

Botany - Section A

1.

Members of Kingdom Protista:

1. are primarily aquatic
2. do not have membrane bound organelles
3. are all ciliated or flagellated
4. reproduce exclusively by asexual means

2.

When the population density reaches the carrying capacity, the logistic growth curve is said to be in:

1. Lag phase
2. A phase of acceleration
3. A phase of deceleration
4. Asymptote

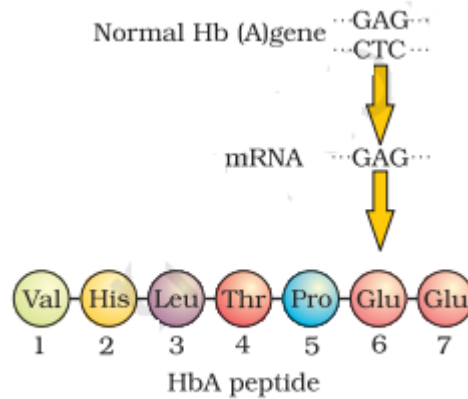
3.

In DNA replication, the Okazaki fragments on the lagging strand are joined together by:

1. DNA ligase
2. DNA polymerase
3. Primase
4. Helicase

4.

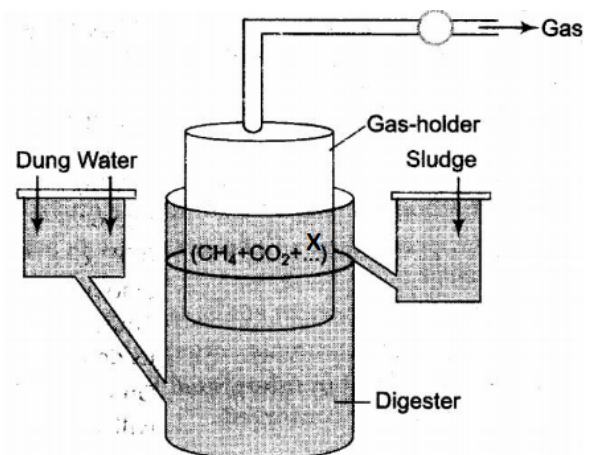
Given below is the initial amino acids of the beta chain of a hemoglobin molecule. What will be true about this hemoglobin molecule ?



1. The RBCs carrying this molecule will undergo sickling at high oxygen tension
2. The RBCs carrying this molecules will undergo sickling at low oxygen tension
3. There will be a quantitative decrease in the synthesis of this molecule
4. This is normal beta chain of the hemoglobin molecule

5.

In the given diagram the gas X can be:



- (1) Hydrogen sulfide
- (2) Carbon monoxide
- (3) Ammonia
- (4) Oxygen

6. Which of the following is incorrect w.r.t. competition?
 1. Resources need not be limiting for competition to occur
 2. Competitive species may evolve mechanism that promote their co-existence
 3. Connell's field experiment is an example of competitive release
 4. Only closely related species can show competition
7. Coralloid roots of gymnosperms are/have
 1. Irregular and possess large number of roots hairs.
 2. Symbiotic association with Rhizobium.
 3. Symbiotic association with N_2 - fixing cyanobacteria.
 4. VAM
8. Which one of the following features differentiates G_2 phase from G_1 phase?
 1. Synthesis of proteins.
 2. 4C content of DNA.
 3. 2C content of DNA.
 4. Synthesis of RNA.
9. Select the correct statement w.r.t. axoneme of eukaryotic flagella.
 1. It is composed of 9 peripheral triplet microfilaments of tubulin proteins.
 2. It does not have covering of plasma membrane.
 3. Central tubules are enclosed by a central sheath.
 4. It gives rise to spindle apparatus during cell division.
10. Select correct option w.r.t Rhizophora
 (i) Grows in swampy area.
 (ii) Pneumatophores are present for respiration.
 (iii) Is halophyte.
 (iv) Shows in-situ germination of seed.
 1. All are correct.
 2. All are correct except (iv).
 3. All are correct except (i) & (iv).
 4. All are correct except (i), (iii), & (iv).
11. If there are 12 molecules of CO_2 to be fixed in photosynthesis, then how many turns of Calvin cycle and how many molecules of glucose will be synthesized respectively?
 1. 9 turns, 2 molecules.
 2. 12 turns, 1 molecule.
 3. 6 turns, 1 molecule.
 4. 12 turns, 2 molecules.
12. Which of the following statements is false about filiform apparatus?
 1. The synergids have special cellular thickenings at the micropylar tip called filiform apparatus
 2. It plays an important role in guiding the pollen tubes into the synergid
 3. Both 1 and 2
 4. Pollen tube stimulates the formation of filiform apparatus
13. Which of the following scientist is responsible for the synthesis of protein in a cell-free system?
 1. Har Gobind Khorana
 2. Marshall Nirenberg
 3. Severo Ochoa
 4. Frederic Sanger
14. World Summit on sustainable development held in 2002 in
 1. Rio de Janeiro
 2. Japan
 3. Johannesburg
 4. London

15.

- I. Phloem sap can be transported in any required direction.
- II. Phloem transports mainly water and sucrose but other sugars, hormones and amino acids are also transported.
- III. Cytoplasmic strands pass through the holes in the sieve plate forming continuous filaments.
- IV. Ascent of sap is a pulling movement and translocation of organic solutes is a pushing movement.

1. All are correct
2. All are incorrect
3. I, II, III are correct
4. III and IV are correct

16.

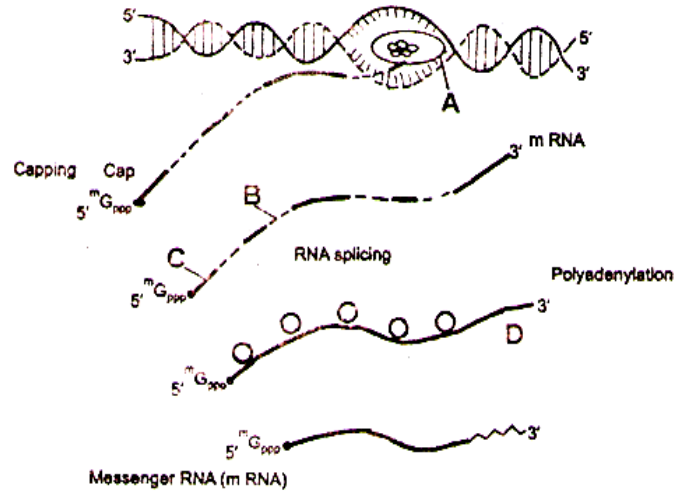
Which of the following statements about classification is not true?

- I. Members of a family are less similar than members of an included genus.
- II. An order has more members than the number of members in an included genus.
- III. Families have more members than phyla.
- IV. The number of species in a taxon depends on their relative degree of similarity.

1. Only III
2. Only IV
3. Only IV
4. Only I

17.

The following diagram refers to the process of transcription in Eukaryotes. Identify A, B, C and D –



1. A – RNA polymerase II, B – Exon, C – Intron, D – Poly A tail
2. A – DNA polymerase II, B – Intron, C – Exon, D – Poly A tail
3. A – RNA polymerase II, B – Intron, C – Exon, D – Poly A tail
4. A – RNA polymerase II, B – Intron, C – Exon, D – Poly G tail

18.

During aerobic respiration hydrogen from the system is removed by?





1. O₂
2. NADP
3. FMN
4. UQ

19.

Find out which one of the following statement is not correct with respect to gobar-gas plant?

