathyroid and adrenal
2. Pancreas and parathyroid
3. Thymus and testes
4. Adrenal and ovary

42.

Match the disease in column-I with the appropriate items (pathogen/prevention/treatment) in column-II

	Column-I		**Column-II**
A.	Amoebiasis	1.	Treponema pallidum
B.	Diphtheria	2.	Use only sterilized food and water
C.	Cholera	3.	DPT vaccine
D.	Syphilis	4.	Use oral rehydration therapy

1. A-1 B-2 C-3 D-4
2. A-2 B-4 C-1 D-3
3. A-2 B-1 C-3 D-4
4. A-2 B-3 C-4 D-1

43.
Replum is present in the ovary of the flower of

1. lemon
2. mustard
3. sunflower
4. pea

44.
Which one of the following is the correct matching of the site of action on the given substrate, the enzyme acting upon it and the end product?

1. Duodenum : Triglycerides $\xrightarrow{\text{Trypsin}}$ Monoglycerides
2. Small intestine : starch $\xrightarrow[\alpha]{\text{Amylase}}$ Disaccharide (maltose)
3. Small intestine : Proteins $\xrightarrow{\text{Pepsin}}$ Amino acids
4. Stomach : Fats $\xrightarrow{\text{Lipase}}$ Micelles

45.
Modern detergents contain enzyme preparations of

1. acidophiles
2. alkaliphiles
3. thermoacidophiles
4. thermophiles

46.
The haemoglobin of a human foetus

1. has a lower affinity for oxygen than that of the adult
2. its affinity for oxygen is the same as stat of an adult
3. has only 2 protein subunits instead of 4
4. has a higher affinity for oxygen than that of an adult.

47.
Which one of the following scientist's name is correctly matched with the theory put forth by him?

1. Weismann - Theory of continuity of germplasm
2. Pasteur -- Inheritance of acquired characters
3. de Vries -- Natural selection
4. Mendel -- Theory of pangenesis

48.
The most active phagocytic white blood cells are

1. neutrophils and eosinophils
2. lymphocytes and macrophages
3. eosinophils and lymphocytes
4. neutrophils and monocytes

49.
According to Central Pollution Control Board (CPCB), which particulate size in diameter(in micrometres) of the air pollutants is responsible for greatest harm to human health?

1. 2.5 or less
2. 1.5 or less
3. 1.0 or less
4. 5.2 or 2.5

50.
Which one of the following is the correct statement regarding the particular psychotropic drug specified?

1. Hashish causes alter thought perceptions and hallucinations
2. Opium stimulates nervous system and causes hallucinations
3. Morphine leads to delusions and disturbed emotions
4. Barbiturates cause relaxation and temporary euphoria

51.
The two subunits of ribosome remain united at a critical ion level of

1. copper.
2. manganese.
3. magnesium.
4. calcium.

52.
During the propagation of a nerve impulse, the action potential results from the movement of

1. K+ ions from extracellular fluid to intracellular fluid
2. Na+ ions from intracellular fluid to extracellular fluid
3. K+ ions from intracellular fluid to extracellular fluid
4. Na+ ions from extracellular fluid to intracellular fluid

53.
Bacterial leaf blight of rice is caused by a species of

1. Xanthomonas
2. Pseudomonas
3. Alternaria
4. Erwinia

54.
Darwin's finches are an excellent example of

1. adaptive radiation
2. seasonal migration
3. brood parasitism
4. connecting links

55.
Earthworms have no skeleton but during burrowing, the anterior end becomes turgid and acts as a hydraulic skeleton. It is due to

1. coelomic fluid
2. blood
3. gut peristalsis
4. setae

56.
Which one of the following pairs of nitrogenous bases of nucleic acids, is wrongly matched with the category mentioned against it?

1. Thymine, Uracil - Pyrimidines
2. Uracil, Cytosine - Pyrimidines
3. Guanine, Adenine - Purines
4. Adenine, Thymine - Purines

57.
Main objective of production/use of herbicide-resistant GM crops is to

1. eliminate weeds from the field without the use of manual layout
2. eliminate weeds from the field without the use of herbicides
3. encourage eco-friendly herbicides
4. reduce herbicide accumulation in food particles for health safety

58.

The table below gives the populations(in thousands) of ten species(A--J) in four areas (a-d) consisting of the number of habitats given within brackets against each. Study the table and answer the question which follows:
which area out of a to d shows maximum species diversity?

Area and number if habitats	Species and their populations (in thousands) in the areas									
	A	B	C	D	E	F	G	H	I	J
a (11)	23	1.2	0.52	6.0	-	3.1	1.1	9.0	-	10.3
b (11)	10.2	-	0.62	-	1.5	3.0	-	8.2	1.1	11.2
c (13)	11.3	0.9	0.48	2.4	1.4	4.2	0.8	8.4	2.2	4.1
d (12)	3.2	10.2	11.1	4.8	0.4	3.3	0.8	7.3	11.3	2.1

1. b
2. c
3. a
4. a

59.
To which type of barriers under innate immunity, do the saliva in the mouth and the tears from the eyes, belong?

1. Cytokine barriers
2. Cellular barriers
3. Physiological barriers
4. Physical barriers

60.
Cornea transplant in humans is almost never rejected. This is because

1. its cells are least penetrable by bacteria
2. it has no blood supply
3. it is composed of enucleated cells
4. it is a non-living layer

61.
The energy-releasing process in which the substrate is oxidized without an external electron acceptor is called

1. fermentation
2. photorespiration
3. aerobic respiration
4. glycolysis

62.
Select one of the following pairs of important features distinguishing Gnetum from Cycas and Pinus and showing affinities with angiosperms

1. absence of resin duct and leaf venation
2. presence of vessel elements and absence of archegonia
3. periandl and two integuments
4. embryo development and apical meristem

63.
Thorn of Bougainvillea and tendril of Cucurbita are examples of

1. analogous organs
2. homologous organs
3. vestigial organs
4. retrogressive evolution

64.
What is true about the isolated small tribal populations?

1. There is a decline in population as boys marry girls only from their own tribe
2. Hereditary diseases like colour blindness do not spread in the isolated population
3. Wrestlers who develop strong body muscles in their life time pass this character on to their progeny
4. There is no change in population size as they have a large gene pool

65.
Human insulin is being commercially produced from a transgenic species of

1. Escherichia
2. Mycobacterium
3. Rhizobium
4. Saccharomyces

66.
In the light of recent classification of living organisms into three domains of life (bacteria. archaea and eukarya), which one of the following statement is true about archaea?

