

Botany - Section A

1.

Identify the incorrect statement:

1. The presence of vessels is a characteristic of angiosperms
2. In roots the primary xylem is exarch
3. Gymnosperms lack albuminous cells and sieve cells
4. Bast fibers are generally absent in primary phloem

2.

An important biofertilizer in paddy fields is :

1. Azospirillum
2. Azotobacter
3. Anabaena
4. Rhizobium

3.

The cells of which of the following regions of the root are responsible for growth of its length?

1. Root cap
2. Region of meristematic activity
3. Region of elongation
4. Region of maturation

4.

Two phenotypically normal individuals have an affected child. What can we conclude about the parents?

1. they both carried the disease allele
2. they are not the parents of the child
3. they are affected
4. no conclusions can be drawn

5.

Identify the incorrectly matched pair:

- | | | |
|----|-----------------------|-------------------|
| 1 | Streptococcus | Clot buster |
| 2. | Monascus purpureus | Statins |
| 3. | Trichoderma harzianum | Immunosuppressant |
| 4. | Aspergillus niger | Citric acid |

6.

Cells in some filamentous cyanobacteria that are specialized for nitrogen fixation are called:

1. Phycobilisomes
2. Chromatophores
3. Grana
4. Heterocysts

7.

Classification of organisms on the basis of gene sequencing is

1. Cytotaxonomy
2. Karyotaxonomy
3. Chemotaxonomy
4. Classical taxonomy

8.

During cell cycle, events are under

1. Genetic control
2. Metabolic control
3. Cytoplasmic control
4. Mitochondrial control

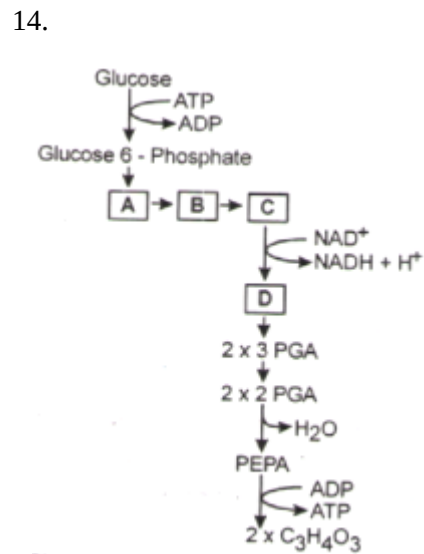
9. In a stamen proximal end of filament is attached to
1. Anther.
 2. Thalamus or petals.
 3. Sepals.
 4. Gynoecium.

10. The first genetic code of life was based on :
1. DNA
 2. RNA
 3. Proteins
 4. Lipids

11. Enzymes and electron carriers for the formation of cellular energy are present in the mitochondria at
1. Outer membrane only.
 2. Inner membrane only.
 3. Both outer and inner membrane.
 4. Mitochondrial matrix only.

12. When a cell is viewed under the microscope, it does not show golgi complex, endoplasmic reticulum, nucleolus, nuclear envelope in which stage of cell division?
1. Early prophase
 2. Late prophase
 3. Interphase
 4. Telophase

13. Vernalisation stimulates flowering in
1. Zamikand
 2. Turmeric
 3. Carrot
 4. Ginger



Choose the correct names of A, B, C and D

	A	B	C	D
1.	1,3 di PGA	3 PGAlD	Fr,1,6 di P	Fr. 6P
2.	3 PGAlD	1,3 Di PGA	Fr,1,6 di P	Fr. 6P
3.	Fr,1, 6 Di P	Fr. 6 P	3 PGAlD	1,3 di PGA
4.	Fr,6P	Fr,1,6 di P	3 PGAlD	1,3 di PGA

15. Why breakdown of proton gradient is essential during photosynthesis
1. It leads to production of NADPH.
 2. It leads to production of O₂
 3. It leads to production of ATP.
 4. Both 1 and 3
16. Non-membranous nucleoplasmic structures in nucleus are the site for active synthesis of
1. protein synthesis
 2. mRNA
 3. rRNA
 4. tRNA
17. Carnivorous animals - lions and leopards, occupy the same niche but lions predate mostly larger animals and leopards take smaller ones. This mechanism of competition is referred to as -
1. Character displacement
 2. Altruism
 3. Resource partitioning
 4. Competitive exclusion
18. Match the organisms in column I with habitats in column II.
- | Column I | Column II |
|-----------------------|--------------------------|
| (a) Halophiles | (i) Hot springs |
| (b) Thermoacidophiles | (ii) Aquatic environment |
| (c) Methanogens | (iii) Guts of ruminants |
| (d) Cyanobacteria | (iv) Salty areas |
- Select the correct answer from the options given below:
1. (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)
 2. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
 3. (a)-(iii), (b)-(iv), (c)-(i), (d)-(i)
 4. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
19. Bicarpellary ovary with obliquely placed septum is seen in :
1. Brassica
 2. Aloe
 3. Solanum
 4. Sesbania
20. Exploration of molecular, genetic and species level diversity for novel products of economic importance is known as :
1. Biopiracy
 2. Bioenergetics
 3. Bioremediation
 4. Bioprospecting
21. Nucellar polyembryony is reported in species
1. Citrus
 2. Gossypium
 3. Triticum
 4. Brassica

22.