1. It has a floating cover which keeps on rising as gas is produced
2. It is developed by IARI and KVIC
3. Main gas produced is butane, isobutene & propane
4. Spent slurry may be used as fertilizer

20. In a flowering plant if auxins are not synthesizing, then effects which would most probably be seen in this plant are
- Dropping of fruits at early stage.
 - Inhibition in the growth of lateral buds.
 - Delayed abscission of older mature leaves.
 - Inhibition of cell division in cambium.
- i, ii and iv
 - i, iii and iv
 - ii and iv only
 - i and iii only
21. Tracheids are
- Elongated cells with tapering ends and unperforated end walls
 - Elongated cells with tapering ends and perforated end wall
 - Rounded cells with lignified walls
 - Both (1) and (2)
22. A dioecious flowering plant prevents both:
- Autogamy and xenogamy
 - Autogamy and geitonogamy
 - Geitonogamy and xenogamy
 - Cleistogamy and xenogamy
23. An organism used as biofertilizer for raising soyabean crop is
- Nostoc*
 - Azotobacter*
 - Azospirillum*
 - Rhizobium*
24. When a violet flower of unknown genotype is crossed with white flower, the progenies are violet and white in equal proportion. Then read the following statements :
- This is called test cross.
 - Unknown flower is homozygous
 - Unknown flower is heterozygous
 - This test used to determine the phenotype of the plant at F₂
 - In test cross, violet or white flower is crossed with the recessive parent instead of self-crossing.
- Select the incorrect statement.
- iii, iv, v
 - ii, iv
 - i, ii, v
 - ii, iv, v
25. In E.coli, the regulation of gene expression could be occur at :-
- Translation initiation
 - Transcription initiation
 - RNA processing
 - All of these
26. Chromatin condensation and movement of duplicated centriole towards opposite pole can be observed during -
- Prophase
 - Metaphase
 - Anaphase
 - Telophase

27. Triple fusion involves the fusion of:-
1. Two male gametes and one egg cell
 2. Two egg cell and one male gamete
 3. Two male gametes and secondary nucleus
 4. One male gamete and secondary nucleus
28. Leaves originate from-
1. Shoot apical meristems and arranged acropetal order
 2. Shoot apical meristem and arranged in a basipetal order
 3. Root apical meristem
 4. Stem
29. The stage during which chiasmata becomes visible is
1. Pachytene
 2. Diplotene
 3. Diakinesis
 4. Zygotene
30. PS II is not found involved in
1. Non-cyclic photophosphorylation
 2. Cyclic photophosphorylation
 3. Photolysis of H₂O
 4. Formation of NADPH
31. Red tides are due to the rapid multiplication of
1. Cyanobacteria
 2. Chlamydomonas
 3. Gonyaulax
 4. Diatoms
32. Which statement is not correct for Krebs' cycle
1. Krebs' cycle occurs in mitochondrial matrix
 2. Pyruvic acid condense with OAA to form citric acid
 3. 3 NADH₂ and 1 FADH₂ are produced during one Krebs' cycle
 4. Succinate dehydrogenase is found attached to inner mitochondrial membrane
33. Select the incorrect about apoplast pathway.
1. It is faster than symplast
 2. Little resistance in the movement of water
 3. Consists of living parts of the plant body
 4. Water moves through cell walls and intercellular spaces
34. In pedigree analysis, the symbol for affected male is
1. 
 2. 
 3. 
 4. 
35. Who first explained that new cells are formed from pre-existing cells
1. Theodore Schwann
 2. Rudolf Virchow
 3. Matthias Schleiden
 4. Robert Hooke

Botany - Section B

36.

Statement - 1 : Herbivores and plants appears to be more adversely affected by competition than carnivores.

Statement - 2 : Competition is a process in which fitness of one species is significantly lower in the presence of another species.

Options

1. Both statements are correct.
2. Both statements are incorrect.
3. 1 is incorrect.
4. 2 is incorrect.

37.

In which of the following options the PGR is correctly matched with its two functions?

1. Abscisc acid - (i) Induce immediate stomatal closure in leaves.
(ii) Induce rooting in a twig.
2. Gibberellins - (i) Bolting in rosette plant.
(ii) Speed up the malting process in brewing industry.
3. Ethylene - (i) Delay leaf senescence.
(ii) Controls xylem differentiation.
4. Auxin - (i) Used to kill monocotyledonous weeds.
(ii) Promotes nutrient mobilisation.

38.

Seed-set is assured even in absence of pollinators, when:

1. Both flowers (♂ and ♀) of a plant mature at the same time
2. The numbers of flowers clustered into an inflorescence to make them conspicuous, colorless and rich in nectar
3. The flowers are cleistogamous
4. The flowers are functionally cross-pollinating but genetically self-pollinating

39.

Which is not correct about methanogens?

1. they are archaebacteria
2. they live in marshy areas
3. Methane is their preferred carbon source
4. They are present in guts of several ruminant animals (cow, buffaloes) and they produce biogas (CH₄) from the dung of these animals.

40.

Which one of the given reaction does not involve decarboxylation?

1. α -ketoglutarate \rightarrow Succinyl CoA
2. Fumarate \rightarrow Malate
3. Oxalo-succinate \rightarrow α -ketoglutarate
4. Pyruvate \rightarrow Acetyl CoA

41.

Mark the odd one (w.r.t. zygote)

1. Formed in the water or inside the body of the organism
2. Develops a thick wall in all organisms
3. The vital link between the two generations
4. Divides by meiosis in the haplontic life cycle

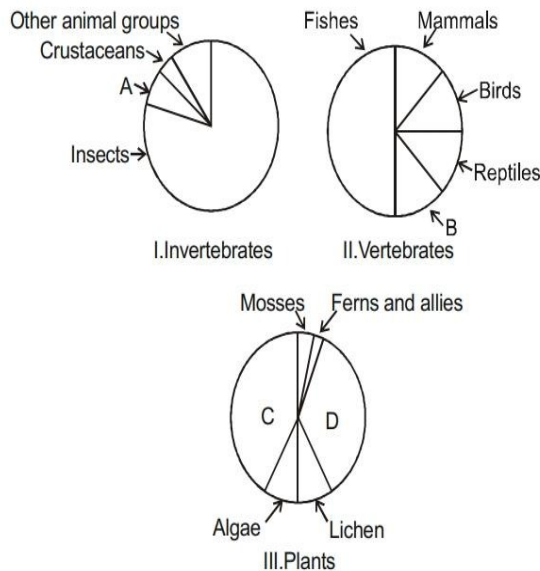
42.

Eco-san toilets are not associated with which of the following?

1. Are working in Sri Lanka and Kerala
2. Composting method for recycling of human excreta
3. Recycled material forms natural fertilizer
4. Enhance the need for chemical fertilizers

43.

Given below are pie diagram I, II and III related to the proportionate number of species of major taxa of invertebrates, vertebrates and plants, respectively. Critically study the fill in the blanks A, B, C and D.



1. A-Mollusca, B-Amphibians, C Angiosperms, D-Gymnosperms
2. A-Mollusca, B-Amphibians, C-Fungi, D-Angiosperms
3. A-Turtles, B-Amphibians, C-Fungi, D-Angiosperms
4. A-Hexapoda, B-Amphibians, C-Fungi, D-Angiosperms

44.

E-wastes are buried in ...A.. or ...B....

Complete the given statement by choosing the appropriate option for A and B:-

1. A-landfills; B-incinerated
2. A-open area; B-recycle
3. A-dumping zone; B-recycle
4. A-open area; B-incinerated

45.

The stomata are equally distributed on both the surfaces of the epidermis in

1. Dorsiventral leaf
2. Dicot stem
3. Isobilateral leaf
4. Dicot root

46.

Which of the following are not given any place in ecological pyramids

1. Primary producers
2. Primary consumers
3. Top carnivores
4. Saprophytes

47.

Mark the correct statement about centriole.

1. Forms basal body
2. Found in higher plant cells
3. Has '9 + 2' organisation of microtubules
4. Is surrounded by plasma membrane

48.

Read the following statements and choose the correct option.

Statement-A : Auxin inhibits the growth of lateral or axillary buds.

Statement-B : Cytokinins are used to delay the senescence of intact leaves and other plant parts.