1. Archaea resemble eukarya in all respects.
2. Archaea have some novel features that are absent in other prokaryotes and eukaryotes.
3. Archaea completely differ from both prokaryotes and eukaryotes.
4. Archaea completely differ prokaryotes.

67.
Thermococcus. Methanococcus and Methanobacterium exemplify

1. archaebacteria that contain protein homologous to eukaryotic core histones
2. archaebacteria that lack any histones resembling those found in eukaryotes but whose DNA is negatively supercoiled
3. bacteria whose DNA is relaxed or positively supercoiled but which have a cytoskeleton as well as mitochondria
4. bacteria that contain a cytoskeleton and ribosomes

68.
A competitive inhibitor of succinic dehydrogenase is

1. malonate
2. Oxaloacetate
3. α-ketoglutarate
4. malate

69.
Cry-I endotoxins obtained from Bacillus thuringiensis are elective against

1. mosquitoes
2. flies
3. nematodes
4. bollworms

70.
Vacuole in a plant cell

1. is membrane-bound and contains storage proteins and lipids
2. is membrane-bound and contains water and excretory substances
3. lacks membrane and contains air
4. lacks membrane and contains water and excretory substances

71.
Which one of the following is not observed in biodiversity hot spots?

1. Endemism
2. Accelerated species loss
3. Lesser inter specific competition
4. Species richness

72.
Consider the statements given below regarding contraception and answer as directed thereafter
(A) Medical Termination of Pregnancy(MTP) during first trimester is generally safe
(B) Generally chances of conception are nil until the mother breast-feeds the infant up to two year
(C) Intrauterine devices like copper-T are effective contraceptives
(D) Contraception pills may be taken up to one week after coitus to prevent conception
Which two of the above statements are correct?

1. B, C
2. C, D
3. A, C
4. A, B

73.
Which one of the following proud elective for biological control of nematodal diseases in plants?

1. Pisolithus tinctorius
2. Pseudomonas cepacin
3. Gliocladium virens
4. Paecilomyces lilacinus

74.
Which one of the following condition in humans is correctly matched with its chromosomal abnormality/linkage?

1. Klinefelter's syndrome-44 autosomes + XXY
2. Colourblindness – Y-linked
3. Erythroblastosis foetalis-- X-linked
4. Down syndrome--44 autosomes + XO

75.
Which one of the following item gives its correct total number?

1. Floating ribs in humans - 4
2. Amino acids found in proteins - 16
3. Types of diabetes - 3
4. Cervical vertebrae in humans - 8

76.
In germinating seeds fatty acids are degraded exclusively in the

1. proplastids
2. glyoxisomes
3. peroxisomes
4. mitochondria

77.
What does the filiform apparatus do at the entrance into ovule?

1. it helps in the entry of pollen tube into a synergid
2. it prevents entry of more than one pollen tube into the embryo sac
3. it brings about opening of the pollen tube
4. it guides pollen tube from a synergid to egg

78.
Which one of the following is being tried in India as a bio fuel substitute for fossil fuels?

1. Jatropha
2. Azadirachta
3. Musa
4. Aegilops

79.
Which one of the following is resistant to enzyme action?

1. Cork
2. Wood fibre
3. Pollen exine
4. Leaf cuticle

80.
What is antisense technology?

1. A cell displaying a foreign antigen used for synthesis of antigens.
2. Production of somaclonal variants in tissue cultures.
3. When a piece of RNA that is complementary in sequence is used to stop expression of a specific gene
4. RNA polymerase producing DNA

81.
Haploids are more suitable for mutation studies than the diploids. This is because

1. haploids are reproductively more stable than diploids
2. mutagens penetrate in haploids more effectively than in diploids
3. haploids are more abundant in nature than diploids
4. all mutations, whether dominant or recessive are expressed in haploids

82.
Which one of the following is not characteristic of phylum-Annelida?

1. Closed circulatory system
2. Segmentation
3. Pseudocoelom
4. Ventral nerve cord

83.
Importance of day length in flowering of plants was first shown in

1. Lemma
2. tobacco
3. cotton
4. Petunia

84.
In humans, blood passes from the post caval to the diastolic right atrium of heart due to

1. pushing open of the venous valves
2. suction pull
3. stimulation of the sino auricular node
4. pressure difference between the caval and atrium

85.
The linking of the antibiotic resistance gene with the plasmid vector became possible with

1. DNA ligase
2. endonucleases
3. DNA polymerase
4. exonucleases

86.
Which one of the following statement is incorrect about menstruation?

1. During normal menstruation about 40 mL blood is lost
2. The menstrual fluid can easily clot
3. At menopause in the female, there is especially abrupt increase in gonadotropic hormones
4. The beginning of the cycle of menstruation is called menarche

87.
Which one of the following phyla is correctly matched with its two general characteristics?

1. Arthropoda - Body divided into head, thorax and abdomen and respiration by tracheae
2. Chordata - Notochord at some stage and separate anal and urinary openings to the outside
3. Echinodermata – Pentamerous radial symmetry and mostly internal fertilization
4. Mollusca - Normally oviparous and development through a trochophore or veliger larva

88.
Which one of the following pair of items correctly belongs to the category of organs mentioned against it?

1. Thorn of Bougainvillea and tendrils of Cucurbita – Analogous organs
2. Nictitating membrane and blind spot in human eye – vestigial organs
3. Nephridia of earthworm and Malpighian tubules of cockroach - Excretory organs
4. Wings of honey bee and wings of crow - Homologous organs

89.
The chemiosmotic coupling hypothesis of oxidative phosphorylation proposes that Adenosine Triphosphate (ATP) is formed because

1. high energy bonds are formed in mitochondrial proteins
2. ADP is pumped out of the matrix into the inter membrane space
3. a proton gradient forms across the inner membrane
4. there is a change in the permeability of the inner mitochondrial membrane toward Adenosine Diphosphate (ADP)

90.
Consider the following statements about biomedical technologies
(A) During open heart, surgery blood is circulated in the heart-lung machine.
(B) Blockage in coronary arteries X-ray by angiography.
(C) Computerized Axial Tomography (CAT) shows a detailed internal structure as seen in a section of the body.
(D) X-ray provides clear and detailed images of organs like prostate glands and lungs. Which two of the above statements are correct?

