Biology

1. Motile zygote of Plasmodium occurs in
1. Gut of female Anopheles
2. Salivary glands of Anopheles
3. Human RBCs
4. Human liver

2. The human hind brain comprises three parts, one of which is
1. Cerebellum
2. Hypothalamus
3. Spinal
4. Corpus callosum

3. Which part of the human ear plays no role in hearing as such but is otherwise very much required?
1. Eustachian tube
2. Organ of Corti
3. Vestibular apparatus
4. Ear ossicles

4. The most abundant prokaryotes helpful to human in making curd from milk and in production of antibiotics are the ones categorized as
1. Cyanobacteria
2. archaebacteria
3. Chemosynthetic autotrophs
4. Heterotrophic bacteria

5. Which one of the following statements is false in respect of viability of mammalian sperm?
1. Sperm is viable for only up to 24 hours
2. Survival of sperm depends on the pH of the medium and is more active in alkaline medium
3. Viability of sperm is determined by its motility
4. Sperms must be concentrated in a thick suspension

6. Evolution of different species in a given area starting from a point and spreading to other geographical areas is known as
1. Adaptive radiation
2. natural selection
3. Migration
4. divergent evolution

7. What is the figure given below showing in particular?
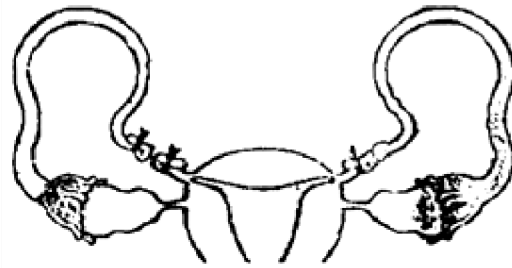
1. Ovarian cancer
2. Uterine cancer
3. Tubectomy
4. Vasectomy

8. In an area where DDT had been used extensively, the population of birds declined significantly because
1. Birds stopped laying eggs
2. Earthworms in the area got eradicated
3. Cobras were feeding exclusively on birds
4. Many of the birds laid eggs, but eggs did not hatch

9.
The figure below is the diagrammatic representation of the E. coli vector pBR 322. Which one of the given options correctly identifies its certain components (s)?
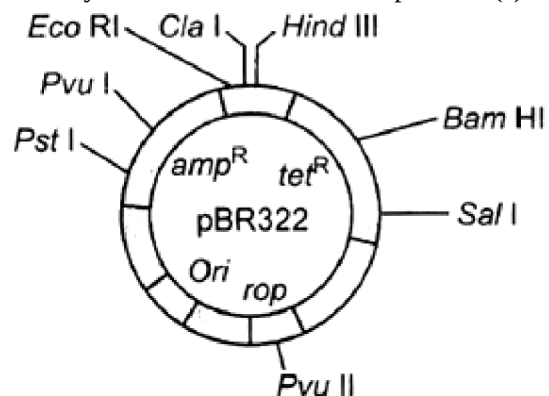
1. Ori-original restriction enzyme
2. rap-reduced osmotic pressure
3. Hind III, Eco RI-selectable markers
4. amp^R, $teti^R$-antibiotic resistance genes

10. The common bottle cork is a product of
1. dermatogen
2. phellogen
3. xylem
4. vascular cambium

11. Widal test is carried out to test
1. Malaria
2. Diabetes mellitus
3. HIV/AIDS
4. typhoid fever

12. Which part would be most suitable for raising virus-free plants for micro propagation?
1. Bark
2. Vascular tissue
3. Meristem
4. Node

13. Which one of the following is a wrong statement?
1. Most of the forests have been lost in tropical areas
2. Ozone in upper part of atmosphere is harmful to animals
3. Greenhouse effect is a natural phenomenon
4. Eutrophication is a natural phenomenon in freshwater bodies

14. Companion cells are closely associated with
1. Sieve elements
2. Vessel elements
3. Trichomes
4. guard cells

15. Common cold differs from pneumonia in, that
1. Pneumonia is a communicable disease, whereas the common cold is a nutritional deficiency disease
2. Pneumonia can be prevented by a live attenuated bacterial vaccine, whereas the comon cold has no effective vaccine
3. Common cold is caused by a virus, while the Pneumonia is caused by the bacterium.
4. Pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs

16. Pheretima and its close relatives derive nourishment from
1. Sugarcane roots
2. Decaying fallen leaves and soil organic matter
3. Soil insects
4. Small pieces of fresh fallen leaves of maize

17. Removal of RNA polymerase III from nucleoplasm will affect the synthesis of
1. tRNA
2. hnRNA
3. mRNA
4. rRNA

18. A process that makes an important difference between C_3 and C_4 plants is
1. Transpiration
2. glycolysis
3. Photosynthesis
4. Photorespiration

19. PCR and Restriction Fragment Length Polymorphism are the methods for
1. Study of enzymes
2. Genetic transformation
3. DNA sequencing
4. Genetic fingerprinting

20. Best defined function of manganese in green plants is
1. Photolysis of water
2. Calvin cycle
3. Nitrogen fixation
4. Water absorption

21. Measuring Biochemical Oxygen Demand (BOD) is a method used for
1. Estimating the amount of organic matter in sewage water
2. Working out the efficiency of oil driven automobile engines
3. Measuring the activity of Saccharomyces cerevisae in producing curd on a commercial scale
4. Working out the efficiency of RBCs about their capacity to carry oxygen

22. Which one of the following is not a part of a transcription unit in DNA?
1. The inducer
2. A terminator
3. A promoter
4. The structural gene

23. A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor?
1. Blood group B
2. Blood group AB
3. Blood group O
4. Blood group A

24. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin-A deficiency?
1. Flaver savr tomato
2. Canolla
3. Golden rice
4. Bt-brinjal

25. The maximum amount of electrolytes and water (70-80%) from the glomerular filtrate is reabsorbed in which part of the nephron?
1. Ascending limb of loop of Henle
2. Distal convoluted tubule
3. Proximal convoluted tubule
4. Descending limb of loop of Henle

26. Both, autogamy and geitonogamy are prevented in
1. Papaya
2. Cucumber
3. Castor
4. Maize

27. Placentation in tomato and lemon is
1. Parietal
2. free central
3. marginal
4. axile

28. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neurohormonal control system?
1. Sympathetic nervous system activated releasing epinephrine and norepinephrine from adrenal medulla
2. Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse
3. Hypothalamus activates thge parasympathetic division of brain
4. Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal cortex

29. Which one of the following is not a gaseous biogeochemical cycle in ecosystem?
1. Sulphur cycle
2. Phosphorus cycle
3. Nitrogen cycle
4. Carbon cycle

30. A single strand of nucleic acid tagged with a radioactive molecule is called
1. vector
2. selectable marker
3. Plasmid
4. Probe

31. Which one of the following options give one correct example each of convergent evolution and divergent evolution?

	Convergent Evolution	Divergent Evolution
(a)	Eyes of octopus and mammals	Bones of forelimbs of vertebrates
(b)	Thorns of Bougain-villia and tendrils Cucurbita	Wings of butterflies and birds
(c)	Bones of forelimbs of vertebrates	Wings of butterfly and birds
(d)	Thorns of Bougain-villia and tendrils of Cucurbita	Eyes of Octopus and mammals

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

32. An organic substance that can withstand environmental extremes and cannot be degraded by any enzyme is :
1. Cuticle
2. Sporopollenin
3. Lignin
4. Cellulose

33. Cycas and Adiantum resemble each other in having
1. Seeds
2. Motile sperms
3. Cambium
4. Vessels

34. What was the most significant trend in the evolution of modem man (Homo sapiens) from his ancestors?
1. Shortening of jaws
2. Binocular vision
3. Increasing cranial capacity
4. upright posture

35. Cymose inflorescence is present in
1. Solanum
2. Sesbania
3. Trifolium
4. Brassica

36. Ribosomal RNA is actively synthesized in
1. Lysosomes
2. Nucleolus
3. Nucleoplasm
4. Ribosomes

37. During gamete formation, the enzyme recombinase participates during
1. Metaphase-I
2. Anaphase-II
3. Prophase-I
4. Prophase-II

38. Identify the possible link A in the following food chain
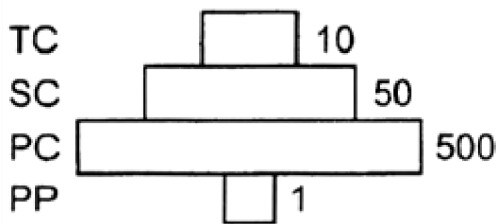Green plant→Insect→Frog→A→Eagle
1. Rabbit
2. Wolf
3. Cobra
4. Parrot

39. Phyllode is present in
1. Asparagus
2. Euphorbia
3. Australian Acacia
4. Opuntia

40.
Given below is an imaginary pyramid of numbers. What could be one of the possibilities about certain organisms at some of the different levels?