Read the following four statements (A-D):

- (A) In transcription, adenosine pairs with uracil.
 - (B) Regulation of lac operon by repressor is referred to as positive regulation.
 - (C) The human genome has approximately 50,000 genes.
 - (D) Haemophilia is a sex-linked recessive disease.
- How many of the above statements are right ?

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

23.

A person with Down syndrome will show all the given symptoms except

1. Many loops on finger tips.
2. Flat back of head
3. Big and wrinkled tongue
4. Narrow round face

24.

Read the following statements carefully and select the correct

- a. Tapetum cells possess dense cytoplasm and generally have more than one nucleus
- b. Sporopollenin is absent in the areas called germ pore
- c. Generative cell is small, spindle shaped with a irregularly shaped nuclei
- d. Spindle of first mitosis in pollen is asymmetric

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

25.

Which one is the correct sequence of electron transport from PS-II to PS-I ?

1. P680–PQ–Cytochrome f–Plastocynine–P700
2. P680–Cytochrome f–PQ–Plastocynine–P700
3. P680–Plastocynins–PQ–Cytochrom f–P700
4. P700–PQ–Cytochrom f–Plastocyninn–P680

26.

Eukaryotic cells considered as more efficient than prokaryotic cells, due to -

1. compartmentalisation of cytoplasm
2. Infolding of membrane
3. Presence of cell wall
4. Aerobic respiration

27.

Main factor deciding rate of diffusion is :-

1. Pressure/concentration gradient
2. Solubility of gases
3. Thickness of diffusion membrane
4. Posture of body

28.

Which of the following pairs is wrongly matched?

1. Dog flower – Incomplete dominance
2. Non-Disjunction – Aneuploidy
3. Linkage – Morgan
4. Sutton and Boveri – Recombination and Linkage

29.

Does Tubulin protein synthesis take place in which of the given stages of interphase?

1. G₁
2. G₀
3. S
4. G₂

30. The highest category in the taxonomic hierarchy is

1. Kingdom
2. Phylum
3. Class
4. Species

31. In the human being, chromosome 1 has A genes and Y has B genes.

Select the option which correctly fills A and B.

1. A – 2968, B – 231
2. A – 231, B – 2968
3. A – 2168, B – 321
4. A – 321, B – 2168

32. Water potential of pure water at standard temperatures, which is not under any pressure is

1. Equal to ψ_s of a solution
2. Equal to zero
3. Always negative
4. Any positive value above zero

33. In lac operon, β galactosidase is coded by

1. Lac z gene
2. Lac y gene
3. Lac a gene
4. i gene

34. In an interaction, between two species, one species is harmed and other species is benefitted. This relationship can be indicated by

1. Commensalism
2. Predation
3. Competition
4. Both 2 and 3

35. (a) Soil are reservoir of all mineral elements that are essential for the proper growth and development of plants.

(b) Initial uptake of minerals into the symplast is slow

(c) Uptake of minerals in inner space is rapid

1. All are correct
2. Only (a) is incorrect
3. (b) & (c) are incorrect
4. Only (c) is incorrect

Botany - Section B

36. What is the F_2 phenotypic ratio in cases of incomplete dominance?

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

37. What conditions are required for vernalisation in plants?

1. Low temperature, CO_2 .
2. Low temperature, O_2 , leaf.
3. Optimum temperature, O_2 .
4. Low temperature, O_2 .

38. Pusa sadabahar variety is resistant to all, except
1. Tobacco mosaic virus.
 2. Bacterial blight.
 3. Chilly mosaic virus.
 4. Leaf curl disease.

39. Which of the following is an innovative remedy for plastic waste ?
1. Burning in the absence of oxygen
 2. Burying 500 m deep below soil surface
 3. Polyblend
 4. Electrostatic precipitator

40. The biomass available for consumption by the herbivores and the decomposers is called
1. Secondary productivity
 2. Standing crop
 3. Gross primary productivity
 4. Net primary productivity

41. Pick the correct set of gases labelled A, B, C and D in the given figure showing their respective contribution to global warming



1. A – CFCs, B – CH₄, C – CO₂, D – N₂O
2. A – CO₂, B – CH₄, C – CFCs, D – N₂O
3. A – N₂O, B – CH₄, C – CO₂, D – CFCs
4. A – CO₂, B – CFCs, C – CH₄, D – N₂O

42. The cell gets swell up, when placed in
1. Hypertonic solution
 2. Hypotonic solution
 3. Ultratonic solution
 4. Isotonic solution

43. The number of ATP required for phosphorylation to form a RUBP during regeneration steps is
- 1 18
 - 2 3
 - 3 5
 - 4 1