1. B and D
2. C and D
3. A and C
4. A and B

91.
Consider the following statements concerning food chains
(A) removal of 80% tigers from an area resulted in greatly increased growth of vegetation
(B) removal of most of the carnivores resulted in an increased population of deers
(C) the length of food chains is generally limited to 3-4 trophic levels due to energy
(D) the length of food chains may vary from 2 to 8 trophic levels
Which two of the above statements are correct?

1. B and C
2. C and D
3. A and D
4. A and B

92.
Ascaris is characterized by

1. absence of true coelom but presence of metamerism
2. presence of neither true coelom nor metamerism
3. presence of true coelom but absence of metamerism
4. presence of true coelom and metamerism (metamerisation)

93.
Consider the following four statements (A-D) about certain desert animals such as kangaroo rat
(A) they have dark colour and high rate of reproduction and excrete solid urine.
(B) they do not drink water, breathe at a slow rate to conserve water and have their body covered with thick hairs.
(C) they feed on dry seeds and do not require drinking water.
(D) they excrete very concentrated urine and do not use water to regulate body temperature.
Which two of the above statements for such animals are true?

1. C and D
2. B and C
3. C and A
4. A and B

94.
Which one of the following is incorrect about the characteristics of protobionts (coacervates and microspheres) as envisaged in the abiogenic origin of life?

1. They were not able to reproduce
2. They could separate combinations of molecules from the surroundings
3. They were partially isolated from the surroundings
4. They could maintain an internal environment

95.

Which one of the following groups of three animals each is correctly matched with their one characteristic morphological feature?

Animals	Morphological feature
(a) Liver fluke, sea anemone, sea cucumber	Bilateral symmetry
(b) Centipede, prawn, sea urchin	Jointed appendages
(c) Scorpion spider, cockroach	Ventral solid central nervous system
(d) cockroach locust, Taenia	Metameric segmentation

1. a
2. b
3. c
4. d

96.

The fruit is chambered, developed from inferior ovary and has seeds with succulent testa in

1. pomegranate
2. orange
3. guava
4. cucumber

97.

Which one of the following is the correct percentage of the two (out of the total of 4) green-house gases that contribute to the total global warming?

1. CFCs 14%, CH4 20%
2. CO2 40%, CFCs 30%
3. N2O 6%, CO2 86%
4. CH4 20%, N2O 18%

98.

World Summit on Sustainable Development (2002) was held in

1. Brazil
2. Sweden
3. Argentina
4. South Africa

99.

Quercus species are the dominant component in

1. temperate deciduous forests
2. alpine forests
3. scrub forests
4. tropical rain forests

100.

Which one of the following is the true description about an animal concerned?

1. Cockroach – 10 pairs of spiracles (2 pairs on thorax and 8 pairs on abdomen)
2. Earthworm – The alimentary canal consists of a sequence of pharynx, oesophagus, stomach, gizzard and intestine
3. Frog – Body divisible into three regions -head, neck and trunk
4. Rat – Left kidney is slightly higher in position than the right one

101.

If the lattice parameter for a crystalline structure is 3.6 Å, then the atomic radius in fcc crystal is

1. 1.81 Å
2. 2.10 Å
3. 2.92 Å
4. 1.27 Å

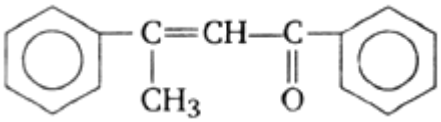
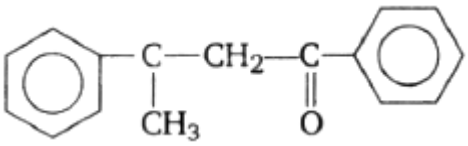
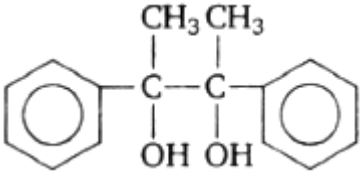
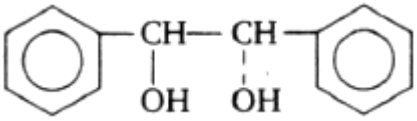
102.

Equal volumes of three acid solutions of pH 3, 4 and 5 are mixed in a vessel. What will be the H^+ ion concentration in the mixture?

1. 1.11×10^{-4} M
2. 3.7×10^{-4} M
3. 3.7×10^{-3} M
4. 1.11×10^{-3} M

103.

Acetophenone when reacted with a base, C_2H_5ONa, yields a stable compound which has the structure

1. 
2. 
3. 
4. 

104.
The angular shape of ozone molecule (O_3) consists of

1. 1 sigma and 2 pi bonds
2. 2 sigma and 2 pi bonds
3. 1 sigma and 1 pi bonds
4. 2 sigma and 1 pi bonds

105.

On the basis of the following E^O values, the strongest oxidizing agent is

$\left[Fe(CN)_6\right]^{4-} \rightarrow \left[Fe(CN)_6\right]^{3-} + e^-;\ E^o = -0.35\ V$
$Fe^{2+} \rightarrow Fe^{3+} + e^-;\ E^o = -0.77\ V$

$[Fe(CN)_6]^{4-} \rightarrow [Fe(CN)_6]^{3-} + e^-;\ E^o = -0.35\ V$
$Fe^{2+} \rightarrow Fe^{3+} + e^-;\ E^o = -0.77\ V$

1. $\left[Fe(CN)_6\right]^{4+}$
2. Fe^{2+}
3. Fe^{3+}
4. $\left[Fe(CN)_6\right]^{3-}$

106.
Green chemistry means such reactions which

1. produce colour during reactions
2. reduce the use and production of hazardous chemicals
3. are related to the depletion of ozone layer
4. study the reactions in plants

107.
Which of the following are not state functions?
(I) q + W
(II) q
(III) W
(IV) H - TS

1. (I) and (IV)
2. (II), (III) and (IV)
3. (I), (II) and (III)
4. (II) and (III)

108.