1. Level PC is insects and level SC is small insectivorous birds
2. Level PP is phytoplanktons sea and Whale on top level TC
3. Level one PP is pipal trees and the level SC is sheep
4. Level PC is rats and level SC is cats

41. Monascus purpureus is yeast used commercially in the production of
1. Etyhanol
2. Streptokinase for removing clots from the blood vessels
3. Citric acid
4. Blood cholesterol lowering statins

42. The correct sequence of cell organelles during photorespiration is
1. chloroplast-Golgi bodies-mitochondria
2. chloroplast-rough endoplasmic reticulum-dictyosomes
3. chloroplast-mitochondria-peroxisome
4. chloroplast-vacuole-peroxisome

43. Which one of the following is correctly matched?
1. Passive transport of nutrients-ATP
2. Apoplast- Plasmodesmata
3. Potassium- Readily mobilized
4. Bakane of rice seedlings-F Skoog

44. A normal-visioned man whose father was color blind marries a woman whose father was also colorblind. They have their first child as a daughter. What are the chances. That this child would be colorblind?
1. 100%
2. 0%
3. 25%
4. 50%

45. Signals for parturition originate from
1. Both placenta as wel as fully developed foetus
2. Oxytocin released from maternal pituitary
3. Placenta only
4. Fully developed foetus only

46. A patient brought to a hospital with myocardial infarction is normally immediately given
1. Penicillin
2. streptokinase
3. cyclosporin-A
4. statins

47. Which one of the following is not a property of cancerous cells, whereas the remaining three are?
1. They compete with normal cells for vital nutrients
2. They do not remain confined in the area of formation
3. They divine in an uncontrolled manner
4. They show contact inhibition

48. The gynoecium consists of many free pistils in flowers of
1. Aloe
2. Tomato
3. Papaver
4. Michelia

49. Which one of the following is not a functional unit of an ecosystem?
1. Energy flow
2. Decomposition
3. Productivity
4. Stratification

50. In a normal pregnant woman, the amount of total gonadotropin activity was assessed. The result expected was
1. High level of circulating FSH and LH in the uterus to stimulate implantation of the embryo
2. High level of circulating HCG to stimulate endometrial thickening
3. High levels of FSH and LH in uterus to stimulate endometrial thickening
4. High level of circulating HCG to stimulate oestrogen and progesterone synthesis

51. Which one of the following areas in India is a hot spot of biodiversity?
1. Eastern Ghats
2. Gangetic plain
3. Sunder bans
4. Western Ghats

52. Which one of the following is a correct statement?
1. Pteridophyte gametophyte has a protonemal and leafy stage
2. In gymnosperms female gametophyte is free-living
3. Antheridiophores and protonema are present in pteridophytes
4. Origin of seed habit can be traced in pteridophytes

53. Which one of the following does not differ in E.coli and Chlamydomonas?
1. Ribosomes
2. Chromosomal organization
3. Cell wall
4. Cell membrane

54. The cyanobacteria are also referred to as
1. Protists
2. golden algae
3. Slime moulds
4. Blue-green algae

55. The test-tube baby programme employs which one of the following techniques?
1. Intra Cytoplasmic Sperm Injection (ICSI)
2. Intra Uterine Insemination (IUI)
3. Gamete Intra Fallopian Transfer (GIFT)
4. Zygote Intra Fallopian Transfer(ZIFT)

56. Which one of the following is a case of wrong matching?
1. Somatic hybridization- Fusion of two diverse cells
2. Vector DNA- Site for tRNS synthesis
3. Micropropagation- In vitro production of plants in large numbers
4. Callus - Unorganized mass of cells produced in tissue culture

57. The highest number of species in the world is represented by
1. Fungi
2. Mosses
3. Algae
4. Lichens

58. In which one of the following options the two examples are correctly matched with their particular type of immunity?

Examples	Type of immunity
(a) Polymorphonuclear leukocytes and monocytes	Cellular barriers
(b) Anti-tetanus and anti-snake bite injection	Active immunity
(c) Saliva in mouth and tears in eyes	Physical barriers
(d) Mucus coating of epithelium lining the urinogenital tract and the HCl in stomach	Physiological barriers

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

59. Which one of the following is wrong statement?
1. Anabaena and Nostoc are capable of fixing nitrogen in free- living state also
2. Root nodule forming nitrogen fixers live as aerobes under free-living conditions
3. Phosphorus is a constituents of cell membranes, certain nucleic acids and all proteins
4. Nitrosomonas and Nitrobacter are chemoautotrophs

60. Anxiety and eating spicy food together in an otherwise normal human, may lead to
1. Indigestion
2. Jaundice
3. Diarrhoea
4. vomiting

61. The Leydig cells as found in the human body are the secretory source of
1. Progesterone
2. Intestinal mucus
3. Glocagon
4. Androgens

62. Compared to those of humans, the erythrocytes in frog are
1. Without nucleus but with haemoglobin
2. Nucleated and with haemoglobin
3. Very much smaller and fewer
4. Nucleated and without haemoglobin

63. In which one of the following, the genus name, its two characters and its phylum are not correctly matched, whereas the remaining three are correct?

	Genus Name		Two Characters	Phylum
(a)	Pila	(i) (ii)	Body segmented Mouth with Radula	Mollusca
(b)	Asterias	(i) (ii)	Spiny skinned Water vascular system	Echinodermata
(c)	Sycon	(i) (ii)	Pore bearing Canal system	Porifera
(d)	Periplaneta	(i) (ii)	Jointed appendages Chitinous exoskeleton	Arthropoda

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

64. What is true about ribosomes?
1. The prokaryotic ribosomes are 80S, where S stands for sedimentation coefficient
2. These are composed of ribonucleic acid and proteins
3. These are found only in eukaryotic cells
4. These are self-splicing introns of some RNAs

65. Cirrhosis of liver is caused by the chronic intake of
1. Opium
2. Alcohol
3. Tobacco (chewing)
4. Cocaine

66. Which one is a true statement regarding DNA polymerase used in PCR?
1. It is used to ligate introduces DNA in recipient cells
2. It serves as a selectable marker
3. It is isolated from a virus
4. It remains active at high temperature

67. Which statement is wrong for viruses?
1. All are parasites
2. All of them have helical symmetry
3. They have the ability to synthesize nucleic acids and proteins
4. Antibiotics have no effect on them

68. Which one of the following is correctly matched?
1. Onion - Bulb
2. Ginger - Sucker
3. Chlamydomonas - Conidia
4. Yeast - Zoospores

69. How many plants in the list given below have composite fruits that develop from an inflorescence?
Walnut, poppy, radish, fig, pineapple, apple, tomato, mulberry
1. Four
2. Five
3. Two
4. Three

70. Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the category shown and the one blank component X in it
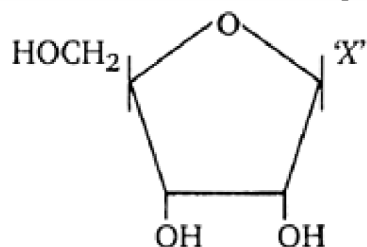
Category   Component
1. Cholesterol   Guanin
2. Amino acid NH_2
3. Nucleotide   Adenine
4. Nucleoside   Uracil