44. Cryopreservation of gametes of threatened species in viable and fertile condition can be referred to as :-
1. in situ conservation of biodiversity
 2. advanced ex-situ conservation of biodiversity
 3. in situ conservation by sacred groves
 4. in situ cryoconservation of biodiversity

45. Select the incorrect match.
1. Bacteria - Binary fission
 2. Yeast - Budding
 3. Chlamydomonas - Zoospores
 4. Amoeba - Conidia

46. The anther wall layer which is usually polyploid and has dense cytoplasm as well as high DNA content is

1. Endothelium
2. Tapetum
3. Epidermis
4. Middle layer

47. Find the correct mathematical expression for geometric growth resulting in a J-shaped population growth curve.

1. $\frac{dN}{dt} = rN$
2. $\frac{K-N}{K}$
3. $\frac{dN}{dt} = rN \left(\frac{K-N}{K} \right)$
4. $\frac{dN}{dt} = rN \left(\frac{N-K}{N} \right)$

48. Select the wrong statement about eukaryotic cells.

1. They have well defined nucleus
2. Possess 70S ribosomes
3. May have a cell wall
4. No organelles are single membrane bound

49. *Nitrococcus* is

1. Photosynthetic
2. Nitrifying bacteria
3. Helpful in nitrate assimilation
4. Nitrogen fixing bacteria

50. Select the **correct** statement

1. ATP formation occurs both in chloroplast and mitochondria
2. RQ of protein is 1.5
3. RQ of fatty acid is more than one
4. Cytochrome a_3 has both Fe^{3+} and Fe^{2+}

Zoology - Section A

51. The condition where urea accumulates in blood is:

1. Glycosuria
2. Uremia
3. Ketonuria
4. Acidosis

52. Consider the following statements:

- I. RNAi takes place in all eukaryotic organisms as a method of cellular defense.
- II. It involves silencing of a specific mRNA due to complementary dsDNA molecules that prevent the translation of mRNA.
- III. Fire and Mello got Nobel Prize for the discovery of RNAi.

Which of the above statements are true?

1. I and II only
2. I and III only
3. II and III only
4. I, II, and III

53. NAD and NADP are consider as

1. Apoenzyme and cofactor respectively.
2. Coenzyme and co-factor respectively.
3. Both as co-enzyme.
4. Apoenzyme and holoenzyme respectively.

54.

The iris _____.

1. regulates light entrance through the pupil
2. refracts light rays
3. absorbs stray light rays
4. contains receptors for sight

55.

The sliding filament theory of muscle contraction involves

1. calcium ions releasing ATP for energy
2. calcium ions binding with troponin, which shifts tropomyosin and allows the myosin-binding sites on actin to be exposed
3. neuromuscular junctions directly producing the movement of actin and myosin
4. actin filaments moving the myosin filaments in each sarcomere

56.

During an allergic reaction, the binding of antigens to IgE antibodies initiates a response, in which chemicals cause the dilation of blood vessels and a host of other physiological changes, Such chemicals are

- | | |
|----------------|----------------|
| 1. interferons | 2. hormones |
| 3. histamines | 4. acetylamine |

57.

At the end of spermatogenesis, sperms heads become embedded in the sertoli and finally released from the seminiferous tubules by the process called

1. Spermiogenesis
2. Spermateliosis
3. Spermiation
4. Androgenesis

58.

Basmati rice is distinct for its unique aroma and flavour. How many documented varieties of Basmati are grown in India ?

1. 27
2. 270
3. 13
4. 230

59.

Cartilage is present

- A. In the tip of nose and middle ear joints
- B. Between adjacent bones of vertebral column
- C. Between adjacent bones of limbs and hands in adults

1. A,B and C
2. A and B
3. B and C
4. A anc C

60.

Match the terms given in Column-I with their physiological processes given in column-II and choose the correct answer

Column-I		Column-II	
(A) Proximal convoluted tubule	(i)	Formation of concentrated urine	
(B) Distal convoluted tubule	(ii)	Filtration of blood	
(C) Henle's loop	(iii)	Reabsorption of 70-80% of electrolytes	
(D) Counter-current mechanism	(iv)	Ionic balance	
(E) Renal corpuscle	(v)	Maintainance of a concentration gradient in medulla	

1. (A)-(iii); (B)-(v); (C)-(iii); (D)-(ii); (E)-(i)
2. (A)-(iii); (B)-(iv); (C)-(i);(D)-(v);(E)-(ii)
3. (A)-(i);(B)-(iii); (C)-(ii); (D)-(v);(E)-(iv)
4. (A)-(iii) ; (B)-(i) ; (C)-(iv) ; (D)-(v) ; (E)-(ii)

61.

Which one of the following sets of animals belong to a single taxonomic group?

1. Cuttlefish, jellyfish, silverfish, dogfish, starfish
2. Bat, pigeon, butterfly
3. Monkey, chimpanzee, man
4. Silkworm, tapeworm, earthworm

62.