If uncertainty in position and momentum are equal, then uncertainty in velocity is

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

109.
The correct order of decreasing second ionization enthalpy of Ti(22), V(23), Cr (24) and Mn(25) is

1. Cr > Mn > V > Ti
2. V > Mn > Cr > Ti
3. Mn > Cr > Ti > V
4. Ti > V > Cr > Mn

110.
The relative reactivities of acyl compounds towards nudeophilic substitution are in the order of

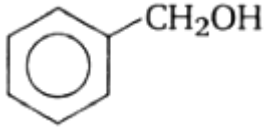
1. Acyl chloride > Acid anhydride > Ester > Amide
2. Ester > Acyl chloride > Amide >Acid anhydride
3. Acid anhydride > Amide > Ester > Acyl chloride
4. Acyl chloride > Ester > Acid anhydride > Amide

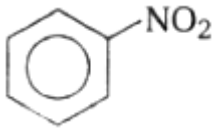
111.
Kohlrausch's law states that at

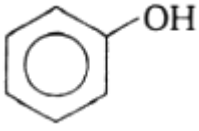
1. finite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte, whatever be the nature of the other ion of the electrolyte.
2. infinite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte depending on the nature of the other ion of the electrolyte.
3. infinite dilution, each ion makes definite contribution to conductance of an electrolyte whatever be the nature of the other ion of the electrolyte.
4. infinite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte, whatever be the nature of the other ion of the electrolyte.

112.

Which one of the following is most reactive towards electrophilic attack?

1. 

2. 

3. 

4. 

113.

Volume occupied by one molecule of water (density = 1 g cm^{-3}) is

1. 9.0×10^{-23} cm^3
2. 6.023×10^{-23} cm^3
3. 3.0×10^{-23} cm^3
4. 5.5×10^{-23} cm^3

114.

Which of the following complexes exhibits the highest paramagnetic behavior ?
where gly = glycine, en = ethylene Jiamine and bpy = bipyridyl moieties
(At no : Ti= 22 V = 21! Fe = 26, Co = 27)

1. $\left[V(gly)_2(OH)_2\left(NH_3\right)_2\right]^+$
2. $\left[Fe(en)\ (bpy)\ \left(NH_3\right)_2\right]^{2+}$
3. $\left[Co(OX)_2(OH)_2\right]^-$
4. $\left[Ti\left(NH_3\right)_6\right]^{3+}$

115.
If a gas expands at constant temperature, it indicates that

1. kinetic energy of molecules decreases
2. pressure of the gas increases
3. kinetic energy of molecules remains the same
4. number of the molecules of gas increases

116.
For the gas phase reaction,

$PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

which of the following conditions are correct?

1. $\Delta H = 0$ and $\Delta S < 0$
2. $\Delta H > 0$ and $\Delta S > 0$
3. $\Delta H < 0$ and $\Delta S < 0$
4. $\Delta H > 0$ and $\Delta S < 0$

117.

In a S_N2 substitution reaction of the type

$$R - Br + Cl^- \xrightarrow{DMF} R - Cl + Br^-$$

which one of the following has the highest relative rate?

1. $CH_3 - CH_2 - CH_2Br$
2. $CH_3 - \underset{\underset{Br}{|}}{CH} - CH_2Br$
3. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2Br$
4. CH_3CH_2Br

118.

Number of moles of MnO_4^- required to oxidise one mole of ferrous oxalate completely in acidic medium will be

1. 0.6 mole
2. 0.4 mole
3. 7.5 moles
4. 0.2 mole

119.

If the concentration of OH ' ions in the reaction

$Fe(OH)_3(s) \rightleftharpoons Fe^{3+}(aq) + 3OH^-(aq)$ is

decreased by $\frac{1}{4}$ times, then equilibrium concentration of Fe^{3+} will increase by

1. 8 times
2. 16 times
3. 64 times
4. 4 times

120.

The sequence of ionic mobility in aqueous solution is

1. $K^+ > Na^+ > Rb^+ > Cs^+$
2. $Cs^+ > Rb^+ > K^+ > Na^+$
3. $Rb^+ > K^+ > Cs^+ > Na^+$
4. $Na^+ > K^+ > Rb^+ > Cs^+$

121.

The alkali metals form salt-like hydrides by the direct synthesis at elevated temperature. The thermal stability of these hydrides decreases in which of the following orders?

1. CsH > RbH > KH > NaH > LiH
2. KH > NaH > LiH > CsH > RbH
3. NaH > LiH > KH > RbH > CsH
4. LiH > NaH > KH > RbH > CsH

122.

Which one of the following arrangements does not give the correct picture of the trends indicated against it?

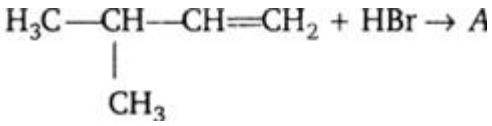
1. $F_2 > Cl_2 > Br_2 > I_2$: Oxidising power
2. F<Cl>Br>I : Electron gain enthalpy
3. $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy
4. F> Cl > Br > I : Electronegativity

123.

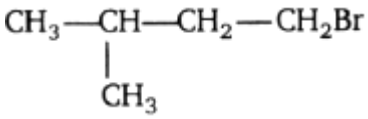
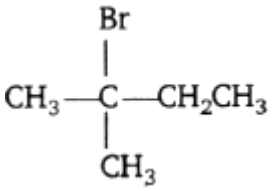
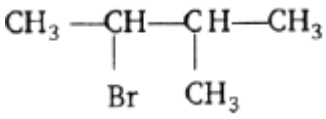
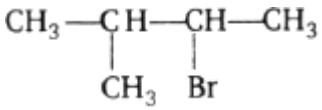
Standard free energies of formation(in kJ/mol) at 298 K are -237.2, -394.4 and -8.2 for $H_2O(l)$, $CO_2(g)$ and pentane (g), respectively. The value of E_{cell} for the pentane-oxygen fuel cell is

1. 1.968 V
2. 2.0968 V
3. 1.0968 V
4. 0.0968 V

124.



A (Predominantly) is

1. 
2. 
3. 
4. 

125.
Base strength of
(1) CH_3-CH_2^-
(2) $H_2C{=}CH^-$
(3) $HC{\equiv}C^-$
is in the order of

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

126.
Which of the following statements is not correct?

1. The fraction of the total volume occupied by die atoms in a primitive cell is 0.48
2. Molecular solids are generally volatile
3. The number of carbon atoms in an unit cell of diamond is 8
4. The number of Bravais lattices in which a crystal can be categorized is 14

127.