71. Which one of the following microbes forms a symbiotic association with plants and helps them in their nutrition?
1. Azotobacter
2. Aspergillus
3. Glomus
4. Trichoderma

72. The extinct human who lived 100000 to 40000 years ago, in Europe, Asia and parts of Africa, with short stature, heavy eye brows, retreating for heads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was
1. Homo habilis
2. Neanderthal human
3. Cro-Magnon humans
4. Ramapithecus

73. If one strand of DNA has the nitrogenous base sequence as ATCTG, what would be the complementary RNA strand sequence?
1. TTAGU
2. UAGAC
3. AACTG
4. ATCGU

74. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (mostly in the nucleus)?
1. Insulin and gucagon
2. Thyroxin and insulin
3. Somatosatin and oxytocin
4. Cortisol and testosterone

75. Nuclear membrane is absent in
1. Penicillium
2. Agaricus
3. Volvox
4. Nostoc

76. Which one is the most abundant protein in the animal world?
1. Trypsin
2. Haemoglobin
3. Collagen
4. Insulin

77. Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses?
1. Diplontic life cycle
2. Members of kingdom-Plantae
3. Mode of nutrition
4. Multiplication by fragmentation

78. Which one single organism or the pair of organisms is correctly assigned to its or their named taxonomic group'?
1. Paramecium and Plasmodium belong to the same kingdom as that of Penicillium
2. Lichen is a composite organism formed from the symbiotic association of an algae and a protozoan
3. Yeast is used in making bread and brew is a fungus
4. Nostoc and Anabaena are examples of Protista

79. Even in absence of pollinating agents seed-setting is assured in
1. Commellina
2. Zostera
3. Salvia
4. Fig

80. Yeast is used in the production of
1. Citric acid and lactic acid
2. Lipase and pectinase
3. Bread and beer
4. Cheese and butter

81. Which one out of A-D given below correctly represents the structural formula of the basic amino acid?

A	B	C	D
NH_2 | $H-C-COOH$ | CH_2 | CH_2 | C $\underset{O}{\overset{}{\diagdown}} OH$	NH_2 | $H-C-COOH$ | CH_2 | CH_2 | OH	CH_2OH | CH_2 | CH_2 | NH_2	NH_2 | $H-C-COOH$ | CH_2 | CH_2 | CH_2 | CH_2 | CH_2 | NH_2

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

82. The upright pyramid of number is absent in
1. Pond
2. Forest
3. Lake
4. Grassland

83. What is correct to say about the hormone action in humans?
1. Glucagon is secreted by β-cells of islet of Langerhans and stimulates glycogenolysis
2. Secretion of thymosine is stimulates with ageing
3. In females, FSH first binds with specific receptors on overian cell membrane
4. FSH stimulates the sevretion of oestrogen and progesterone

84. Closed vascular bundles lack
1. Ground tissue
2. Conjective tissue
3. Cambium
4. Pith

85. Which one of the following is the correct statement for respiration in humans?
1. Cigarette smoking may lead to inflammation of bronchi
2. Neural signals from pneumotaxic centre in pons region of brain can increase the duration of inspiration
3. Workers in grinding and stone breaking industries may suffer, from lung fibrosis
4. About 90% of carbon dioxide(CO_2) is carried by haemoglobin as carbamino haemoglobin

86. Removal of introns and joining of exons in a defined order during transcription is called
1. Looping
2. Inducing
3. Slicing
4. Splicing

87. F_2 generation in a Mendelian cross showed that both genotypic and phenotypic ratios are same as 1: 2: 1. It represents a case of
1. Co - dominance
2. Dihybrid crosses
3. Monohybrid crosses with complete dominane
4. Monohybrid cross with incomplete dominance

88. Given below is the representation of a certain event at a particular stage of a type of cell division. Which is this stage?
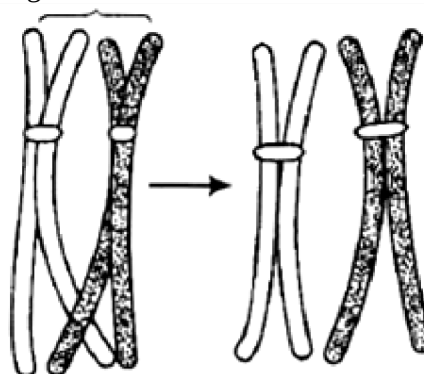
1. Prophase-I during meiosis
2. Prophase-II during meiosis
3. Prophase of mitosis
4. Both prophase and metaphase of mitosis

89. People who have migrated from the planes to an area adjoining Rohtang Pass about six months back
1. Have more RBCs and their haemoglobin has lower binding affinity to O_2
2. Are not physically fit to play games like football
3. Suffer from altitude sichness with symptoms like nausea, fatigue, etc.
4. have the usual RBC count but their haemoglobin has very binding affinity to O_2

90. For transformation, microparticles coated with DNA to be bombarded with gene gun are made up of
1. Silver or platinum
2. Platinum or zinc
3. Silicon or platinum
4. Gold or tungsten

91. A nitrogen-fixing microbe associated with Azolla in rice fields is
1. Spirulina
2. Anabaena
3. Frankia
4. Tolypothrix

92. Select the correct statement regarding the specific disorder of muscular or skeletal system.
1. Mascular dystrophy age related shortening of muscles
2. Osteoporosis- decrease in bone mass and higher chances of fructures with advancing age
3. Myasthenia gravis- auto immune disorder which inhibits sliding of myosin filaments
4. Gout- inflammation of joints due to extra deposition of calcium

93. Water containing cavities in vascular bundles are found in
1. Sunflower
2. Maize
3. Cycas
4. Pinus

94. Select the correct statement from the following regarding cell membrane.
1. Na^+ and K^+ ions move across cell membrane by passive transport
2. Proteins make up 60 to 70% of the cell membrane
3. Lipids are arranged in a bilayer with polar heads towards the inner part
4. Fluid mosaic model of cell membrane was proposed by Singer and Nicolson

95. Gymnosperms are also called soft wood spermatophytes because they lack
1. Cambium
2. Phloem fibres
3. Thick-walled tracheids
4. Xylem fibres

96. The coconut water and the edible part of coconut are equivalent to
1. Endosperm
2. Endocarp
3. Mesocarp
4. Embryo

97. Vexillary aestivation is characteristic of the family
1. Fabaceae
2. Asteraceae
3. Solanaceae
4. Brassicaceae

98. Which one of the following is an example of carrying out biological control of pests/diseases using microbes?
1. Trichoderma sp. against certain plant pathogens
2. Nucleopolyhedrovirus against white rust in Brassica
3. Bt-cotton to increase cotton yield
4. Lady bird beetle against aphids in mustard

99. Select the correct statement from the ones given below with respect to Periplaneta americana.
1. Nervous system located dorsally, consists of segmentally arranged ganglia joined by a pair of lingitudinal connectives
2. Males bear a pair of short thread like anal styles
3. There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut
4. Grinding of food is carried out only by the mouth parts

100. Maximum nutritional diversity is found in the group
1. Fungi
2. Animalia
3. Monera
4. Plantae

Chemistry

101. Aluminium is extracted from alumina Al_2O_3 by electrolysis of a molten mixture of :
1. $Al_2O_3 + HF + NaAlF_4$
2. $Al_2O_3 + CaF_2 + NaAlF_4$
3. $Al_2O_3 + Na_3AlF_6 + CaF_2$
4. $Al_2O_3 + KF + Na_3AlF_6$

102. pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product K_{sp} of $Ba(OH)_2$ is

1. 3.3×10^{-7}
2. 5.0×10^{-7}
3. 4.0×10^{-6}
4. 5.0×10^{-6}

103. The change in oxidation number of chlorine when Cl_2 gas reacts with hot and concentrated sodium hydroxide solution is -
1. Zero to +1 and Zero to -5
2. Zero to -1 and Zero to +5
3. Zero to -1 and Zero to +3
4. Zero to +1 and Zero to -3