1. Only statement A is correct
2. Only statement B is correct
3. Both statements are correct
4. Both statements are incorrect

49. Select the **incorrect** match
1. Atlas 66 - wheat
 2. Himgiri - Resistant to smut
 3. Jaya - Rice variety
 4. Protina – Maize variety

50. Hilum represents the junction between
1. Funicle and nucellus
 2. Ovule and funicle
 3. Chalaza and funicle
 4. Funicle and micropyle

Zoology - Section A

51. Which of the following does not help in excretion in *Periplaneta Americana*?
1. Fat body
 2. Urecoase glands
 3. Nephrocytes
 4. None of these

52. Which of the following restriction sites is located within the gene for tetracycline resistance in the plasmid pBR322?
1. BamHI
 2. Psti
 3. ClaI
 4. PvuII

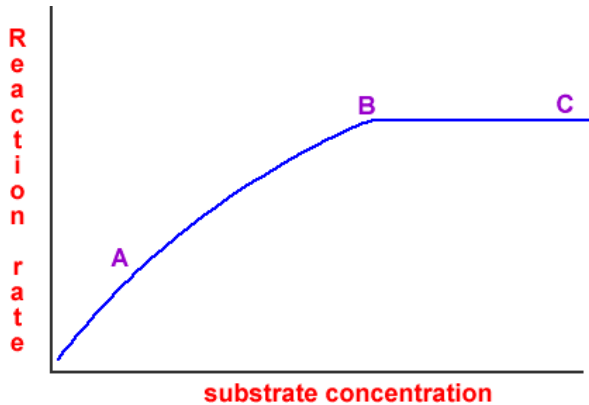
53. For the multiplication of any alien piece of DNA in an organism:
1. It must be devoid of any introns in it
 2. It must be a part of a chromosome with an ori
 3. It must have recognition sequence of at least one restriction enzyme
 4. It must have selectable markers

54. What is the function of copper ions in copper releasing IUDs?
1. They increase phagocytosis of sperm within the uterus
 2. They suppress sperm motility and the fertilising capacity of sperms
 3. They make the uterus unsuitable for implantation
 4. They inhibit ovulation

55. Identify the hormones that are secreted in large amount prior to ovulation :
- | | |
|-------------|-----------------|
| A. LH | B. FSH |
| C. Estrogen | D. Progesterone |
1. A only
 2. A & B only
 3. A,B & C only
 4. A,B,C & D

56.

- Look at the graph given below. The reaction rate the reaction can be increased beyond point C by:



- increasing the amount of substrate
- adding more water
- increasing the temperature
- decreasing enzyme concentration

57.

Animals without excretory system, separate sexes, and calcareous endoskeleton are applicable for

- Chaetopeura
- Ophiura
- Limulus
- Spongilla

58.

Eustachian tube connects

- External ear with middle ear
- External ear with internal ear
- Middle ear with pharynx
- Middle ear with internal ear

59.

If Henle's loop were absent from man nephron, which of the following is to be expected?

- The urine will be more dilute
- The urine will be more concentrated
- There will be thardly any change in the quality and quantity of urine formed
- There will be no urine formation

60.

Receptor sites for neurotransmitters are located on the

- tips of axons
- axon membranes in the regions of the nodes of Ranvier
- postsynaptic membrane
- presynaptic membrane

61.

During coitus the human male ejaculates about

- 200 to 400 million sperms
- 100 to 200 million sperms
- 200 to 300 sperms
- 200 to 300 billion sperms

62.

The most toxic nitrogenous waste excreted by many bony fishes, aquatic amphibians, and aquatic insects is

- Ammonia
- Urea
- Uric acid
- Both 2 and 3

63.

Which of the following is required for the breaking of cross bridge during muscle contraction?

1. ATP and Ca^{++}
2. ADP and Ca^{++}
3. Only Ca^{++}
4. ATP only

64.

Extra cellular receptors must be required for the action of
 I. Oxytocin.
 II. Thyroxine.
 III. Epinephrine.
 IV. Glucagon.

1. I, II, III & IV
2. I, IV only
3. I, III, IV
4. III & IV only

65.

How is the digestion and absorption of fats different from that of proteins and carbohydrates ?

1. Fat digestion occurs in the small intestine, and the digestion of proteins and carbohydrates occurs in stomach.
2. Fats are absorbed into the cells as fatty acids and monoglycerides but are then modified for absorption into the blood through lacteals; amino acids and glucose are not modified further.
3. Fats enter hepatic portal circulation, but proteins and carbohydrates enter lymphatic system.
4. Fats are absorbed in large intestine, and protein and carbohydrates are absorbed in small intestine.

66.

Select the correct matching of hormone its source of synthesis and function.

	Hormone	Source	Function
1.	Glucagon	b-cells of pancreas	Increase blood glucose levels
2.	Vasopressin	Hypothalamus	Increase diuresis
3.	ACTH	Anterior lobe of pituitary	Stimulates synthesis and secretion of glucocorticoids
4.	LH	Hypothalamus	Stimulates gonadal activity

67.

Restoration of resting potential of the membrane at the site of excitation is achieved by :-

1. Diffusion of K^+ outside the membrane.
2. Diffusion of Na^+ outside the membrane.
3. Diffusion of K^+ inside the membrane.
4. Diffusion of Na^+ inside the membrane.

68.

When DNA is transcribed into mRNA, usually the mRNA remains single-stranded, but in some cases a RNA can be made that is complementary to the mRNA. This is called _____ and its main function is to _____:

1. Antisense RNA, block gene expression
2. Antisense RNA, amplify mRNA
3. Antisense RNA, enhance translation
4. Reverse transcription, enhance translation

69.

The respiratory centre in the brain is stimulated by

1. CO₂ concentration in venous blood
2. O₂ concentration in arterial blood
3. CO₂ concentration in arterial blood
4. O₂ concentration in venous blood

70.

Match the following cell structure with its characteristic feature :

- | | |
|--|---|
| (a) Tight junctions together to form sheet | (i) Cement neighbouring cells |
| (b) Adhering junctions through chemical to another cells | (ii) Transmit information |
| (c) Gap junctions prevent leakage of fluid across | (iii) Establish a barrier to epithelial cells |
| (d) Synaptic junctions facilitate communication | (iv) Cytoplasmic channels to between adjacent cells |

Select correct option from the following :

1. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
2. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
3. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
4. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

71.

Which one of the following statements is correct?

1. Neurons regulate endocrine activity, but not vice versa.
2. Endocrine glands regulate neural activity, and nervous system regulates endocrine glands.
3. Neither hormones control neural activity nor do the neurons control endocrine activity.
4. Endocrine glands regulate neural activity, but not vice versa

72.

Presence of Ketone bodies in urine are indicative of

1. ARDS
2. Acute Renal failure
3. Diabetes Mellitus
4. Snakebite

73.

In the rest state, a subunit of Troponin masks

1. Active binding sites for actin on the myosin filaments
2. Active binding sites for myosin on the myosin filaments
3. Active binding sites for myosin on the actin filaments
4. Active binding sites for actin on the actin filaments

74.

At the time of implantation, cells attached to the endometrium of the uterus are

1. Inner cell mass
2. Trophoblast
3. Epiblast
4. Hypoblast

75.

Bioluminescence is well marked in member of which phylum?

1. Porifera
2. Echinodermata
3. Ctenophora
4. Platyhelminthes

76. How much percentage of water present in plasma?
 1. 6-8%
 2. 90-92%
 3. 8-10%
 4. 55%
77. Fibrins are formed by the conversion of fibrinogens in plasma by which enzyme ?
 1. Thromboplastin
 2. Thrombin
 3. Ca^{+2}
 4. Thrombokinase
78. Which of the following drugs is not obtained from plants :-
 1. Cocaine
 2. Ganja
 3. Charas
 4. Barbiturates
79. Select the incorrect option.
 1. Polysaccharides $\xrightarrow[pH\ 6.8]{Amylase}$ Disaccharides
 2. Paneth cells in mucosa of gut secrete lysozyme that has antibacterial effects.
 3. Mucus secreting goblet cells are present in submucosa of wall of alimentary canal.
 4. Vomiting is a reflex action controlled by the vomit centre in the medulla.
80. Factors which can cause right shift in oxyhaemoglobin curve include all except
 1. Increase in pCO_2
 2. Decrease in pO_2
 3. Increase in pH
 4. Increase in H^+ concentration
81. Match column I and column II w.r.t animal and its common name

Column-I	Column-II
(i) Ancylostoma	(a) Sea-hare
(ii) Aplysia	(b) Sea anemone
(iii) Echinus	(c) Sea urchin
(iv) Adamsia	(d) Hookworm

 1. i(a), ii(b), iii(c), iv(d)
 2. i(d), ii(b), iii(a), iv(c)
 3. i(d), ii(c), iii(a), iv(b)
 4. i(d), ii(a), iii(c), iv(b)
82. An infertile couple where the female is normal while the male suffers from low sperm count in his ejaculate are usually treated by all except
 1. AI
 2. IUI
 3. GIFT
 4. IVF