If 'a' stands for the edge length of the cubic systems : simple cubic, body centred cubic and face centred cubic, then the ratio of radii of the spheres in these systems will be respectively,

1. $\frac{1}{2}a;\ \frac{\sqrt{3}}{4}a : \frac{1}{2\sqrt{2}}a$
2. $\frac{1}{2}a;\ \sqrt{3}a : \frac{1}{\sqrt{2}}a$
3. $\frac{1}{2}a;\ \frac{\sqrt{3}}{2}a : \frac{\sqrt{2}}{2}a$
4. $1a;\ \sqrt{3}a : \sqrt{2}a$

128.

The rate constants k_1 and k_2 for two different reactions are $10^{16}.\ e^{-2000/T}$ and $10^{15}.\ e^{-1000/T}$, respectively. The temperature at which $k_1 = k_2$ is

1. 1000 K
2. $\frac{2000}{2.303}$ K
3. 2000 K
4. $\frac{1000}{2.303}$ K

129.
What volume of oxygen gas(O_2) measured at 0^0C and 1 atm, is needed to burn completely 1 L of propane gas (C_3H_8) measured under the same conditions?

1. 7L
2. 6 L
3. 5 L
4. 10 L

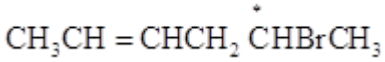
130.

The correct order of increasing bond angles in the following triatomic species is

1. $NO_2^- < NO_2^+ < NO_2$
2. $NO_2^- < NO_2 < NO_2^+$
3. $NO_2^+ < NO_2 < NO_2^-$
4. $NO_2^+ < NO_2^- < NO_2$

131.

How many stereoisomers does this molecule have?



1. 4
2. 6
3. 8
4. 2

132.
Equimolar solutions of the following were prepared in water separately. Which one of the solutions will record the highest pH?

1. $SrCI_2$
2. $BaCl_2$
3. $MgCl_2$
4. $CaCl_2$

133.

Four diatomic species are listed below in different sequences. Which of these presents the correct order of their increasing bond order?

1. $O_2^- < NO < C_2^{2-} < He_2^+$
2. $NO < C_2^{2-} < O_2^- < He_2^+$
3. $C_2^{2-} < He_2^+ < NO < O_2^-$
4. $He_2^+ < O_2^- < NO < C_2^{2-}$

134.
Percentage of free space in a body centred cubic unit cell is

1. 30%
2. 32%
3. 34%
4. 28%

135.
An organic compound contains carbon, hydrogen and oxygen. Its elemental analysis gave C, 38.71% and H, 9.67%. The empirical formula of the compound would be

1. CH_3O
2. CH_2O
3. CHO
4. CH_40

136.
The measurement of the electron position is associated with uncertainty in momentum, which is equal to 1×10^{-18} g cm s^{-1}. The uncertainty in electron velocity is, (mass of an electron is 9×10^{-28} g)

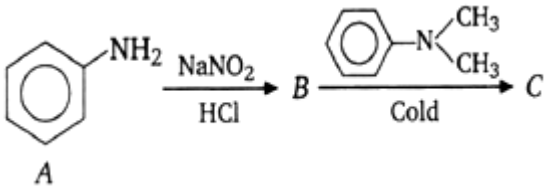
1. 2×10^9 cm s^{-1}
2. 1×10^9 cm s^{-1}
3. 1×10^5 cms^{-1}
4. 1×10^{11} cm s^{-1}

137.
How many moles of lead (II) chloride will be formed from a reaction between 6.5 g of
PbO and 3.2 g of HCl?

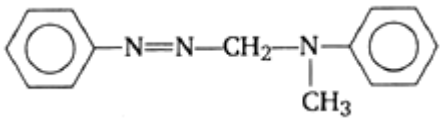
1. 0.044
2. 0.333
3. 0.011
4. 0.029

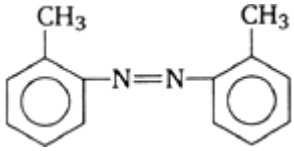
138.

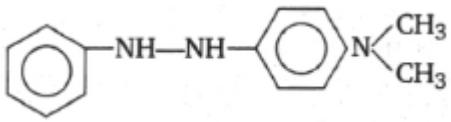
In a reaction of aniline a coloured product C was obtained.

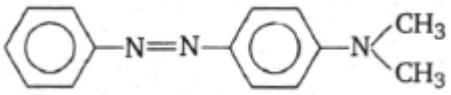


The structure of C would be

1. 

2. 

3. 

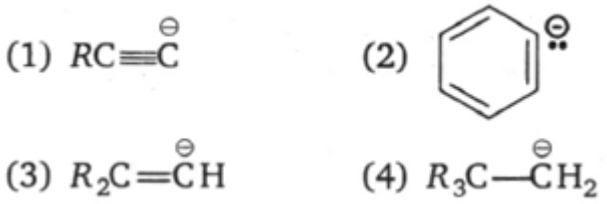
4. 

139.
A strong base can abstract an α- hydrogen from

1. alkene
2. amine
3. ketone
4. alkane

140.

The stability of carbanions in the following



is in the order of

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

141.
Bond dissociation enthalpy of H_2, Cl_2 and HCl are 434, 242 and 431 kJ mol^{-1} respectively. Enthalpy of formation of HCl is

1. 93 kJ mol^{-1}
2. - 245 kJ mol^{-1}
3. -93 kJ mol^{-1}
4. 245 kJ mol^{-1}

142.

The dissociation equilibrium of a gas AB_2 can be represented as

$$2AB_2(g) \rightleftharpoons 2AB(g) + B_2(g)$$

The degree of dissociation is 'x' and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant K_P and total pressure p is

1. (2KP/p)
2. $(2Kp/p)^{1/3}$
3. $(2KP/p)^{1/2}$
4. (KP/P)

143.
Which one of the following is an amine hormone?

1. Thyroxine
2. Oxypurin
3. Insulin
4. Progesterone

144.
Which one of the following statements is not true?

1. in vulcanisation, the formation of sulphur bridges between different chains make rubber harder and stronger
2. Natural rubber has the trans-configuration at every double bond
3. Buna-S is a copolymer of butadiene and styrene
4. Natural rubber is a 1,4-polymer of isoprene

145.

In the hydrocarbon

$$\overset{6}{CH_3} - \overset{5}{CH} = \overset{4}{CH} - \overset{3}{CH_2} - \overset{2}{C} \equiv \overset{1}{CH}$$

The state of hybridization of carbons 1,3 and 5 are in the following sequence

1. sp^2, sp, sp^3
2. sp , sp^3, sp^2
3. sp, sp^2, sp^3
4. sp^3, sp^2, sp

146.