104. Maximum number of electrons in a sub shell with l = 3 and n = 4 is
1. 14
2. 16
3. 10
4. 12

105. Which one of the following is an outer orbital complex and exhibits paramagnetic behavior?
1. $\left[Ni(NH_3)_6\right]^{2+}$
2. $\left[Zn(NH_3)_6\right]^{2+}$
3. $\left[Cr(NH_3)_6\right]^{3+}$
4. $\left[Co(NH_3)_6\right]^{3+}$

106. In a reaction, A + B Product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled. Rate law for the reaction can be written as
1. $Rate = k[A][B]^2$
2. $Rate = k[A]^2[B]^2$
3. $Rate = k[A][B]$
4. $Rate = k[A]^2[B]$

107. In which of the following reactions, standard reaction entropy changes $\left(\Delta S^0\right)$ is positive and standard Gibb's energy change $\left(\Delta G^0\right)$ decreases sharply with increasing temperature?
1. $C\left(graphite\right) + \frac{1}{2}O_2\left(g\right) \rightarrow CO\left(g\right)$
2. $CO\left(g\right) + \frac{1}{2}O_2\left(g\right) \rightarrow CO_2\left(g\right)$
3. $Mg\left(s\right) + \frac{1}{2}O_2\left(g\right) \rightarrow MgO\left(s\right)$
4. $\frac{1}{2}C\left(graphite\right) + \frac{1}{2}O_2\left(g\right) \rightarrow \frac{1}{2}CO_2\left(g\right)$

108. Which one of the following is a mineral of iron?
1. Malachite
2. Cassiterite
3. Pyrolusite
4. Magnetite

109. In Freundlich adsorption isotherm, the value of 1/n is -
1. Between 0 and 1 in all cases.
2. Between 2 and 4 in all cases.
3. 1 in case of physical adsorption.
4. 1 in case of chemisorption.

110. Equimolar solutions of the following substances were prepared separately. Which one of these will record the highest pH value?
1. $BaCl_2$
2. $AlCl_3$
3. $LiCl$
4. $BeCl_2$

111. 50 mL of each gas A and of gas B takes 200 and 150 s respectively for effusing through a pin hole under the similar conditions. If molecular mass of gas B is 36, the molecular mass of gas A will be
1. 96
2. 128
3. 32
4. 64

112. The correct set of four quantum numbers for the valence electron of rubidium atom (Z =37) is -
1. $5, 1, 1, +\frac{1}{2}$
2. $6, 0, 0, +\frac{1}{2}$
3. $5, 0, 0, +\frac{1}{2}$
4. $5, 1, 0, +\frac{1}{2}$

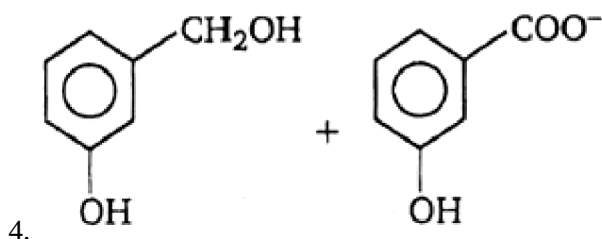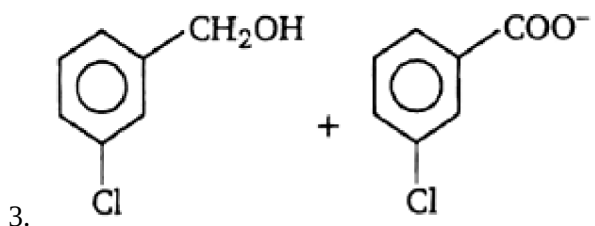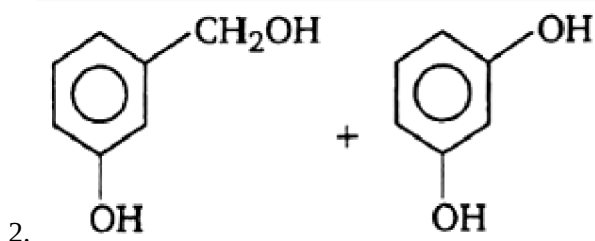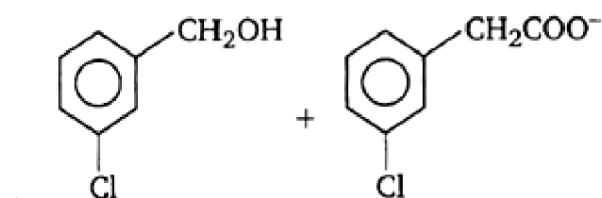113. Compound among the following having nitrogen in highest oxidation number is -
1. N_2H_4
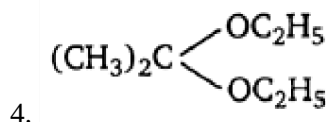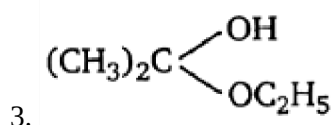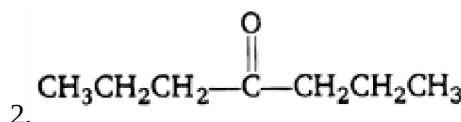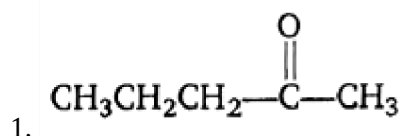2. NH_3
3. N_3H
4. NH_2OH

114.
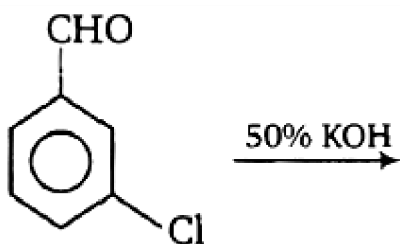
The products of the above mentioned reaction are-

1.

2.

3.

4.

115. Acetone is treated with excess ethanol in the presence of hydrochloric acid. The product obtained is-

1.

2.

3.

4.

116. A metal crystallizes with a fcc lattice. The edge of the unit cell is 408 pm. The diameter of the metal atom is :
1. 288 pm
2. 408 pm
3. 144 pm
4. 204 pm

117. Which one of the following statements is incorrect about enzyme catalysis?
1. Enzymes are mostly proteinous in nature.
2. Enzyme action is specific.
3. Enzymes are denaturized by ultraviolet rays at high temperature.
4. Enzymes are least reactive at optimum temperature.

118. In a zero order reaction for every $10\,^\circ$ rise of temperature, the rate is doubled. If the temperature is increased from 10 °C to 100 °C, the rate of the reaction will become
1. 256 times
2. 512 times
3. 64 times
4. 128 times

119. The disease caused by deficiency of vitamin B_1 is:
1. Convulsions
2. Beri-beri
3. Cheilosis
4. Sterility

120. Among the following compounds the one that is most reactive towards electrophilic nitration is
1. Benzoic acid
2. Nitrobenzene
3. Toluene
4. Benzene

121. Buffer solutions have constant acidity and alkalinity because
1. These give unionized acid or base on reaction with added acid or alkali
2. Acids and alkalies in these solutions are shielded from attack by other ions
3. They have large excess of H^+ or OH^- ions
4. The have fixed value of pH

122. The correct order of decreasing acid strength of trichloroacetic acid (A), trifluoroacetic acid (B),
acetic acid (C) and formic acid (D) is-
1. B > A > D > C
2. B > D > C > A
3. A > B > C > D
4. A > C > B > D

123. One of the following sets having monosaccharide forms sucrose is -
(1) α–D–galactopyranose and α–D–glucopyranose
(2) α–D–glucopyranose and β–D–fructofuranose
(3) β–D–galactopyranose and α–D–fructofuranose
(4) α–D–galactopyranose and β–D–fructopyranose