83. RNAi is a method of gene silencing, which when done in tobacco plant to prevent infestation by *Meloidogyne incognita* may involve all except
1. Agrobacterium as vector
 2. Introduction of single stranded RNA into host cells
 3. Transposons that replicate via RNA intermediate
 4. Silencing of mRNA to stop translation
84. A basic amino acid among the following is
1. Glutamate
 2. Aspartate
 3. Lysine
 4. Valine
85. Complete the analogy by choosing the correct option.
Typhoid : Widal test : : HIV : _____
1. VDRL test
 2. Schick test
 3. ELISA test
 4. Mantoux test
86. In cochlea, the auditory receptors are:
1. Organ of Corti
 2. Ampulla
 3. Macula
 4. Hair cells
87. Some hormones can act on their target cells through second messengers. Identify the one that does not:
1. cortisol
 2. adrenaline
 3. FSH
 4. calcitonin
88. Single step large mutation leading to speciation is also called
1. Founder's effect
 2. saltation
 3. branching descent
 4. natural selection
89. Mark the correct statement w.r.t industrial melanism
1. Lichens can be used as industrial pollution indicator
 2. Low count of melanic moths in rural areas where industrialisation did not occur
 3. Neither grey nor the dark variety of moth has been completely wiped out
 4. All of these
90. Agriculture and human settlement started about
1. 75000 years ago
 2. 18000 years ago
 3. 10000 years ago
 4. 1.5 mya

Zoology - Section B

91.

Select the correct statement

1. The base pairs in DNA are stacked 0.34 nm apart
2. The diameter of a right handed helical ds B-DNA molecules is $34 \overset{\circ}{\text{A}}$
3. Sugar-phosphate and hydrogen bonds are both present in a single nucleotide such as AMP
4. A and T of one strand compulsorily base pair with G and C respectively, of other strand is DNA

92.

Select the incorrect match w.r.t. placental mammals and Australian marsupials.

- (1) Lemur : Spotted cuscus
- (2) Bobcat : Tasmanian tiger
- (3) Anteater : Numbat
- (4) Koala : Flying squirrel

93.

Vertebrates and seastars may seem as different as two animal groups can be, yet they share

1. The same type of body symmetry as adults.
2. A high degree of cephalization.
3. Certain developmental pattern, including the type of coelom formation.
4. The presence of endoskeleton that include cranium

94.

Inbreeding

1. Refers to the mating of distantly related individuals
2. Refers to the mating of more closely related individuals
3. Reduces homozygosity
4. Reduces inbreeding depression

95.

A motor unit is best described as-

1. All the nerve fibres and muscle fibres in a single muscle bundle
2. One muscle fibre and its single nerve fibre
3. A single motor neuron and all the muscle fibres that it innervates
4. It is the neuron which carries the message from muscle to CNS

96.

The technique of replacing a defective mutant allele with a functional one in an individual's cells to treat hereditary diseases is known as

1. Molecular diagnostics
2. Genetic modification
3. Gene therapy
4. Gene cloning

97.

In periodic abstinence, the couple must avoid the coitus/sexual contact from day _____ of the menstrual cycle

1. 14 to 21
2. 18 to 21
3. 14 to 15
4. 10 to 17

98.

The sporozoites that cause infection when a female *Anopheles* mosquito bites a human being are found in

- 1 Hepatocytes of human
- 2 RBCs of mosquito
- 3 RBCs of man
- 4 Salivary glands of infected mosquito

99. In which of the following Radula is absent ?

1. Sepia
2. Octopus
3. Pila
4. Echinus

102. The number of sigma bonds in P_4O_{10} is

1. 6
2. 16
3. 20
4. 7

100.

Column-I

Column-II

- | | |
|--------------------|-----------------------|
| (i) Relaxin | (a) Maternity hormone |
| (ii) Prolactin | (b) Ovulation |
| (iii) Progesterone | (c) Parturition |
| (iv) LH | (d) Pregnancy hormone |

1. (i) → (a), (ii) → (c), (iii) → (b), (iv) → (d)
2. (i) → (c), (ii) → (d), (iii) → (b), (iv) → (a)
3. (i) → (c), (ii) → (b), (iii) → (d), (iv) → (a)
4. (i) → (c), (ii) → (a), (iii) → (d), (iv) → (b)

103. Which has highest freezing point ?

1. 0.01M NaCl
2. 0.05M Urea
3. 0.01 M $MgCl_2$
4. 0.02 M NaCl

104. How many spectral lines are obtained when an electron jumps from $n=5$ to $n=1$ hydrogen atom?

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

Chemistry - Section A

101. The outermost electronic configuration of the most electronegative element is :

1. ns^2np^3
2. ns^2np^4
3. ns^2np^5
4. ns^2np^6

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

1. $[Co(H_2O)_6]^{3+}$
2. $[Co(NH_3)_6]^{3+}$
3. $[Co(CN)_6]^{3-}$
4. $[Co(C_2O_4)_3]^{3-}$

106.

The enthalpy of neutralization of HCN by NaOH is $-12.13 \text{ kJ mol}^{-1}$. The enthalpy of ionisation of HCN will be

1. 45.07 kJ
2. 4.310 kJ
3. 451.9 kJ
4. 33.77 kJ

107.

Which of the following compounds is insoluble in acetic acid?

1. Calcium oxide
2. Calcium carbonate
3. Calcium oxalate
4. Calcium hydroxide

108.

The specific conductivity of solution depends upon :

1. Number of ions as well as mobility of ions
2. Number of ions per c.c solution
3. Number of ions per c.c as well as mobilities of ions
4. Mobilities of ions

109.

Among LiCl, BeCl₂, BCl₃ and CCl₄, the covalent bond character follows the order-

1. $\text{LiCl} < \text{BeCl}_2 > \text{BCl}_3 > \text{CCl}_4$
2. $\text{LiCl} > \text{BeCl}_2 < \text{BCl}_3 < \text{CCl}_4$
3. $\text{LiCl} < \text{BeCl}_2 < \text{BCl}_3 < \text{CCl}_4$
4. $\text{LiCl} > \text{BeCl}_2 > \text{BCl}_3 > \text{CCl}_4$

110.

Which one of the following pairs of solutions is not an acidic buffer?

1. HClO₄ and NaClO₄
2. CH₃COOH and CH₃COONa
3. H₂CO₃ and Na₂CO₃
4. H₃PO₄ and Na₃PO₄

111.

In Kjeldahl's method for estimation of nitrogen present in the soil sample, ammonia evolved from 0.75g of sample neutralized 10ml. of 1M H₂SO₄. The percentage of nitrogen in the soil is:

1. 37.33
2. 45.85
3. 25.75
4. 43.13

112.

From the following bond energies :

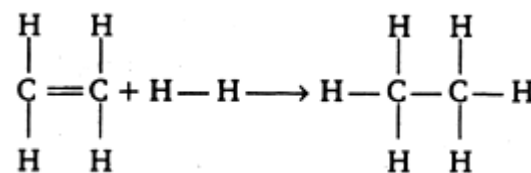
H—H bond energy: $431.37 \text{ kJ mol}^{-1}$

C=C bond energy: $606.10 \text{ kJ mol}^{-1}$

C—C bond energy: $336.49 \text{ kJ mol}^{-1}$

C—H bond energy: $410.50 \text{ kJ mol}^{-1}$

Enthalpy for the reaction,

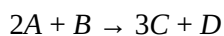


will be

1. $1523.6 \text{ kJ mol}^{-1}$
2. $-243.6 \text{ kJ mol}^{-1}$
3. $-120.0 \text{ kJ mol}^{-1}$
4. $553.0 \text{ kJ mol}^{-1}$

113.

For the reaction



Which of the following does not express the reaction rate?

1. $-\frac{d[C]}{3 dt}$

2. $-\frac{d[B]}{dt}$

3. $\frac{d[D]}{dt}$

4. $-\frac{d[A]}{2dt}$

114.

The human body does not produce

1. DNA
2. Vitamins
3. Hormones
4. Enzymes

115.