The majority of water and salt filtered into Bowman's capsule is reabsorbed by

1. the brush border of the transport epithelia of the proximal tubule
2. diffusion from the descending limb of the loop of Henle into the hypertonic interstitial fluid of the medulla
3. active transport across the transport epithelium of the thick upper segment of the ascending limb of the loop of Henle
4. selective secretion and diffusion across the distal tubule

63.

Which of the following animals are true coelomates with bilateral symmetry ?

1. Adult Echinoderms
2. Aschelminthes
3. Platyhelminthes
4. Annelids

64.

One of the constituents of the pancreatic juice while poured into the duodenum in humans is.

1. Enterokinase
2. Trypsinogen
3. Chymotrypsin
4. Trypsin

65.

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

66.

Which one of the following statements about human sperm is correct?

1. Acrosome has a conical pointed structure used for piercing and penetrating the egg, resulting in fertilization
2. The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilization
3. Acrosome serves as a sensory structure leading the sperm towards the ovum
4. Acrosome serves no particular function

67.

Select the **incorrect** match

- | | | |
|-----|------------------|--|
| (1) | Agarose | - Gel electrophoresis |
| (2) | Ethidium bromide | - Stained DNA can be seen in visible light |
| (3) | Chilled ethanol | - Precipitates DNA for spooling |
| (4) | Chitinase | - Disrupts fungal cell wall |

68.

Which of the following event does not occur after implantation?

- (a) Appearance of germinal layers
- (b) Formation of chorionic villi
- (c) Secretion of HCG
- (d) Formation of trophoblast and inner cell mass

1. a, d
2. c,d,
3. d only
4. c and d

69.

Which of the following hormone binds with membrane-bound receptors?

1. Thyroxine
2. FSH
3. Estrogen
4. Cortisone

70.

Anal cerci are paired, jointed outgrowth found in cockroach. These arise from

1. 9th sternum
2. 10th tergum
3. 9th tergum
4. 8th tergum

71.

Endoskeleton of calcareous ossicles, external fertilization, adults shows radial symmetry, development indirect.

The above-given feature is true for:-

1. Echinus, Asterias
2. Pila, ophiura
3. Antedon, Aplysia
4. Pinctada, cucumaria

72.

Which element is present negligible in human body?

1. O
2. C
3. H
4. Si

73. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of :-
1. Silicon or Platinum
 2. Gold or Tungsten
 3. Silver or platinum
 4. Platinum or zinc
74. Which of the following is not related to ringworm:-
1. Microsporum
 2. Trichophyton
 3. Dry scaly eruption
 4. Wuchereria
75. Which blood cell can secrete and transport heparin, histamin and serotonin?
1. Acidophil
 2. Basophil
 3. Neutrophil
 4. Monocyte
76. Given below are some assisted reproductive technologies (ARTs), in which many technologies involve(s) invitro fertilization?
GIFT,ZIFT,ICSI,IUT,IUI
1. Four
 2. Three
 3. Two
 4. Only one
77. Read the following steps and arrange them in correct sequence for the process of inspiration:
- A. Increases thoracic volume
 - B. Air moves into lungs
 - C. The contraction in diaphragm and EICM
 - D. Increases pulmonary volume
 - E. Lungs expand
 - F. Decreases the pulmonary pressure (IPP)
1. A, B, C, D, E, F
 2. C, D, A, E, F, D
 3. C, A, E, D, F, B
 4. C, E, D, A, F, B
78. Choose the incorrect statement w.r.t. "Saheli".
1. It is a pre-coital contraceptive with a high contraceptive value
 2. It contains centchroman
 3. It is a "once a week" oral contraceptive pill
 4. It triggers estrogen receptors in the uterus, stimulating eggs for getting implanted
79. Complete the analogy with respect to joints Saddle joint: Between carpal and metacarpal of thumb: : Hinge joint:_____
1. Between femur and acetabulum
 2. Between femur and tibia
 3. Between atlas and axis
 4. Between occipital condyle and atlas

80. The partial pressure of carbon dioxide in the pulmonary artery is

1. More than that in tissues
2. Equal to that in systemic arteries
3. Less than that in alveoli
4. Equal to that in the systemic vein

81. Vestibular Apparatus consists of

1. Crista only
2. Macula only
3. Crista and Macula
4. Crista, Macula and Cochlea

82. Identify the incorrect match:

	Hormone Name	Source organ	Function
1.	Gastrin	Stomach	Stimulates gastric secretion
2.	GIP	Duodenum	Inhibits gastric secretion
3.	Secretin	Duodenum	Stimulates gastric secretion and motility
4.	CCK-PZ	Duodenum mainly	Stimulates secretion of Pancreatic juice

83. Select the hormone that acts through intracellular receptors.

1. FSH
2. LH
3. Progesterone
4. Insulin

84. Match Column-I with Column-II

Column I	Column II
(i) Brunner's gland	a. Salivary amylase
(ii) Rugae	b. Nucleosidase
(iii) Succus entericus	c. Mucosa layer
(iv) Carbohydrate splitting enzyme	d. Sub-mucosa

Choose the correct option

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

85. Which of the following is least likely to be caused by reduced blood/oxygen supply to heart muscles?

1. Atherosclerosis
2. Myocardial ischaemia
3. Angina pectoris
4. Heart attack

Zoology - Section B

86.