124. The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at $0^{o}C$ is
1. 10.52 cal/(mol K)
2. 21.04 cal/(mol K)
3. 5.260 cal/(mol K)
4. 0.526 cal/(mol K)

125. Isostructural pair among the following is-
1. BCl_3 and $BrCl_3$
2. NH_3 and NO_3^-
3. NF_3 and BF_3
4. BF_4^- and NH_4^+

126. Bond order of 1.5 is shown by :
1. O_2^+
2. O_2^-
3. O_2^{2-}
4. O_2

127. Which one of the following is not a condensation polymer?
1. Melamine
2. Glyptal
3. Dacron
4. Neoprene
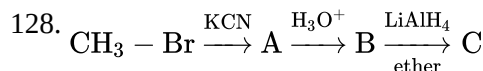
128.
$$CH_3 - Br \xrightarrow{KCN} A \xrightarrow{H_3O^+} B \xrightarrow[ether]{LiAlH_4} C$$
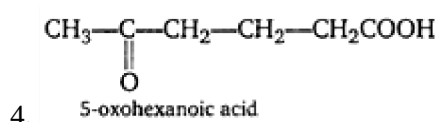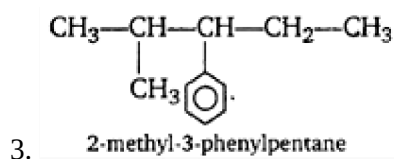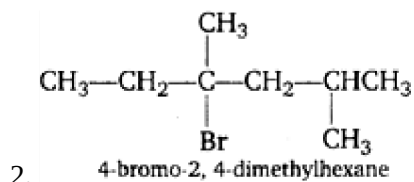The end product (C) in the above mentioned reaction is -
1. Acetone
2. Methane
3. Acetaldehyde
4. Ethyl alcohol

129. The incorrect IUPAC name among the following is -
1. $Br - CH_2 - CH = CH_2$
    1−bromo prop−2−ene

2.
4-bromo-2, 4-dimethylhexane

3.
2-methyl-3-phenylpentane

4.
5-oxohexanoic acid

130. The number of octahedral void(s) per atom present in a cubic close-packed structure is :
1. 1
2. 3
3. 2
4. 4

131. In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with
1. Copper (l) sulphide (Cu_2S)
2. Sulphur dioxide (SO_2)
3. Iron Sulphide (FeS)
4. Carbon monoxide (CO)

132. An interstitial compound among the following is -
1. Invar
2. Steel
3. Bell metal
4. Bronze

133. A mixture of potassium chlorate, oxalic acid and sulphuric acid is heated. During the reaction which element undergoes maximum change in the oxidation number?Redox Reactions
1. S
2. H
3. Cl
4. C

134. Which one of the alkali metals forms only, the normal oxide, M_2O on heating in air?
1. Rb
2. K
3. Li
4. Na

135. The ease of adsorption of the hydrated alkali metal ions on ion-exchange resins follows the order
1. $Li^+ < K^+ < Na^+ < Rb^+$
2. $Rb^+ < K^+ < Na^+ < Li^+$
3. $K^+ < Na^+ < Rb^+ < Li^+$
4. $Na^+ < Li^+ < K^+ < Rb^+$

136. The incorrect statement among the following regarding photochemical smog is -
1. Carbon monoxide does not play any role in photochemical smog formation.
2. Photochemical smog is an oxidising agent in character.
3. Photochemical smog is formed through photochemical reaction involving solar energy.
4. Photochemical smog does not cause irritation in eyes and throat.

137. $CH_3 CHO$ and $C_6H_5 CH_2 CHO$ can be distinguished by-
1. Benedict test
2. Iodoform test
3. Tollen's reagent test
4. Fehling solution test

138. The incorrect statement among the following is -
1. On passing H_2S through acidified $K_2 Cr_2 O_7$ solution, a milky colour is observed.
2. $Na_2 Cr_2 O_7$ is preffered over $K_2 Cr_2 O_7$ in volumetric analysis.
3. $K_2 Cr_2 O_7$ solution in acidic medium is orange.
4. $K_2 Cr_2 O_7$ solution becomes yellow in increasing the pH beyond 7

139. Standard enthalpy of vaporization $\Delta_{vap}H^0$ for water at 100^0C is 40.66 Kj mol^{-1}. The internal energy of vaporization of water at 100^0C (in kJ mol^{-1}) is
(Assume water vapour to behave like an ideal gas).
1. +37.56
1. -43.76
3. +43.76
4. +40.66

140. Identify the wrong statement among the following.
1. Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius
2. Amongst isoelectronic species, greater the negative charge on the anion, larger is ionic radius
3. Atomic radius of the elements encreases as one move down the first group of the Periodic Table
4. Atomic radius of the elements decreases as one move across from left to right in the 2nd period of the Periodic Table

141. The incorrect statement among the following regarding oxoacids of phosphorus is -
1. Orthophosphoric acid is used in the manufacture of triple superphosphate
2. Hypophoshphorous acid is a diprotic acid
3. All oxoacids contain tetrahedral four coordinated phosphorus
4. All oxoacids contain at least one P=O unit and one P-OH group

142. The protecting power of lyophilic colloidal sol is expressed in terms of
1. Coagulation value
2. Gold number
3. Critical micelle concentration
4. Oxidation number

143. Sulphur trioxide can be obtained by which of the following reaction
1. $CaSO_4 + C \xrightarrow{\Delta}$
2. $Fe_2\left(SO_4\right)_3 \xrightarrow{\Delta}$
3. $S + H_2SO_4 \xrightarrow{\Delta}$
4. $H_2SO_4 + PCl_5 \xrightarrow{\Delta}$

144. p_A and p_B are the vapor pressure of pure liquid components, A and B, respectively of an ideal binary solution. If x_A represents the mole fraction of component A, the total pressure of the solution will be
1. $p_A + x_A(p_B - p_A)$
2. $p_A + x_A(p_A - P_B)$
3. $p_B + x_A(p_B - p_A)$
4. $p_B + x_A(p_A - p_B)$

145. Acid that does not exhibit optical isomerism-
1. Maleic acid
2. α-amino acid
3. Lactic acid
4. Tartaric acid

146. Which of the following species contains three bond pairs and one lone pair around the central atom?
1. H_2O
2. BF_3
3. NH^-_2
4. PCl_3

147. Limiting molar conductivity of NH_4OH (i.e., $\Lambda^0_{m(NH_4OH)}$ is equal to -
1. $\Lambda^0_{m(NaOH)} + \Lambda^0_{m(NaCl)} - \Lambda^0_{m(NaOH)}$

2. $\Lambda^0_{m(NaOH)} + \Lambda^0_{m(NaCl)} - \Lambda^0_{m(NH_4Cl)}$

3. $\Lambda^0_{m(NH_4OH)} + \Lambda^0_{m(NH_4Cl)} - \Lambda^0_{m(HCl)}$

4. $\Lambda^0_{m(NH_4Cl)} + \Lambda^0_{m(NaOH)} - \Lambda^0_{m(NaCl)}$

148. The pair of species with the same bond order is
1. O_2^{2-}, B_2
2. O_2^+, NO^+
3. NO,CO
4. N_2, O_2

149. Which of the following statement is false?
1.Artificial silk is derived from cellulose
2. Nylon-66 is an example of elastomer
3. The repeat unit in natural rubber is isoprene
4. Both starch and cellulose are polymers of glucose

150.

$$A + B$$
Major Product   Minor product
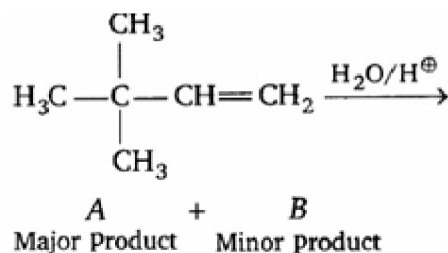
The major product in the above mentioned reaction is-

1.

2.

3.