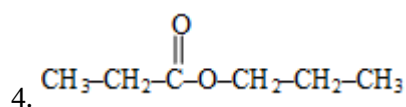
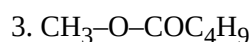
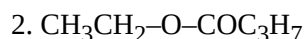
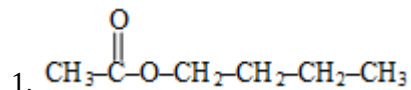
The vapour density of a volatile chloride of a metal is 95 and the specific heat of the metal is 0.13 cal/g. The equivalent mass of the metal will be:

1. 6
2. 12
3. 18
4. 24

116.

A sweet-smelling ester, with molar mass 116, on hydrolysis, produces a carboxylic acid and an alcohol. Alcohol gives positive iodoform reaction which of the following formula could correspond to above statements

-



117.

The phenomenon in which atmospheric gases trap the heat radiations from the sun, near the earth's surface and keeps it warm is known as:

1. Natural greenhouse effect
2. Tyndall effect
3. Heating effect
4. Joule's effect

118.

Aqua regia reacts with Pt to yield :

1. $\text{Pt}(\text{NO}_3)_4$
2. H_2PtCl_6
3. PtCl_4
4. PtCl_2

119.

$A(C_3H_9N)$ reacts with benzenesulfonyl chloride to give a solid insoluble in alkali. The compound (A) is

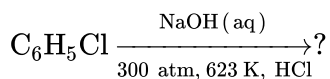
1. $CH_3CH_2CH_2NH_2$
2. $CH_3NHCH_2CH_3$
3. $CH_3 - \overset{CH_3}{\underset{|}{N}} - CH_3$
4. Any of these

120.

Which reaction does not represent auto redox or disproportionation ?

1. $Cl_2 + OH^- \rightarrow Cl^- + ClO_3^- + H_2O$
2. $2H_2O_2 \rightarrow H_2O + O_2$
3. $2Cu^+ \rightarrow Cu^{2+} + Cu$
4. $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$

121.



The product will be

1. Phenol
2. Benzol
3. Sodium benzoate
4. Benzal

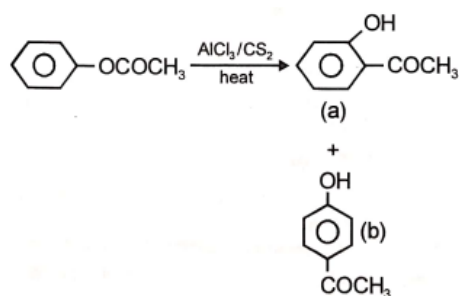
122.

Orthoboric acid when heated to red hot gives:

1. metaboric acid
2. pyroboric acid
3. boron and water
4. boric anhydride

123.

Choose the correct statement(s) for the reaction



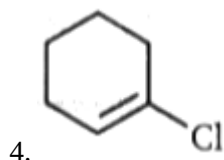
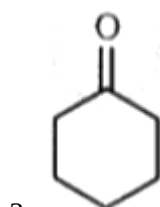
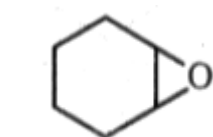
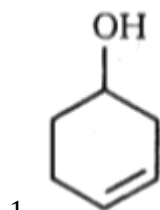
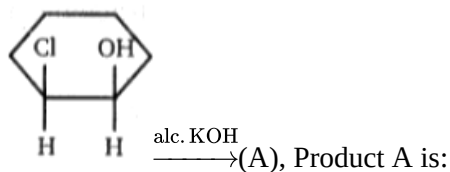
1. (b) has a lesser stability
2. (b) is more volatile than (a)
3. (a) is more volatile than (b)
4. (a) is formed higher yields at a lower temperature

124.

In water-saturated air, the mole fraction of water vapor is 0.02. If the total pressure of the saturated air is 1.2 atm, the partial pressure of dry air is-

1. 1.17 atm
2. 1.76 atm
3. 1.27 atm
4. 0.98 atm

125.



126.

The correct statement is

- 1 SO_2 bleaches by reduction
- 2 Cl_2 bleaches by oxidation
- 3 O_3 bleaches by oxidation
- 4 All of these

127.

Among the given oxoacids, the acid having highest K_a is

- 1 HClO_3
- 2 HBrO_3
- 3 HIO_3
- 4 All have equal K_a

128.

What will be the electrode potential of Cu electrode dipped in 0.025 M CuSO_4 solution at 298 K. Cu has the standard reduction potential 0.34 V :-

1. 0.047 V
2. 0.293 V
3. 0.35 V
4. 0.387 V

129.

The amount of H_2O_2 present in 1 L of 1.5 N H_2O_2 solution is:

1. 2.5 g
2. 25 g
3. 3.0 g
4. 8.0 g

130.

The pH 0.1 M solution the following salts increases in the order

1. $\text{NaCl} < \text{NH}_4\text{Cl} < \text{NaCN} < \text{HCl}$
2. $\text{HCl} < \text{NH}_4\text{Cl} < \text{NaCl} < \text{NaCN}$
3. $\text{NaCN} < \text{NH}_4\text{Cl} < \text{NaCl} < \text{HCl}$
4. $\text{HCl} < \text{NaCl} < \text{NaCN} < \text{NH}_4\text{Cl}$

131. An isomer of ethanol is

1. Methanol
2. Diethyl ether
3. Acetone
4. Dimethyl ether

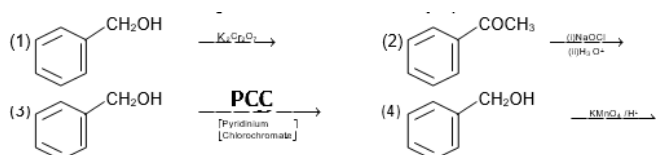
132. Acidic hydrogen is present in

1. ethyne
2. ethene
3. benzene
4. ethane

133. 2-Bromopentane reacts with alcoholic KOH to give

1. cis-2-Pentene
2. trans-2-Pentene
3. 1-Pentene
4. None of the above

134. The reaction that does not give benzoic acid as the major product is-



135. The crystal field stabilization energies (CFSE) of high spin and low spin d^6 metal complexes in terms of Δ_0 , respectively are

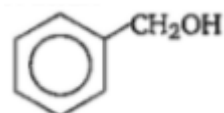
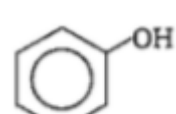
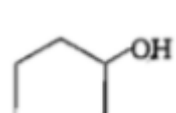
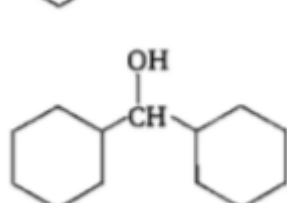
1. -0.4 and -2.4
2. -2.4 and -0.4
3. -0.4 and 0.0
4. -2.4 and 0.0

Chemistry - Section B

136. The bond angles of NH_3 , NH_4^+ and NH_2^- are in the order :

1. $NH_2^- > NH_3 > NH_4^+$
2. $NH_4^+ > NH_3 > NH_2^-$
3. $NH_3 > NH_2^- > NH_4^+$
4. $NH_3 > NH_4^+ > NH_2^-$

137. Which one of the following is most acidic?

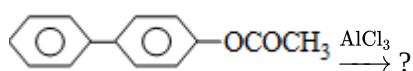
1. 
2. 
3. 
4. 

138.

At 400K energy of activation of a reaction is decreased by 0.8 kcal in presence of catalyst. Hence rate will be

1. Increased by 2.71 times
2. Increased by 1.18 times
3. Decreased by 2.72 times
4. Increased by 6.26 times

139.



Major product is -

- 1.
- 2.
- 3.
- 4.

140.

The Henry's law constant for the solubility of N_2 gas in water at 298 K is 1.0×10^5 atm. The mole fraction of N_2 in air is 0.8. The number of moles of N_2 from air dissolved in 10 moles of water at 298 K and 5 atm pressure is-

1. 4.0×10^{-4}
2. 4.0×10^{-5}
3. 5.0×10^{-4}
4. 4.0×10^{-6}

141.

An element crystallizes in a structure having FCC unit cell of an edge length 200 pm. If 200 g this element contains, the density of the element is

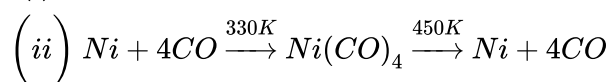
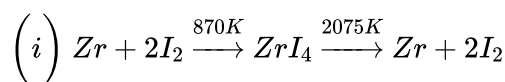
1. 50.3 g/cc
2. 63.4 g/cc
3. 41.6 g/cc
4. 34.8 g/cc

142.