Dense irregular connective tissue is present in:

1. Tendons
2. Ligaments
3. Skin
4. Cartilage

87.

Among the following sets of examples for divergent evolution, select the incorrect option.

1. Brain of bat, man and cheetah
2. Heart of bat, man and cheetah
3. Forelimbs of man, bat and cheetah
4. Eyes of Octopus, bat and man

88.

Read the following statements (A-D):-

- (A) A neural signal reaching the neural muscular junction releases adrenalin.
 (B) Many monomeric proteins called meromyosin constitute one thin filament.
 (C) A complex protein troponin is distributed at irregular intervals on the tropomyosin.
 (D) During shortening of muscle, the I-bands get reduced.

How many of the above statements are true?

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

89.

Biologists discover about 1000 species in an Island which is descended from a single ancestor species. What is the reason behind the such large speciation?

1. Mutation
2. Adaptive radiation
3. Convergent evolution.
4. Reproductive isolation

90.

Which of the following is not the function of the large intestine?

1. Absorption of some water, minerals and certain drugs
2. Nutrient absorption
3. Secretion of mucus to lubricate feces
4. The temporary storage of feces in rectum

91.

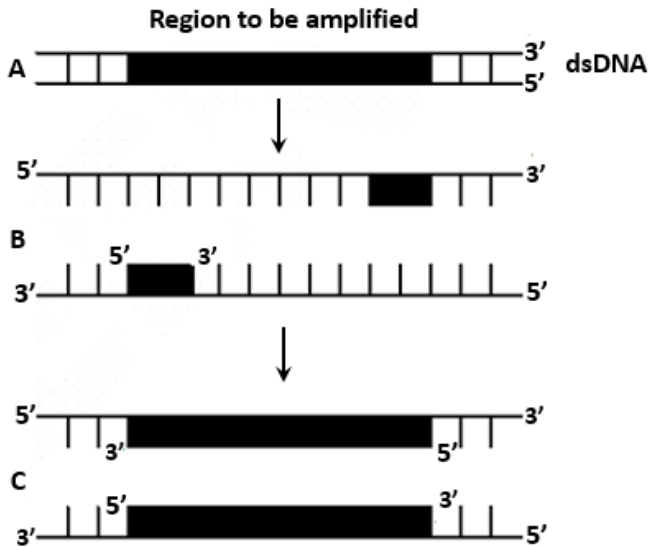
Which of the following hormones are secreted by placenta?

- A. Human chorionic gonadotropin
- B. Chorionic thyrotropin
- C. Estrogen
- D. Progesterone

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

92.

The figure below shows three steps (A, B, C) of polymerase chain reaction (PCR). Select the correct identification together with what it represents



1. B - Denaturation at a temperature of about 98°C separating the two DNA strands
2. A - Denaturation at a temperature of about 60°C
3. C - Extension in the presence of heat stable DNA polymerase
4. A - Annealing with two sets of primer

93.

The contraction of which of the following muscles will cause constriction of pupil in the presence of bright light?

1. Radial iris muscles
2. Circular iris muscles
3. Suspensory ligaments
4. Superior rectus

94.

One turn of the helix in a B-form DNA is approximately ?

1. 20 nm
2. 0.34 nm
3. 3.4 nm
4. 2 nm

95.

Two key concepts of Darwin theory are :-

1. Gene mutation and natural selection
2. Branching descent and variations
3. Branching descent and natural selection
4. Saltation and variations

96.

A hormone responsible for normal sleep-wake cycle is:-

1. epinephrine
2. gastrin
3. melatonin
4. insulin

97.

Interstitial or leydig cells, present outside the seminiferous tubules, synthesize and secrete

1. Inhibin
2. GnRH
3. Androgens
4. Progesterone

98.

Identify the left end of the glycogen chain

1. Reducing end
2. Non-reducing end
3. N-terminal end
4. C-terminal end

99.

Read the following statements and choose the option that correctly represents the true and false ones

- (i) Inbreeding depression can be corrected by outcrossing.
- (ii) In MOET fertilized eggs at the 8-32 celled stage are surgically recovered
- (iii) More than 70% of the world livestock population is in India and China.
- (iv) Poultry birds exclusively grown for meat are called roosters.

(i) (ii) (iii) (iv)

1. T F T F
2. T T T F
3. T F F T
4. F F T F

100.

Choose the **correct** statement

1. All members of phylum echinodermata are marine and parasitic
2. Bioluminescence is well marked in cnidarians
3. Ctenophores are strictly dioecious
4. Platyhelminthes possess organ level of organisation and an incomplete digestive tract

Chemistry - Section A

101.

Which of the following sets of quantum numbers represent an impossible arrangement -

n l m s

1. 3 2 -2 (+)1/2
2. 4 0 0 (-)1/2
3. 3 2 -3 (+)1/2
4. 5 3 0 (-)1/2

102.