4.
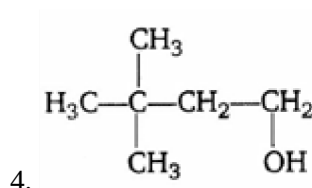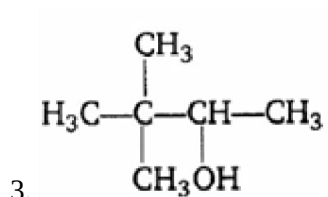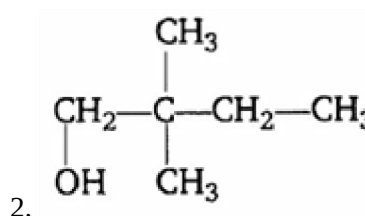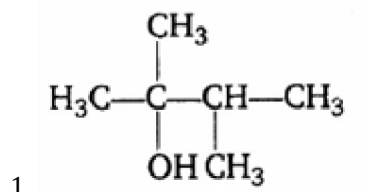
Physics

151. Electron in hydrogen atom first jumps from third excited state to second excited state and then from second excited to the first excited state. The ratio of the wavelengths $\lambda_1 : \lambda_2$ emitted in the two cases is
1. 7/5
2. 20/7
3. 27/5
4. 27/20

152. When a string is divided into three segments of lengths l_1, l_2 and l_3, the fundamental frequencies of these three segments are v_1, v_2 and v_3 respectively. The original fundamental frequency (v) of the string is

1. $\sqrt{v} = \sqrt{v_1} + \sqrt{v_2} + \sqrt{v_3}$
2. $v = v_1 + v_2 + v_3$
3. $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2} + \frac{1}{v_3}$
4. $\frac{1}{\sqrt{v}} = \frac{1}{\sqrt{v_1}} + \frac{1}{\sqrt{v_2}} + \frac{1}{\sqrt{v_3}}$

153. A 200 W sodium street lamp emits yellow light of wavelength 0.6 μm. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is

1. 1.5×10^{20}
2. 6×10^{18}
3. 62×10^{20}
4. 3×10^{19}

154.
Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is:
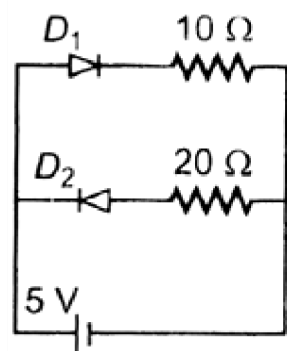
1. 0.75 A
2. zero
3. 0.25 A
4. 0.5 A

155. When a mass is rotating in a plane about a fixed point, its angular momentum is directed along:
1. a line perpendicular to the plane of rotation
2. the line making an angle of 45° to the plane of rotation
3. the radius
4. the tangent to the orbit

156. An electric dipole of moment p is placed in an electric field of intensity E. The dipole acquires a position such that the axis of the dipole makes an angle θ with the direction of the field. Assuming that the potential energy of the dipole to be zero when $\theta = 90°$, the torque and the potential energy of the dipole will respectively be
1. $pE\,\sin\theta, -pE\,\cos\theta$
2. $pE\,\sin\theta, -2pE\,\cos\theta$
3. $pE\,\sin\theta,\, 2pE\,\cos\theta$
4. $pE\,\cos\theta, -pE\,\sin\theta$

157. In a CE transistor amplifier, the audio signal voltage across the resistance of 2 kΩ is 2V. If the base resistance is 1 kΩ and the current amplification of the transistor is 100, the input signal voltage is:
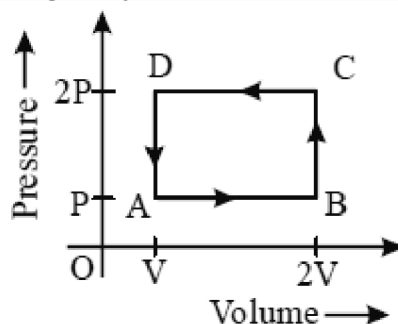1. 0.1 V
2. 1.0 V
3. 1 mV
4. 10 mV

158. A coil of resistance 400 Ω is placed in a magnetic field. If the magnetic flux ϕ(Wb) linked with the coil varies with time t (sec) as $\phi = 50t^2 + 4$.
The current in the coil at t= 2s is:
1. 0.5 A
2. 0.1 A
3. 2 A
4. 1 A

159. A thermodynamic system is taken through the cycle ABCD as shown in the figure. Heat rejected by the gas during the cycle is:

1. 2PV
2. 4PV
3. $\frac{1}{2}$PV
4. PV

160. If the nuclear radius of ^{27}Al is 3.6 Fermi, the approximate nuclear radius of ^{64}Cu in Fermi is:
1. 2.4
2. 1.2
3. 4.8
4. 3.6

161. Two similar coils of radius R are lying concentrically with their planes at right angles to each other. The currents flowing in them are I and 2I, respectively. The resultant magnetic field induction at the center will be
1. $\frac{\sqrt{5}\mu_0 I}{2R}$
2. $\frac{3\mu_0 I}{2R}$
3. $\frac{\mu_0 I}{2R}$
4. $\frac{\mu_0 I}{R}$

162. The potential energy of a particle in a force field is $U=\frac{A}{r^2} - \frac{B}{r}$ where A and B are positive constants and r is the distance of the particle from the center of the field. For stable equilibrium, the distance of the particle is:
1. B/A
2. B/2A
3. 2A/B
4. A/B

163. When a biconvex lens of glass having a refractive index of 1.47 is dipped in a liquid, it acts as a plane sheet of glass. The liquid must have a refractive index:
1. equal to that of glass.
2. less than one.
3. greater than that of glass.
4. less than that of glass.

164. The horizontal range and the maximum height of a projectile are equal. The angle of projection of the projectile is:
1. $\theta = \tan^{-1}\left(\frac{1}{4}\right)$
2. $\theta = \tan^{-1}(4)$
3. $\theta = \tan^{-1}(2)$
4. $\theta = 45^0$

165. In an electrical circuit R, L, C, and an AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and the current in the circuit is $\tan^{-1}\sqrt{3}$. If instead, C is removed from the circuit, the phase difference is again $\tan^{-1}\sqrt{3}$. The power factor of the circuit is:
1. 1/2
2. $1/\sqrt{2}$
3. 1
4. $\sqrt{3}/2$

166. If the radius of a star is R and it acts as a black body, what would be the temperature of the star at which the rate of energy production is Q?
1. $Q/4\pi R^2\sigma$
2. $\left(Q/4\pi R^2\sigma\right)^{\frac{-1}{2}}$
3. $\left(4\pi R^2 Q/\sigma\right)^{\frac{1}{4}}$
4. $\left(Q/4\pi R^2\sigma\right)^{\frac{1}{4}}$

167. The current (I) in the inductance is varying with time according to the plot shown in the figure.
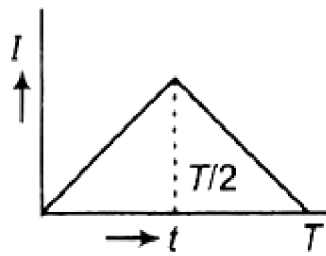
Which one of the following is the correct variation of voltage with time in the coil?

1.

2.

3.