Which will be adsorbed more readily on the surface of charcoal ?

1. CO_2
2. NH_3
3. Br_2
4. N_2

143.



(pure)

The respective (ii) and (i) processes are

1. Mond's process; Van Arkel process
2. Van Arkel process; Mond's process
3. Goldschmidt process; Mond's process
4. Mond's process; Goldschmidt process

144.

The geometry and the number of the unpaired electron(s) of $[\text{MnBr}_4]^{2-}$, respectively, are

1. Tetrahedral and 1
2. Square planar and 1
3. Tetrahedral and 5
4. Square planar and 5

145.

HI cannot be prepared by the action of KI and H_2SO_4 because

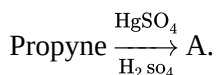
1. HI is a much weaker acid than H_2SO_4
2. HI gets oxidized by H_2SO_4 to I_2
3. H_2SO_4 is a dehydrating reagent
4. HI is less volatile than H_2SO_4

146.

Which reagent is used for converting propylene to polypropylene?

1. $TiCl_3 + K / THF$
2. $TiCl_4 + Al(C_2H_5)_3$
3. $TiCl_3 + (CH_3)_2Mg$
4. $TiCl_4 + CH_3(CH_2)_3Al$

147.



What is compound A ?

- (1) 2-propanol
- (2) propane
- (3) propene
- (4) 2-propanone

148.

The correct order of relative basic strength of the following is

1. $C_2H_5O^- > CH \equiv C^- > OH^-$
2. $CH \equiv C^- > ^-OH > C_2H_5O^-$
3. $CH \equiv C^- > C_2H_5O^- > OH^-$
4. $C_2H_5O^- > OH^- > CH \equiv C^-$

149.

What would happen when a solution of potassium chromate is treated with an excess of dilute nitric acid ?

1. $Cr_2O_7^{2-}$ and H_2O are formed
2. Cr^3 and $Cr_2O_7^{2-}$ are formed
3. CrO_4^{2-} is oxidized to +7 state to Cr
4. CrO_4^{2-} is reduced to +3 state of Cr

150.

Which of the following statements are correct about barbiturates?

- (1) Antifertility drugs
- (2) These are tranquilizers
- (3) Non-narcotic analgesics
- (4) Pain reducing without disturbing the nervous system

Physics - Section A

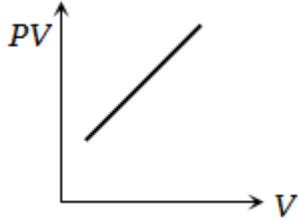
151.

In a Carnot engine, when $T_2 = 0^\circ C$ and $T_1 = 200^\circ C$, its efficiency is η_1 and when $T_1 = 0^\circ C$ and $T_2 = -200^\circ C$, its efficiency is η_2 , then what is η_1 / η_2 ?

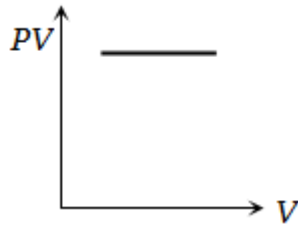
1. 0.577
2. 0.733
3. 0.638
4. Can not be calculated

152.

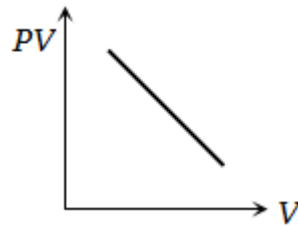
Which one of the following graphs represents the behaviour of an ideal gas at constant temperature?



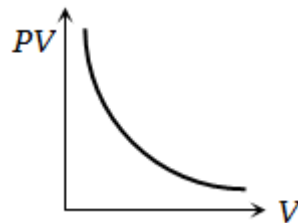
1.



2.



3.



4.

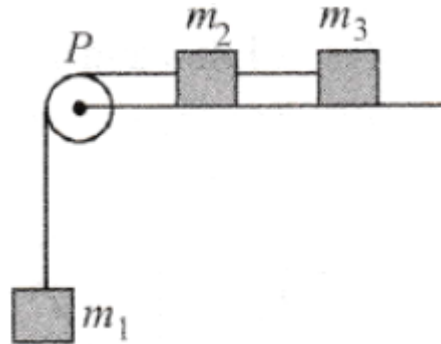
153.

In Young's double slit experiment, the two slits are illuminated by light of wavelength 5890 \AA and the angular separation between the fringes obtained on the screen is 0.2° . If the whole apparatus is immersed in water, then the angular fringe width will be, if the refractive index of water is $4/3$ -

1. 0.30°
2. 0.15°
3. 15°
4. 30°

154.

A system consists of three masses m_1 , m_2 , and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is : (Assume $m_1 = m_2 = m_3 = m$)



1. $\frac{g(1-g\mu)}{9}$
2. $\frac{2g\mu}{3}$
3. $\frac{g(1-2\mu)}{3}$
4. $\frac{g(1-2\mu)}{2}$

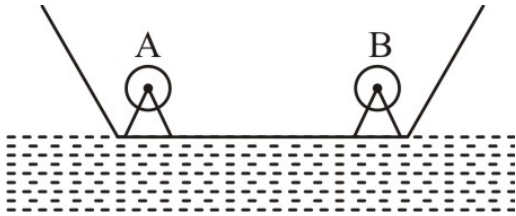
155.

The electric potential due to an infinite sheet of positive charge density σ at a point located at a perpendicular distance Z from the sheet is : (Assume V_0 to be the potential at the surface of sheet)

1. V_0
2. $V_0 - \frac{\sigma Z}{\epsilon_0}$
3. $V_0 + \frac{\sigma Z}{2\epsilon_0}$
4. $V_0 - \frac{\sigma Z}{2\epsilon_0}$

156.

A man A, mass 60 kg, and another man B, mass 70 kg are sitting at two extremes of 2m long boat of mass 70 kg, standing still in the water as shown. They come to the middle of the boat. (Neglect friction). How far does the boat move on the water during the process?



1. 5 cm leftward
2. 5 cm rightward
3. 7 cm leftward
4. 7 cm rightward

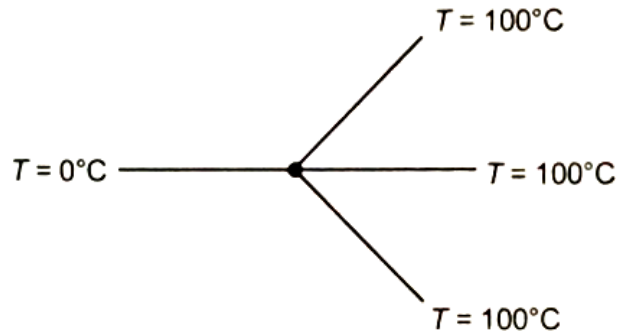
157.

The magnetic moment of a circular orbit of radius 'r' carrying a charge 'q' and rotating with velocity v is given by

1. $\frac{qvr}{2\pi}$
2. $\frac{qvr}{2}$
3. $qv\pi r$
4. $qv\pi r^2$

158.

A metallic prong consists of 4 rods made of the same material, cross-sections, and same lengths as shown in figure. The three forked ends are kept at 100°C and the handle end is at 0°C . The temperature of the junction is-



1. 25°C
2. 50°C
3. 60°C
4. 75°C

159.

The potential energy U (in J) of a body executing S.H.M. is given by $U = 20 + 10(\sin^2 100\pi t)$, then the minimum potential energy of the body is

1. Zero
2. 30 J
3. 20 J
4. 40 J

160.

The electric potential V is given as a function of x (in metre) as $V = (x^2 - 6x + 5)$. The electric field is zero at :

1. $x = 1\text{m}$
2. $x = 2\text{m}$
3. $x = 3\text{m}$
4. $x = 6\text{m}$

161.

When a body moves non-uniformly on a circular path,

1. no work is done by a tangential force.
2. no work is done by centripetal force.
3. work done by the tangential force is always positive.
4. work done by the centripetal force is negative.

162.