A sample of CaCO_3 is 50% pure. On heating 1.12 litres of CO_2 (at STP) is obtained. Residues left (assuming non-volatile impurity) is , (Ca = 40, C= 12, O=16)

1. 7.8gm
2. 5 gm
3. 3.8 gm
4. 2.8 gm

103.

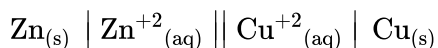
Which salt is more hydrolyzed?

(Assume that K_b of all weak base is the same)

1. NH_4Cl
2. CuSO_4
3. AlCl_3
4. All are equally hydrolyzed

104.

What will be the maximum work which can be obtained from a Daniel cell -



if

$$E^{\circ}_{\text{Zn}^{+2}/\text{Zn}} = -0.76 \text{ V and } E^{\circ}_{\text{Cu}^{+2}/\text{Cu}} = 0.34 \text{ V}$$

1. 106.15 KJ
2. -212.3 KJ
3. 424.6 KJ
4. +212.3 KJ

105.

The compound which does not react with sodium is:

1. $\text{CH}_3\text{CHOHCH}_3$
2. $\text{CH}_3\text{—O—CH}_3$
3. CH_3COOH
4. $\text{C}_2\text{H}_5\text{OH}$

106.

Oxidation number of oxygen in potassium super oxide (KO_2) is

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

107.

The rate constant for a reaction of zero order in A is $0.0030 \text{ mol L}^{-1} \text{ s}^{-1}$. How long will it take for the initial concentration of A to fall from 0.10 M to 0.075 M?

1. 8.3 sec
2. 0.83 sec
3. 83 sec
4. 10.3 sec

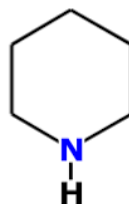
108.

Bond angle between two hybrid orbitals is 105° s character orbital is:

1. Between 30-31%
2. Between 9- 12%
3. Between 25 -26%
4. Between 22-23%

109.

In piperidine "N" atom has hybridization:



1. sp
2. sp^2
3. sp^3
4. dsp^2

110.

The boiling point of calcium is abnormally high as compared to Magnesium because-

1. In calcium d-orbital forms weak metallic bond
2. In calcium p-orbital forms weak metallic bond
3. In calcium d-orbital forms strong metallic bond
4. In calcium s-orbital forms strong metallic bond

111. Match the interhalogen compounds of column I with the geometry in column-II and assign the correct code:

Column-I

- (A) XX'
- (B) XX'_3
- (C) XX'_5
- (D) XX'_7

Column-II

- (i) T-shape
- (ii) Pentagonal bipyramidal
- (iii) Linear
- (iv) Square Pyramidal
- (v) Tetrahedral

1. A-(iii) B-(i) C-(iv) D-(ii)
2. A-(v) B-(iv) C-(iii) D-(ii)
3. A-(iv) B-(iii) C-(ii) D-(i)
4. A-(iii) B-(iv) C-(i) D-(ii)

112.

It is because of the inability of ns^2 electrons of the valence shell to participate in bonding that:

1. Sn^{2+} is oxidizing agent while Pb^{4+} is a reducing agent
2. Sn^{2+} and Pb^{2+} both are an oxidizing agents
3. Sn^{4+} is a reducing agent while Pb^{4+} is oxidizing agent
4. Sn^{2+} is a reducing agent while Pb^{4+} is oxidizing agent

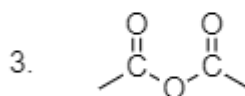
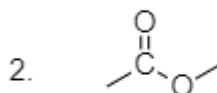
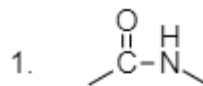
113.

Green chemistry means such reactions which

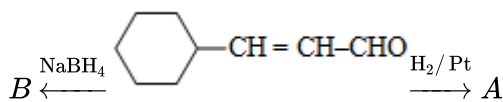
1. produce colour during reactions
2. reduce the use and production of hazardous chemicals
3. are related to the depletion of ozone layer
4. study the reactions in plants

114.

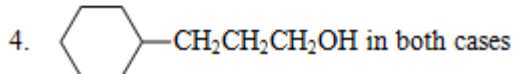
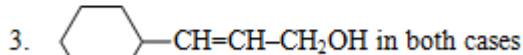
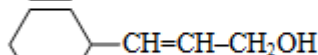
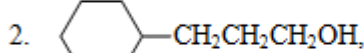
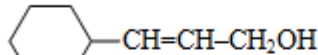
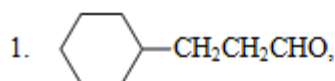
A linkage present in proteins and peptides is:



115.