The value of K_{P1} and K_{p2} for the reactions

$X \rightleftharpoons Y + Z$ …(i)

and $A \rightleftharpoons 2B$ …(ii)

are in ratio of 9 : 1. If degree of dissociation of X and. A be equal, then total pressure at equilibrium(i) and (ii) are in the ratio

1. 3 : 1
2. 1 : 9
3. 36 : 1
4. 1 : 1

147.

In DNA, die complimentary bases are

1. Adenine and thymine; guanine and cytosine
2. Adenine and thymine; guanine and uracil
3. Adenine and guanine, thymine and cytosine
4. Uracil and adenine; cytosine and guanine

148.

The bromination of acetone plat occurs in acid solution is represented by this equation.

$CH_3COCH_3(aq) + Br_2(aq) \rightarrow$

$CH_3COCH_2Br(aq) + H^+(aq) + Br^-(aq)$

These kinetic data were obtained for given reaction concentrations.

Initial concentrations, M

$[CH_3COCH_3]$	$[Br_2]$	$[H^+]$
0.30	0.05	0.05
0.30	0.10	0.05
0.30	0.10	0.10
0.40	0.05	0.20

Initial rate, disappearance of Br_2, Ms^{-1}

5.7×10^{-5}

5.7×10^{-5}

1.2×10^{-4}

3.1×10^{-4}

Based on these data, the rate equation is

1. Rate = $k[CH_3COCH_3][H^+]$
2. Rate = $k[CH = COCH_3][Br_2]$
3. Rate = $k[CH_3COCH_3][Br_2][H^+]^2$
4. Rate = $k[CH_3COCH_3][Br_2][H^+]$

149.

The value of equilibrium constant of the reaction $HI(g) \rightleftharpoons \frac{1}{2}H_2(g) + \frac{1}{2}I_2$ is 8.0 The equilibrium constant of the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ will be

1. $\frac{1}{16}$
2. $\frac{1}{64}$
3. 16
4. $\frac{1}{8}$

150.

In which of the following coordination entities the magnitude of A.(CFSE in octahedral field) will be maximum?
(Atomic number Co = 27)

1. $\left[Co\left(H_2O\right)_6\right]^{3+}$
2. $\left[Co(NH3)_6\right]^{3+}$
3. $\left[Co(CN)_6\right]^{3-}$
4. $\left[Co\left(C_2O_4\right)_3\right]^{3-}$

151.

If the error in the measurement of the radius of a sphere is 2%, then the error in the determination of the volume of the sphere will be:

1. 4%
2. 6%
3. 8%
4. 2%

152.

The electric potential at a point in free space due to a charge Q coulomb is Q x 10^{11} V. The electric field at that point is

1. $4\pi\varepsilon_0 Q \times 10^{22}$ V/m
2. $12\pi\varepsilon_0 Q \times 10^{20}$ V/m
3. $4\pi\varepsilon_0 Q \times 10^{20}$ V/m
4. $12\pi\varepsilon_0 Q \times 10^{22}$ V/m

153.

The voltage gain of an amplifier with 9% negative feedback is 10. Find the voltage gain without feedback will be

1. 90
2. 10
3. 1.25
4. 100

154.

The energy required to charge a parallel plate condenser of plate separation d and plate area of cross-section A such that the uniform electric field between the plates is E, is

1. $\frac{1}{2}\varepsilon_0 E^2/Ad$
2. $\varepsilon_0 E^2/Ad$
3. $\varepsilon_0 E^2 Ad$
4. $\frac{1}{2}\varepsilon_0 E^2 Ad$

155.
A roller coaster is designed such that riders experience "weightlessness" as they go round the top of a hill whose radius of curvature is 20 m. The speed of the car at the top of the hill is between

1. 14 m/s and 15 m/s
2. 15 m/s and 16 m/s
3. 16 m/s and 17 m/s
4. 13 m/s and 14 m/s

156.

The ratio of the radii of gyration of a circular disc to that of a circular ring, each of the same mass and radius, around their respective axes is:

1. $\sqrt{3} : \sqrt{2}$
2. $1 : \sqrt{2}$
3. $\sqrt{2} : 1$
4. $\sqrt{2} : \sqrt{3}$

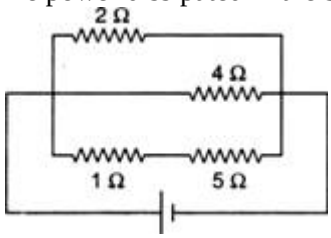
157.
The work function of a surface of a photosensitive material is 6.2 eV. The wavelength of the incident radiation for which the stopping potential is 5 V lies in the

1. ultraviolet region
2. visible region
3. infrared region
4. X-ray region

158.
The ground state energy of hydrogen atom is -13.6 eV. When its electron is in the first excited state, its excitation energy is-

1. 3.4 eV
2. 6.8 eV
3. 10.2 eV
4. zero

159.
A current of 3 A flows through the 2 Ω resistor shown in the circuit. The power dissipated in the 5 Ω resistor is :



1. 4 W
2. 2W
3. 1 W
4. 5W

160.

A p-n photodiode is made of a material with a bandgap of 2.0 eV. The minimum frequency of the radiation that can be absorbed by the material is nearly:

1. 10×10^{14} Hz
2. 5×10^{14} Hz
3. 1×10^{14} Hz
4. 20×10^{14} Hz

161.
Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional forces are 10% of energy. How much power is generated by the turbine? (g = 10 m/s^2)

1. 8.1 kW
2. 10.2 kW
3. 12.3 kW
4. 7.0 kW

162.

On a new scale of temperature, which is linear and called the W scale, the freezing and boiling points of water are 39 °W and 239 °W respectively. What will be the temperature on the new scale corresponding to a temperature of 39°C on the Celsius scale?

1. 78° W
2. 117° W
3. 200° W
4. 1'39° W

163.
If Q, E, and W denote respectively the heat added, change in internal energy, and the work is done in a closed cycle process, then:

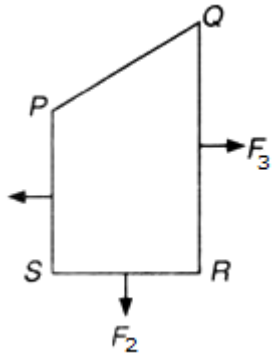
1. W = 0
2. Q =W = 0
3. E = 0
4. Q = 0

164.
Two simple harmonic motions of angular frequency 100 and 1000 rad s^{-1} have the same displacement amplitude. The ratio of their maximum acceleration is:

1. 1: 10
2. 1: 10^2
3. 1: 10^3
4. 1: 10^4

165.