In a uniform magnetic field, a ring is rotating about its axis which is parallel to the magnetic field and the magnetic field is perpendicular to the plane of the ring. The induced electric field in the ring

1. is zero.
2. depends on the radius of the ring.
3. depends on the nature of the material of the ring.
4. depends on the product of the magnetic field and speed.

163.

A direct current of 2 A and an alternating current having peak value 2 A flow through two identical resistance at the same time. The ratio of heat produced in the two resistance will be

1. 1: 1
2. 1: 2
3. 2: 1
4. 4: 1

164.

The speed of the electromagnetic wave in a medium which has relative permittivity and permeability 4.5 and 2 respectively, is

1. 1.5×10^7 m/s
2. 1.0×10^8 m/s
3. 2.2×10^8 m/s
4. 6.5×10^7 m/s

165.

Which of the following expressions represents Biot Savart law? (Symbols have their usual meanings)

$$1. \vec{dB} = \frac{\mu_0 I \left(\vec{dl} \times \hat{r} \right)}{4\pi |\vec{r}|^3}$$

$$2. \vec{dB} = \frac{\mu_0 I \left(\vec{dl} \times \hat{r} \right)}{4\pi |\vec{r}|^2}$$

$$3. \vec{dB} = \frac{\mu_0 I \left(\vec{dl} \times \vec{r} \right)}{4\pi |\vec{r}|^3}$$

$$4. \vec{dB} = \frac{\mu_0 I \left(\vec{dl} \cdot \vec{r} \right)}{4\pi |\vec{r}|^3}$$

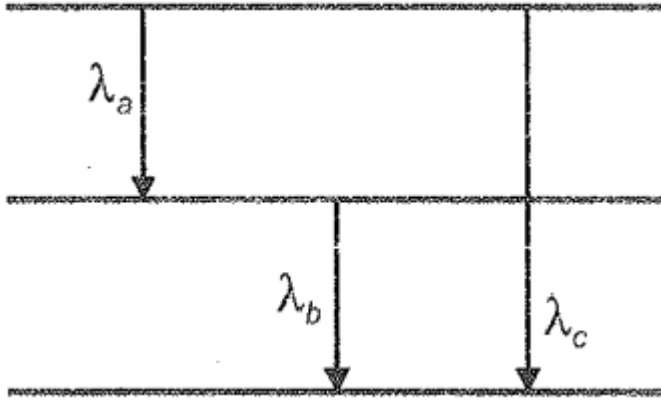
166.

A cylindrical tube open at both ends has a fundamental frequency f_0 in the air. The tube is dipped vertically in water such that half of its length is inside water. The fundamental frequency of the air column now is:

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

167.

In the figure shown, the wavelength and frequency of photons in transition a, b and c for hydrogen atoms are λ_a , λ_b , λ_c and ν_a , ν_b and ν_c respectively then



1. $\nu_b = \nu_a + \nu_c$
2. $\nu_c = \nu_a + \nu_b$
3. $\nu_c = \frac{\lambda_a \nu_a + \lambda_b \nu_b}{\lambda_a \nu_c}$
4. $\lambda_b = \frac{\lambda_a \lambda_c}{\lambda_a + \nu_c}$

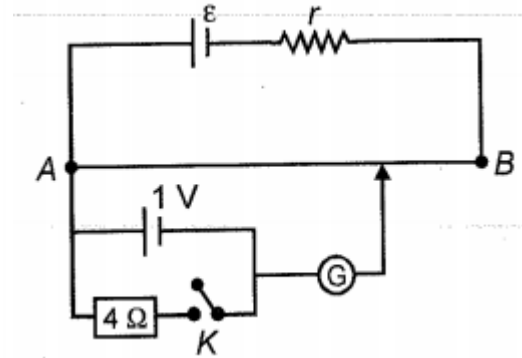
168.

In the case of free expansion, when a sample of gas expands suddenly. The change in internal energy of the gas is

1. Positive
2. Negative
3. Zero
4. May be positive or negative

169.

Figure shows a potentiometer used for determination of internal resistance of a cell of emf 1 V. When key K is open, the balance point is obtained at 90 cm from A and when closed, the balance point shifts to 80 cm from A. The internal resistance of the cell must be-



1. 0.5Ω
2. 4Ω
3. 1Ω
4. 2Ω

170.

Which of the following diode is used in forward bias ?

1. LED
2. Zener diode
3. Photodiode
4. Both 1 & 2

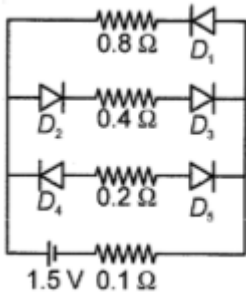
171.

Focal length of a glass ($\mu = 1.5$) lens in air is 20 cm. If it is dipped in water ($\mu = \frac{4}{3}$), its focal length in water will be-

1. 80 cm
2. 40 cm
3. 60 cm
4. 20 cm

172.

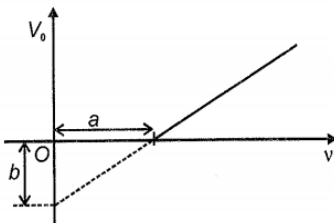
Five diodes and three resistors are connected along with a cell of emf 1.5 V and internal resistance 0.1Ω as shown. The current drawn from the cell is (diodes are ideal).



1. 3 A
2. 0.3 A
3. 5 A
4. 0.5 A

173.

If stopping potential V_0 is plotted versus frequency (ν) in an experiment of the photoelectric effect, the graph as shown in the diagram is obtained. Then (e is an electronic charge)



1. Planck's constant $t = \frac{b}{a}$
2. Planck's constant $t = \frac{eb}{a}$
3. Planck's constant $t = \frac{a}{b}$
4. Planck's constant $t = \frac{ea}{b}$

174.

What is the value of the de-Broglie wavelength of an electron when it is accelerated from rest through a potential difference of 150 V?

1. 0.5 \AA
2. 1.0 \AA
3. 1.5 \AA
4. 2.0 \AA

175.

In the making of an alloy, a metal of density n_1 and another metal of density n_2 are used. If the masses of two metals used are m_1 and m_2 respectively, then the density of the alloy is

1. $\left(\frac{m_1 + m_2}{n_1 + n_2} \right)$
2. $\frac{m_1 + m_2}{\left(\frac{m_1}{n_1} + \frac{m_2}{n_2} \right)}$
3. $\frac{m_1 + m_2}{\left(\frac{m_1 + m_2}{n_2 + n_1} \right)}$
4. $\left(\frac{n_1 + n_2}{2} \right)$

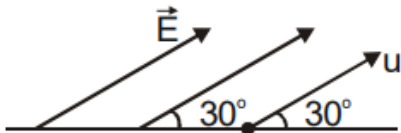
176.

A varying horizontal force $F = at$ acts on a block of mass m kept on a smooth horizontal surface. An identical block is kept on the first block. The coefficient of friction between the blocks is μ . The time after which the relative sliding between the blocks prevails is:-

1. $\frac{2mg}{a}$
2. $\frac{2\mu mg}{a}$
3. $\frac{\mu mg}{a}$
4. $2\mu mga$

177.

In a region an electric field $E = 15 \text{ NC}^{-1}$ making an angle 30° with the horizontal plane is present. A ball having charge 2 C and mass 3 kg is projected with speed 20 m/s at an angle 30° with the horizontal, the horizontal range of the projectile in metre is:- ($g = 10 \text{ ms}^{-2}$)



1. 40
2. $20\sqrt{3}$
3. $40\sqrt{3}$
4. $80\sqrt{3}$

178.

A particle starts from rest (with constant acceleration) and acquires velocity 20 m/s in 5 s . The distance traveled by the particle in the next 2 s is

1. 50 m
2. 48 m
3. 100 m
4. 150 m

179.

Two equal masses initially moving along the same straight line with velocity $+4 \text{ m/s}$ and -5 m/s respectively collide elastically. Their respective velocities after the collision will be:

1. -5 m/s and $+3 \text{ m/s}$
2. $+4 \text{ m/s}$ and -4 m/s
3. -4 m/s and $+4 \text{ m/s}$
4. -5 m/s and $+4 \text{ m/s}$

180.