A and B are-

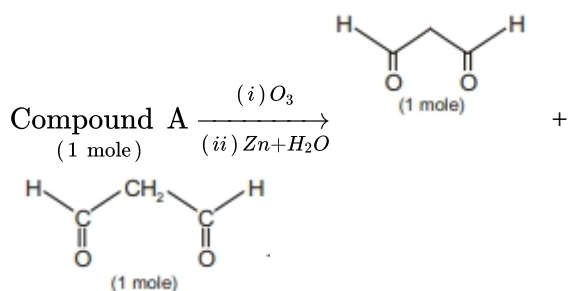


116.

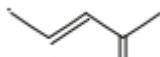



$N_2 + 3H_2 \rightarrow 2NH_3$. 1 mol N_2 and 4 mol H_2 are taken in 15 L flask at 27 °C. After complete conversion of N_2 into NH_3 , 5 L of H_2O is added. Pressure set up in the flask is -

1. $\frac{3 \times 0.0821 \times 300}{15} \text{ atm}$
2. $\frac{2 \times 0.0821 \times 300}{10} \text{ atm}$
3. $\frac{1 \times 0.0821 \times 300}{15} \text{ atm}$
4. $\frac{3 \times 0.0821 \times 300}{10} \text{ atm}$

117.



Compound A can be

1. 
2. 
3. 
4. 

118.

Which of the following gives pink colour with Schiff's reagent?

1. CH_3CHO
2. CH_3CH_2COOH
3. C_3H_5COOH
4. $C_6H_5COC_6H_5$

119.

The pH of 0.01 M NaOH (aq) solution will be-

1. 7.01
2. 2
3. 12
4. 9

120.

Zero magnetic moment of octahedral complex $K_2[NiF_6]$ is due to

1. Low spin d^6 Ni(IV) complex
2. Low spin d^8 Ni(II) complex
3. High spin d^8 Ni(II) complex
4. High spin d^6 Ni(IV) complex

121.

A compound is made by mixing cobalt (III) nitrate and potassium nitrite solution in the ratio of 1 : 3. The aqueous solution of the compound showed 4 particles per molecule whereas molar conductivity reveals the presence of six electrical charges. The formula of the compound is

1. $Co(NO_2)_3 \cdot 2KNO_2$
2. $Co(NO_2)_3 \cdot 3KNO_2$
3. $K_3[Co(NO_2)_6]$
4. $K[Co(NO_2)_4]$

122.

Which of the following can not exist together in aqueous solution?

1. HgCl_2 and SnCl_2
2. HgCl_2 and SnCl_4
3. SnCl_4 and FeCl_3
4. SnCl_4 and PbCl_4

123.

Hydrogen exists in the atomic state in these compounds –

1. Metallic hydrides
2. Ionic hydrides
3. Molecular hydrides
4. Water

124.

The maximum number of stereoisomers possible for 3-hydroxy-2-methyl butanoic acid is:

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

125.

The correct acidic nature order is

1. $\text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$
2. $\text{H}_3\text{PO}_4 < \text{H}_3\text{PO}_3 < \text{H}_3\text{PO}_2$
3. $\text{CH}_4 < \text{NH}_3 < \text{H}_2\text{O} < \text{HF}$
4. All of these

126.

Total number of elements of 3rd period which have more than one electron in 3d-orbital :-

1. 9
2. 11
3. 0
4. 8

127.

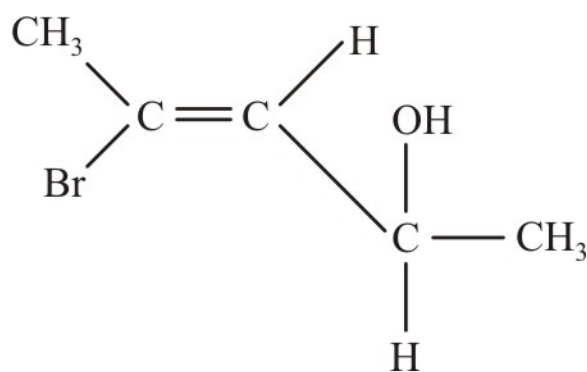
A fuel cell develops an electrical potential from the combustion of butane at 1 bar and 298 K
 $\text{C}_4\text{H}_{10}(\text{g}) + 6.5\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 5\text{H}_2\text{O}(\text{l});$

What is E° of a cell? given $\Delta G = -2746\text{kJ/mole}$

- (1) 4.74 V
- (2) 0.547 V
- (3) 4.37 V
- (4) 1.09 V

128.

The compound, whose stereochemical formula is shown below, exhibits A-geometrical isomers and B-optical isomers



The values of A and B are

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

129.

Which one of these is not an acid salt?

1. NaH_2PO_2
2. NaH_2PO_3
3. $\text{Na}_2\text{H}_2\text{S}_2\text{O}_7$
4. NaH_2PO_4

130.

The azeotropic mixture of water and ethanol boils at 78.15°C . When this mixture is distilled, it is possible to obtain

1. pure H_2O
2. pure $\text{C}_2\text{H}_5\text{OH}$
3. pure H_2O as well as pure C_2HOH
4. neither H_2O nor $\text{C}_2\text{H}_5\text{OH}$ in their pure state

131.