4.
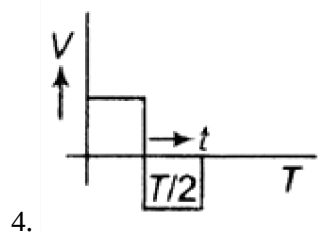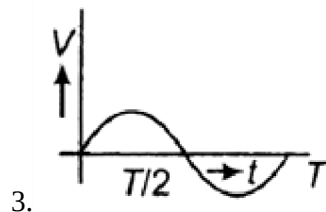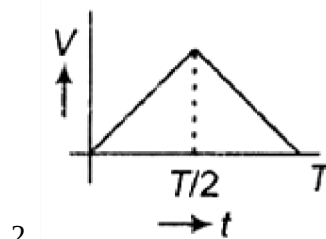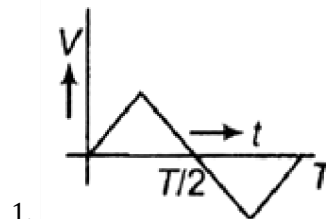
168. A millivoltmeter of 25 mV range is to be converted into an ammeter of 25 A range. The value (in ohm) of necessary shunt will be:
1. 0.001
2. 0.01
3. 1
4. 0.05

169. Two persons of masses 55 kg and 65 kg respectively, are at the opposite ends of a boat. The length of the boat is 3.0 m and weighs 100 kg. The 55 kg man walks up to the 65 kg man and sits with him. If the boat is in still water the center of mass of the system shifts by:
1. 3.0 m
2. 2.3 m
3. zero
4. 0.75 m

170. A mixture consists of two radioactive materials A_1 and A_2 with half-lives of 20 s and 10 s respectively. Initially, the mixture has 40 g of A_1 and 160 g of A_2. The amount of the two in the mixture will become equal after:
1. 60 s
2. 80 s
3. 20 s
4. 40 s

171. C and Si both have the same lattice structure, having 4 bonding electrons in each. However, C is an insulator whereas Si is an intrinsic semiconductor. This is because:
1. in the case of C, the valence band is not completely filled at absolute zero temperature.
2. in the case of C, the conduction band is partly filled even at absolutely zero temperature.
3. the four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si, they lie in the third.
4. the four bonding electrons in the case of C lie in the third orbit, whereas for Si, they lie in the fourth orbit.

172. The height at which the weight of a body becomes $1/16^{th}$ of its weight on the surface of the earth (radius R) is:
1. 5 R
2. 15 R
3. 3 R
4. 4 R

173. An electron of a stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom acquired as a result of photon emission will be
(m is the mass of hydrogen atom, R is Rydberg constant and h is Plank's constant)
1. $\frac{24m}{25hR}$
2. $\frac{25hR}{24m}$
3. $\frac{25m}{24hR}$
4. $\frac{24hR}{25m}$

174. A compass needle which is allowed to move in a horizontal plane is taken to a geomagnetic pole. It
1. will become rigid showing no movement
2. will stay in any position
3. will stay in north-south direction only
4. will stay in east-west direction only

175. In the circuit shown cells, A and B have negligible resistance. For V_A=12 V, R_1=500 Ω, and R=100 Ω, the galvanometer (G) shows no deflection. The value of V_B is:
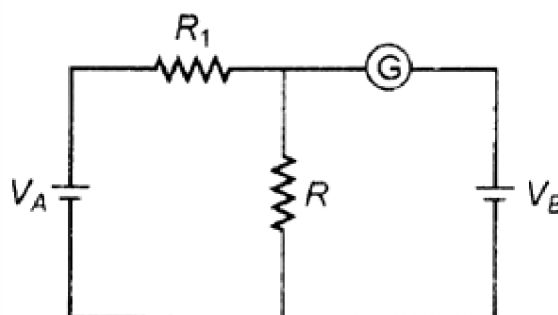
1. 4 V
2. 2 V
3. 12 V
4. 6 V

176. Four-point charges –Q, -q, 2q and 2Q are placed, one at each corner of the square. The relation between Q and q for which the potential at the center of the square is zero is:
1. Q = -q
2. Q = -2q
3. Q = q
4. Q = 2q

177. A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road. If the banking angle is 45°, the speed of the car is:
1. 20 ms^{-1}
2. 30 ms^{-1}
3. 5 ms^{-1}
4. 10 ms^{-1}

178. A solid cylinder of mass 3 kg is rolling on a horizontal surface with a velocity of 4 ms^{-1}. It collides with a horizontal spring of force constant 200 Nm^{-1}. The maximum compression produced in the spring will be:
1. 0.5 m
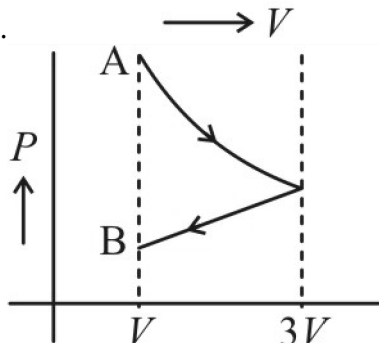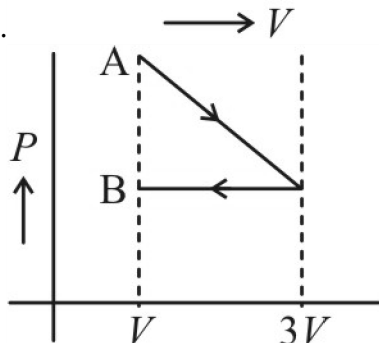2. 0.6 m
3. 0.7 m
4. 0.2 m

179.
One mole of an ideal gas goes from an initial state A to the final state B with two processes. It first undergoes isothermal expansion from volume V to 3V and then its volume is reduced from 3V to V at constant pressure. The correct P-V diagram representing the two processes is:
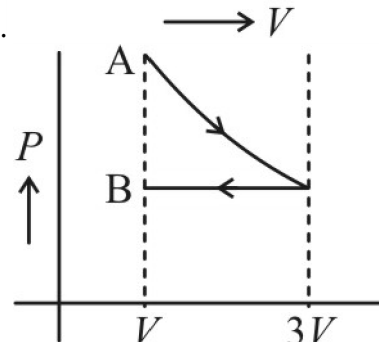

1.

2.

3.

4.
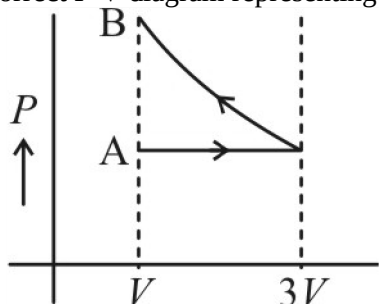
180. Two spheres A and B of masses m_1 and m_2 respectively collide. A is at rest initially and B is moving with velocity v along the x-axis. After collision B has a velocity $\frac{v}{2}$ in a direction perpendicular to the original direction. The mass A moves after collision in the direction:

1. same as that of B.
2. opposite to that of B.
3. $\theta = \tan^{-1}\left(\frac{1}{2}\right)$ to the positive x-axis.
4. $\theta = \tan^{-1}\left(\frac{-1}{2}\right)$ to the positive x-axis
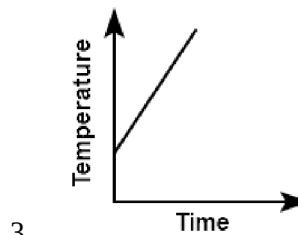
181. Liquid oxygen at 50 K is heated up to 300 K at a constant pressure of 1 atm. The rate of heating is constant. Which one of the following graphs represents the variation of temperature with time?
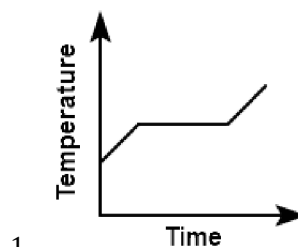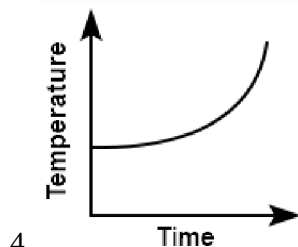

1.
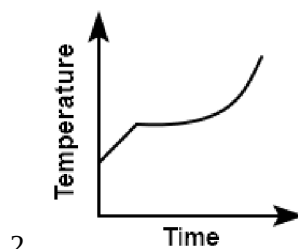
2.

3.

4.