A long vertical pole of length l is standing vertically with one end hinged at the floor. If the pole is released and allowed to fall, then the angular velocity of the rod just before hitting the floor is:

1. $\omega = \sqrt{\frac{3g}{l}}$
2. $\omega = \sqrt{3gl}$
3. $\omega = \sqrt{\frac{3}{2}gl}$
4. $\omega = \sqrt{\frac{3g}{2l}}$

181.

A planet moves around the sun. At a point P, it is closest to the sun at a distance d_1 and has speed v_1 . At another point Q, when it is farthest from the sun at distance d_2 , its speed will be:

1. $\frac{d_2 v_1}{d_1}$
2. $\frac{d_1 v_1}{d_2}$
3. $\frac{d_1^2 v_1}{d_2}$
4. $\frac{d_2^2 v_1}{d_1}$

182.

Which of the following is the most precise device for measuring length?

1. A vernier calliper with 20 divisions on the sliding scale.
2. A screw gauge of pitch 1 mm and 100 divisions on the circular scale.
3. An optical instrument that can measure the length within a wavelength of light.
4. Both 1 and 2

183.

The Young's modulus of the material of the wire of length L and radius r is $Y \text{ N/m}^2$. If the length is reduced to $\frac{L}{2}$ and radius $\frac{r}{2}$, the Young's modulus will be:

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

184.

A cricketer can throw a ball to a maximum horizontal distance of 100 m. How much high above the ground, can the cricketer throw the same ball?

1. 50 m
2. 60 m
3. 75 m
4. 100 m

185.

A horizontal straight wire 10 m long extending from east to west is falling with a speed of 5.0 ms^{-1} , at right angle to the horizontal component of the earth's magnetic field, $0.30 \times 10^{-4} \text{ Wb m}^{-2}$. The instantaneous value of the emf induced in the wire is:

1. $2.5 \times 10^{-3} \text{ V}$
2. $1.5 \times 10^{-4} \text{ V}$
3. $2.5 \times 10^{-4} \text{ V}$
4. $1.5 \times 10^{-3} \text{ V}$

Physics - Section B

186.

An atomic nucleus ${}_{90}^{232}\text{Th}$ emits several α and β radiations and finally reduces to ${}_{82}^{208}\text{Pb}$. It must have emitted

- (1) 4α and 2β
- (2) 6α and 4β
- (3) 8α and 24β
- (4) 4α and 16β

187.

Which one of the following relations is dimensionally consistent where h is the height to which a liquid of density ρ rises in a capillary tube of radius r , T is the surface tension of the liquid, θ the angle of contact, and g the acceleration due to gravity?

1. $h = \frac{2T \cos\theta}{r\rho g}$
2. $h = \frac{2Tr}{\rho g \cos\theta}$
3. $h = \frac{2\rho g \cos\theta}{Tr}$
4. $h = \frac{2Tr\rho g}{\cos\theta}$

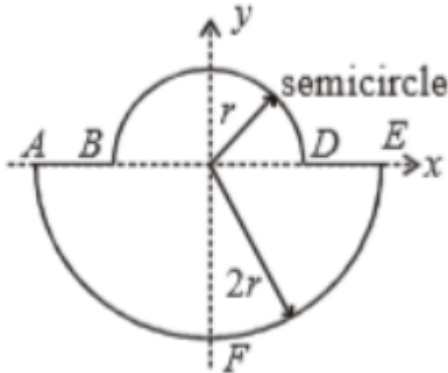
188.

A frog can be levitated in a magnetic field produced by a current in a vertical solenoid placed below the frog. This is possible because the body of the frog behaves as

1. paramagnetic
2. Diamagnetic
3. ferromagnetic
4. None of these

189.

A uniform thin rod is bent in the form of closed loop ABCDEFA as shown in the figure. The ratio of inertia of the loop about x-axis to that about y-axis is:



1. >1
2. <1
3. $=1$
4. $=1/2$

190.

In the spring pendulum, in the place of mass, a liquid is used. If liquid leaks out continuously, then the time period of a spring pendulum:

1. Decreases continuously
2. Increases continuously
3. First increased and then decreased
4. First decreased then increased

191.

A point charge q is placed at a distance $\frac{R}{3}$ from the center O of an uncharged, conducting hollow sphere of inner radius R and outer radius $3R$. The potential at the center is $\left(K = \frac{1}{4\pi\epsilon_0} \right)$

1. $\frac{7}{3} \frac{Kq}{R}$
2. $\frac{5}{3} \frac{Kq}{R}$
3. $\frac{3Kq}{R}$
4. $\frac{Kq}{R}$

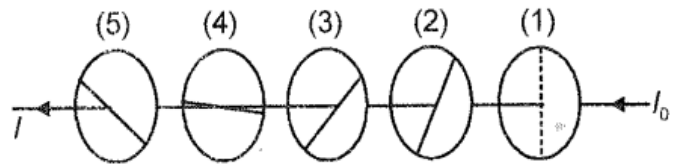
192.

Which of the following statements is correct regarding electrostatics of conductors?

1. The interior of the conductor with no cavity can have no excess charge in the static situation
2. Electrostatic potential is constant throughout the volume of the conductor
3. Electrostatic potential has the same value inside as that on its surface
4. All of these

193.

Five identical polaroids are placed coaxially with 45° angular separation between pass axes of adjacent polaroids as shown in the figure. (I_0 : Intensity of unpolarized light)

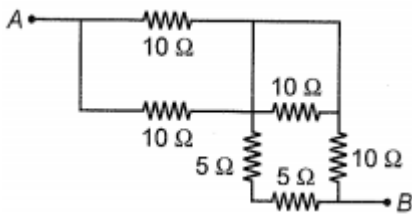


The intensity of light, I , emerging out of 5th polaroid is

1. $\frac{I_0}{4}$
2. $\frac{I_0}{8}$
3. $\frac{I_0}{16}$
4. $\frac{I_0}{32}$

194.

Resistance between terminals A and B is-



1. 5Ω
2. 15Ω
3. 10Ω
4. 20Ω

195.

Zener break down takes place, if

1. Doped impurity concentration is low
2. Doped impurity concentration is high
3. Less impurity in N part
4. Less impurity in P part

196.

When a large bubble rises from the bottom of a lake to the surface, its radius doubles. The atmospheric pressure is equal to that of a column of water of height H . The depth of the lake is

1. H
2. $2H$
3. $7H$
4. $8H$

197.

Two cars A and B are moving with constant velocities 10 m/s east and 40 m/s west respectively. The acceleration of A with respect to B is

1. 20 m/s^2 west
2. 50 m/s^2 west
3. 50 m/s^2 east
4. Zero

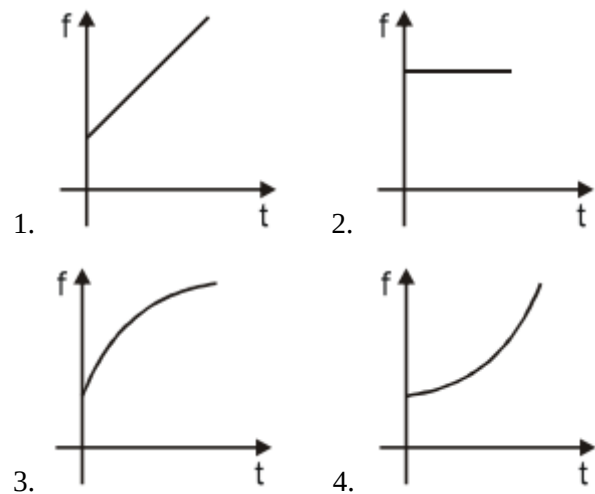
198.

A body is moving towards north with initial velocity of 13 ms^{-1} . It is subjected to a retardation of 2 ms^{-2} towards south. The distance travelled by it in 7^{th} second is

1. Zero
2. 0.75 m
3. 0.25 m
4. 0.5 m

199.

An observer starts moving with uniform acceleration towards a stationary sound source of frequency f_0 . As the observer approaches the source, the apparent frequency f heard by the observer varies with time t as-



200.

A rocket with a lift-off mass of 20,000 kg is blasted upwards with an initial acceleration of 5 m s^{-2} . Then initial thrust (force) of the blast is:

1. $7 \times 10^5 \text{ N}$
2. 0
3. $2 \times 10^5 \text{ N}$
4. $3 \times 10^5 \text{ N}$

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