A closed-loop PQRS carrying a current is placed in a uniform magnetic field. If the magnetic forces on segments PS, SR, and RQ are F_1, F_2, and F_3 respectively and are in the plane of the paper and along the directions shown. the force on the segment QP is:



1. $F_3 - F_1 - F_2$
2. $\sqrt{(F_3 - F_1)^2 + F_2^2}$
3. $\sqrt{(F_3 - F_1)^2 - F_2^2}$
4. $F_3 - F_1 + F_2$

166.

Two radioactive materials X_1 and X_2 have decay constants 5λ and λ respectively. If initially they have the same number of nuclei, then the ratio of the number of nuclei of X_1 to that of X_2 will be $\frac{1}{e}$ after a time

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

167.

Two thin lenses of focal lengths f_1 and f_2 are in contact and coaxial. The power of the combination is :

1. $\sqrt{\frac{f_1}{f_2}}$
2. $\sqrt{\frac{f_2}{f_1}}$
3. $\frac{f_1 + f_2}{f_1 f_2}$
4. None of the above

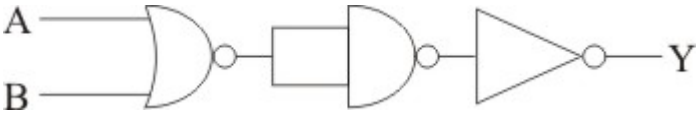
168.

The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}ms^{-2}$, in the third second is

1. 6 m
2. 4 m
3. $\frac{10}{3}$ m
4. $\frac{19}{3}$ m

169.

The circuit is equivalent to:



1. AND gate
2. NAND gate
3. NOR gate
4. OR gate

170.

A particle mass m, charge Q, and kinetic energy T enter a transverse uniform magnetic field of induction $\vec{B}$. After 3sec the kinetic energy of the particle will be :

(a) 3T

(b) 2T

(c) T

(d) 4T

171.
A wire of a certain material is stretched slowly by ten percent, its new resistance and specific resistance become respectively :

1. 1.2 times, 1.1 times
2. 1.21 times, same
3. both remain the same
4. 1.1 times, 1.1 times

172.
An electric kettle takes 4 A current at 220 V. How much time will it take to boil 1 kg of water from temperature 20^{o}C? The temperature of boiling water is 100 °C.

1. 6.3 min
2. 8.4 min
3. 12.6 min
4. 4.2 min

173.
In the phenomenon of electric discharge through gases at low pressure, the colored glow in the tube appears as a result of

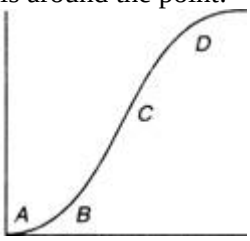
1. excitation of electrons in the atoms
2. collision between the atoms of the gas
3. collisions between the charged particles emitted from the cathode and the atoms of the gas
4. collision between different electrons of the atoms of the gas

174.

A particle of mass 1 mg has the same wavelength as an electron moving with a velocity of 3 x 10^{6} ms^{-1}. The velocity of the particle is :
(Mass of electron = 9.1 x 10^{-31} kg)

1. $2.7 \times 10^{-18}\ ms^{-1}$
2. $9 \times 10^{-2}\ ms^{-1}$
3. $3 \times 10^{-31}\ ms^{-1}$
4. $2.7 \times 10^{-21}\ ms^{-1}$

175.
A particle shows the distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point:



1. B
2. C
3. D
4. A

176.
A cell can be balanced against 100 cm and 110 cm of potentiometer wire, respectively with and without being short-circuited through a resistance of 10 Ω. its internal resistance is :

1. 1.0 Ω
2. 0.5 Ω
3. 2.0 Ω
4. zero

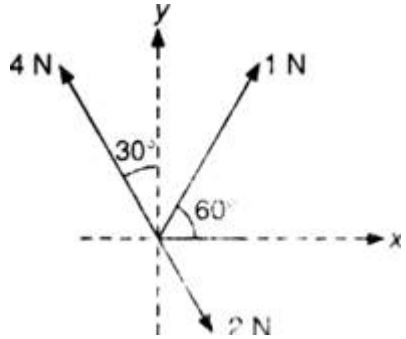
177.

If M (A, Z), M_p, and M_n denote the masses of the nucleus X_Z^A, proton, and neutron respectively in units of u (1 u = 931.5 MeV/c^2) and BE represents its binding energy in MeV, then:

1. $M(A, Z) = ZM_p + (A- Z) M_n - BE/c^2$
2. $M(A, Z) = ZM_p + (A- Z) M_n + BE$
3. $M(A, Z) = ZM_p + (A- Z) M_n - BE$
4. $M(A, Z) = ZM_p + (A- Z) M_n + BE/c^2$

178.

Three forces acting on a body are shown in the figure. To have the resultant force only along the y-direction, the magnitude of the minimum additional force needed is



1. 0. 5 N
2. 1. 5 N
3. $\frac{\sqrt{3}}{4}$ N
4. $\sqrt{3}$ N

179.

Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is

1. $2\left(I_1 + I_2\right)$
2. $\left(\sqrt{I}_1 + \sqrt{I}_2\right)^2$
3. $\left(\sqrt{I}_1 - \sqrt{I}_2\right)^2$
4. $2\left(\sqrt{I}_1 - \sqrt{I}_2\right)$

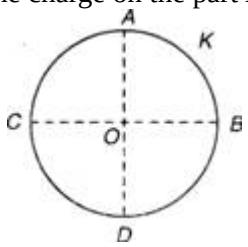
180.

A shell of mass 200 g is ejected from a gun of mass 4 kg by an explosion that generates 1.05 kJ of energy. The initial velocity of the shell is:

1. 100 ms^{-1}
2. 80 ms^{-1}
3. 40 ms^{-1}
4. 120 ms^{-1}

181.