182. An alternating electric field of frequency ν, is applied across the dees (radius=R) of a cyclotron that is being used to accelerate protons (mass=m). The operating magnetic field B, used in the cyclotron and the kinetic energy (K) of the proton beam, produced by it, are given by:

1. $B = \frac{m\nu}{e}$ and $K = 2m\pi^2\nu^2R^2$
2. $B = \frac{2\pi m\nu}{e}$ and $K = m^2\pi\nu R^2$
3. $B = \frac{2\pi m\nu}{e}$ and $K = 2m\pi^2\nu^2R^2$
4. $B = \frac{m\nu}{e}$ and $K = m^2\pi\nu R^2$

183. A ray of light is incident at an angle of incidence, i, on one face of a prism of angle A (assumed to be small) and emerges normally from the opposite face. If the refractive index of the prism is μ, the angle of incidence i, is nearly equal to

1. μA
2. $\frac{\mu A}{2}$
3. A/μ
4. $A/2\mu$

184. A spherical planet has a mass M_p and diameter D_p. A particle of mass m falling freely near the surface of this planet will experience acceleration due to gravity equal to:

1. $\frac{4\,GM_p\,m}{D_p{}^2}$
2. $\frac{4\,GM_p}{D_p{}^2}$
3. $\frac{GM_p\,m}{D_p{}^2}$
4. $\frac{GM_p}{D_p{}^2}$

185. The damping force of an oscillator is directly proportional to the velocity. The units of the constant of proportionality are:

1. kg-msec^{-1}
2. kg-msec^{-2}
3. kg-sec^{-1}
4. kg-sec

186. A concave mirror of the focal length f_1 is placed at a distance of d from a convex lens of focal length f_2. A beam of light coming from infinity and falling on this convex lens-concave mirror combination returns to infinity. The distance d must be equal :

1. $f_1 + f_2$
2. $-f_1 + f_2$
3. $2f_1 + f_2$
4. $-2f_1 + f_2$

187. A geostationary satellite is orbiting the earth at a height of 5R above that surface of the earth, R being the radius of the earth. The time period of another satellite in hours at a height of 2R from the surface of the earth is

1. 5
2. 10
3. $6\sqrt{2}$
4. $6/\sqrt{2}$

188. Transfer characteristic [output voltage (V_o) vs input voltage (V_i)] for a base biased transistor in CE configurations as shown in the figure. For using the transistor as a switch, it is used:
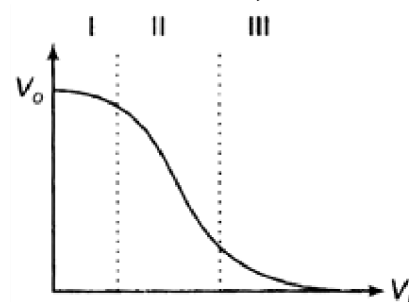
1. In region III
2. Both in the region (I) and (III)
3. In region II
4. In region I

189. If voltage across a bulb rated 220 V-100 W drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is :

1. 20%
2. 2.5%
3. 5%
4. 10%

190. A particle has initial velocity $\left(2\hat{i} + 3\hat{j}\right)$ and acceleration $\left(0.3\hat{i} + 0.2\hat{j}\right)$. The magnitude of velocity after 10 sec will be:

1. $9\sqrt{2}$ units
2. $5\sqrt{2}$ units
3. 5 units
4. 9 unit

191. Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured to be 3.57 V. The threshold frequency of the material is

1. 4×10^{15} Hz
2. 5×10^{15} Hz
3. 1.6×10^{15} Hz
4. 2.5×10^{15} Hz

192. ABC is an equilateral triangle with O as its centre. F_1, F_2, and F_3 represent three forces acting along the sides AB, BC and AC respectively. If the total torque about O is zero, then the magnitude of F_3 is:
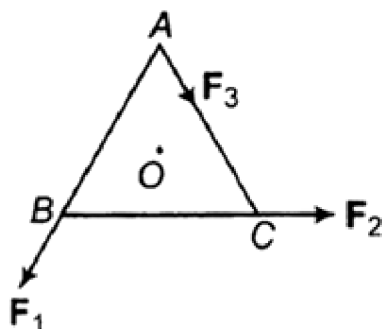
1. $F_1 + F_2$
2. $F_1 - F_2$
3. $\frac{F_1 + F_2}{2}$
4. $2(F + F_2)$

193.
The figure shows a logic circuit with two inputs A and B and the output C. The voltage waveforms across A, B, and C are as given. The logic circuit gate is:
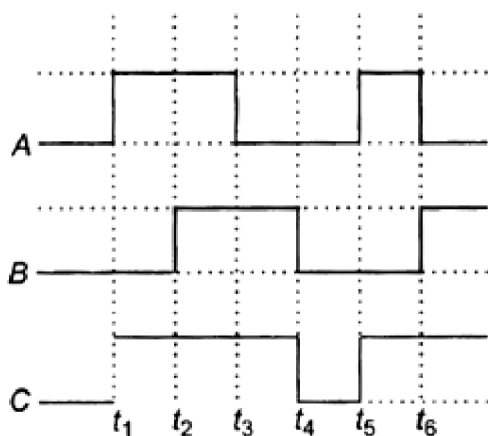
1. OR gate
2. NOR gate
3. AND gate
4. NAND gate

194. What is the flux through a cube of side a, if a point charge of q is placed at one of its corners?
1. $\frac{2q}{\varepsilon_o}$
2. $\frac{q}{8\varepsilon_o}$
3. $\frac{q}{\varepsilon_o}$
4. $\frac{q}{2\varepsilon_o}$

195. An α-particle moves in a circular path of radius 0.83 cm in the presence of a magnetic field of 0.25 Wb/m^2. The de-Broglie wavelength associated with the particle will be :
1. $1 \overset{o}{A}$
2. $0.1 \overset{o}{A}$
3. $10 \overset{o}{A}$
4. $0.01 \overset{o}{A}$

196. The electric field associates with an electromagnetic wave in vacuum is given by $E = \hat{i}\, 40 \cos\left(kz - 6 \times 10^8 t\right)$, where E, z and t are in volt/m, meter and second respectively. The value of wave vector k is
1. $2m^{-1}$
2. $0.5m^{-1}$
3. $6m^{-1}$
4. $3m^{-1}$

197. The motion of a particle along a straight line is described by equation
$x = 8 + 12t - t^3$ where x is in meter and t in second. The retardation of the particle when its velocity becomes zero is
1. $24\ ms^{-2}$
2. zero
3. $6\ ms^{-2}$
4. $12\ ms^{-2}$

198. The magnifying power of a telescope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is 20 cm. The focal length of lenses is :
1. 10 cm, 10 cm
2. 15 cm, 5 cm
3. 18 cm, 2 cm
4. 11 cm, 9 cm

199. Two sources of sound placed close to each other, are emitting progressive waves given by,
$y_1 = 4\sin600\pi t$ and $y_2 = 5\sin608\pi t$
An observer located near these two sources of sound will hear:
1. 4 beats per second with intensity ratio 25:16 between waxing and waning
2. 8 beats per second with intensity ratio 25:16 between waxing and waning
3. 8 beats per second with intensity ratio 81:1 between waxing and waning
4. 4 beats per second with intensity ratio 81:1 between waxing and waning

200. A ring is made of a wire having a resistance $R_0 = 12\Omega$. Find the points A and B, as shown in the figure, at which a current-carrying conductor should be connected so that the resistance R of the subcircuit between these points is equal to 8/3 Ω.
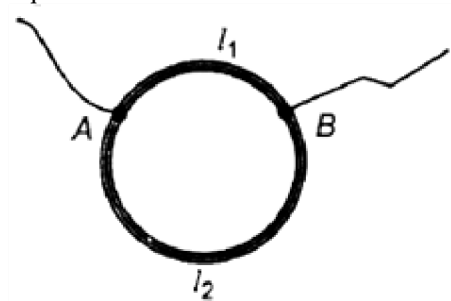
1. $\dfrac{l_1}{l_2} = \dfrac{5}{8}$

2. $\dfrac{l_1}{l_2} = \dfrac{1}{3}$

3. $\dfrac{l_1}{l_2} = \dfrac{3}{8}$

4. $\dfrac{l_1}{l_2} = \dfrac{1}{2}$