A thin conducting ring of radius R is given a charge +Q. The electric field at the centre O of the ring due to the charge on the part AKB of the ring is E. The electric field at the centre due to the charge on the part ACDB of the ring is



1. 3E along KO
2. E along OK
3. f along KO
4. 3 E along OK

182.

The velocity of electromagnetic radiation in a medium of permittivity ε_0 and permeability μ_0 is given by:

1. $\sqrt{\frac{\varepsilon_o}{\mu_o}}$
2. $\sqrt{\mu_o \varepsilon_o}$
3. $\frac{1}{\sqrt{\mu_o \varepsilon_o}}$
4. $\sqrt{\frac{\mu_o}{\varepsilon_o}}$

183.

A point performs simple harmonic oscillation of period T and the equation of motion is given by $x = a\sin(\omega t + \pi/6)$. After the elapse of what fraction of the time period, the velocity of the point will be equal to half of its maximum velocity?

1. $\frac{T}{8}$
2. $\frac{T}{6}$
3. $\frac{T}{3}$
4. $\frac{T}{12}$

184.

A long solenoid has 500 turns. When a current of 2 A is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4 x 10^{-3} Wb. The self-inductance of the solenoid is

1. 2.5 V
2. 2.0 H
3. 1.0 H
4. 4.0 H

185.

A boy is trying to start a fire by focusing sunlight on a piece of paper using an equiconvex lens of focal length 10 cm. The diameter of the sun is 1.39 x10^{9} m and its mean distance from the earth is 1.5 x 10^{11} m. What is the diameter of the sun's image on the paper?

1. 9.2×10^{-4} m
2. 6.5×10^{4} m
3. 6.5×10^{-5} m
4. 12.4×10^{-4} m

186.

In an AC circuit, the emf (e) and the current (I) at any instant are given respectively by

$e = E_0 \sin wt$

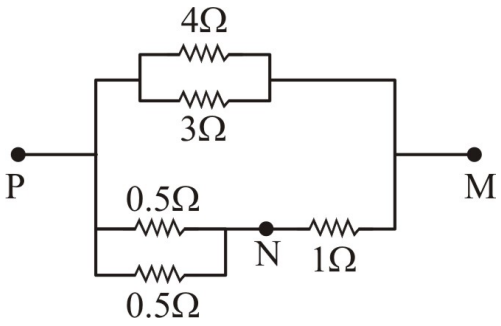
$I = I_0 \sin(\omega t - \phi)$

The average power in the circuit over one cycle of AC is:

1. $\frac{E_o I_o}{2}$
2. $\frac{E_o I_o}{2} \sin\phi$
3. $\frac{E_o I_o}{2} \cos\phi$
4. $E_o I_o$

187.

In the circuit shown, the current through the 4Ω resistor is 1A when the points P and M are connected to a DC voltage source. The potential difference between the points M and N is



1. 1.5 V
2. 1.0 V
3. 0.5 V
4. 3.2 V

188.

A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 ms^{-1} to 20 ms^{-1} while covering a distance 135 m in 't' seconds. The value of 't' is

1. 10
2. 1.8
3. 12
4. 9

189.

A thin rod of length L and mass M is bent at its midpoint into two halves so that the angle between them is 90^{o}. The moment of inertia of the bent rod about an axis passing through the bending point and perpendicular to the plane defined by the two halves of the rod is:

1. $\frac{ML^2}{24}$
2. $\frac{ML^2}{12}$
3. $\frac{ML^2}{6}$
4. $\frac{\sqrt{2}ML^2}{24}$

190.
A circular disc of radius 0.2 m is placed in a uniform magnetic field of induction $\frac{1}{\pi}\left(\frac{Wb}{m^2}\right)$ in such a way that its axis makes an angle of 60^0 with $\vec{B}$. The magnetic flux linked with the disc is:

1. 0.02 Wb
2. 0.06 Wb
3. 0.08 Wb
4. 0.01 Wb

191.

A particle of mass m is projected with velocity v making an angle of 45° with the horizontal. When the particle lands on the level ground, the magnitude of change in its momentum will be:

1. 2mv
2. $mv/\sqrt{2}$
3. $mv\sqrt{2}$
4. zero

192.

Two points are located at a distance of 10 m and 15 m from the source of oscillation. The period of oscillation is 0.05 s and the velocity of the wave is 300 m/s. What is the phase difference between the oscillations of two points?

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

193.
Two nuclei have their mass numbers in the ratio of 1 : 3. The ratio of their nuclear densities would be

1. 1 : 3
2. 3 : 1
3. $(3)^{1/3}$: 1
4. 1 : 1

194.
Sand is being dropped on a conveyor belt at the rate of M kg/s. The force necessary to keep the belt moving with a constant velocity of v m/s will be:

1. Mv Newton
2. 2 Mv Newton
3. $\frac{Mv}{2}$ Newton
4. zero

195.
The wave described by y = 0.25 sin ($10\pi x - 2\pi t$), where x and y are in metre and t in second, is a wave travelling along the:

1. –ve x-direction with frequency 1 Hz
2. +ve x-direction with frequency π Hz and wavelength λ = 0.2 m
3. +ve x-direction with frequency 1 Hz and wavelength λ = 0.2m
4. –ve x-direction with amplitude 0.25 m and wavelength λ = 0.2m

196.
Curie temperatures is the temperature above which

1. Ferromagnetic material becomes paramagnetic material
2. Paramagnetic material becomes diamagnetic material
3. Paramagnetic material becomes ferromagnetic material
4. Ferromagnetic material becomes diamagnetic material

197.

At 10^o C the value of the density of a fixed mass of an ideal gas divided by its pressure is x. At 110^oC this ratio is:

1. x
2. $\frac{383}{283}$x
3. $\frac{10}{110}$x
4. $\frac{283}{383}$x

198.

Which two of the following five physical parameters have the same dimensions?
(1) Energy density
(2) Refractive index
(3) Dielectric constant
(4) Young's modulus
(5) Magnetic field

1. 2 and 4
2. 3 and 5
3. 1 and 4
4. 1 and 5

199.
A galvanometer of resistance 50 Ω is connected to a battery of 3 V along with a resistance of 2950 Ω in series. A full-scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce its deflection to 20 divisions, the resistance in series should be:

1. 5050 Ω
2. 5550 Ω
3. 6050 Ω
4. 4450 Ω

200.
With which one of the following elements silicon should be doped so as to give p-type of semiconductor?

1. Germanium
2. Arsenic
3. Selenium
4. Boron