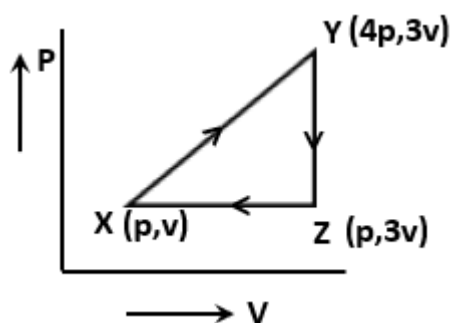
If a gas absorbs 200 J of heat and expands by 500 cm^3 against the constant pressure of

$2 \times 10^5\text{ Nm}^{-2}$ then a change in internal energy is

1. -200 J
2. -100 J
3. $+100\text{ J}$
4. $+300\text{ J}$

132.

The net work done for an ideal gas is given as



1. $-3PV$
2. $3PV$
3. PV
4. Zero

133.

The melting point is highest for

1. primary amines
2. secondary amines
3. tertiary amines
4. quaternary amines

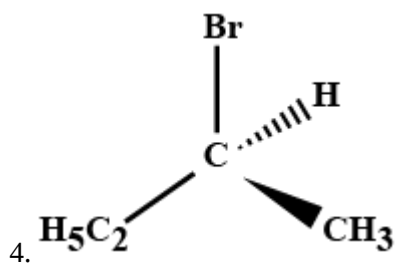
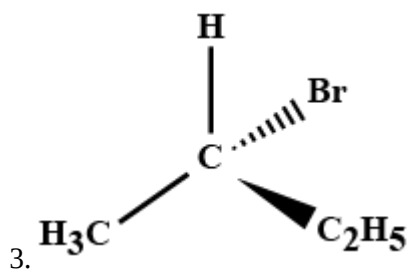
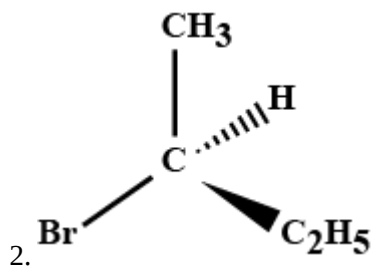
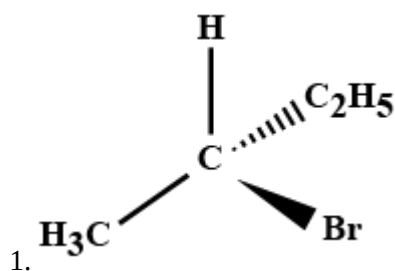
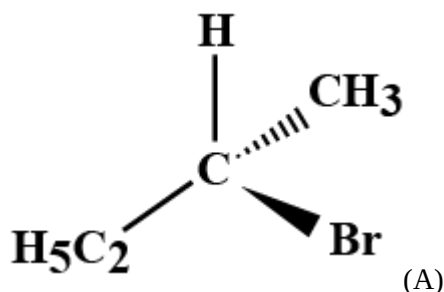
134.

Which of the following compounds gives a positive iodoform test?

1. 2-phenylethanol
2. pentanal
3. 3-pentanol
4. 1-phenylethanol

135.

Which of the following structure is enantiomer of molecule (A) given below?



Chemistry - Section B

136.

For a given reaction, presence of catalyst reduces the energy of activation by 2 kcal at 27°C. The rate of reaction will be increased by:

1. 20 times
2. 14 times
3. 28 times
4. 2 times

137.

The complexes $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ and $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$ are the examples of which type of isomerism?

1. Ionisation isomerism
2. Coordination isomerism
3. Geometrical isomerism
4. Linkage isomerism

138.

Which of the following does not form stable pentoxide

1. As
2. Sb
3. Bi
4. P

139.

Which of the following is most covalent.

1. AlF_3
2. AlCl_3
3. AlBr_3
4. AlI_3

140.

In the first transition series, the highest b.p. and m.p. is of

1. Cr
2. V
3. Ni
4. Fe

141.

On which of the following properties does coagulating power of an ion depend?

1. The magnitude of the charge on the alone
2. Size of the ion alone
3. Both magnitude and sign of the charge the ion
4. The sign of the charge on the ion alone

142.

1.00 g of non-electrolyte solute (molar mass 250 g mol^{-1}) was dissolved in 51.2 g of benzene. If the freezing point depression constant, K_f of benzene is 5.12 mol^{-1} , the freezing point of benzene will be lowered by :

1. 0.4 K
2. 0.3 K
3. 0.5 K
4. 0.2 K

143.

Cetyltrimethyl ammonium bromide is an example of

1. Artificial sweetener
2. Cationic detergent
3. Soap
4. Anionic detergent

144.

The formula of nickel oxide with metal deficiency defect in its crystal is $Ni_{0.98}O$. The crystal contains Ni^{2+} and Ni^{3+} ions. The fraction of nickel existing as Ni^{2+} ions in the crystal is-

1. 0.96
2. 0.04
3. 0.50
4. 0.31

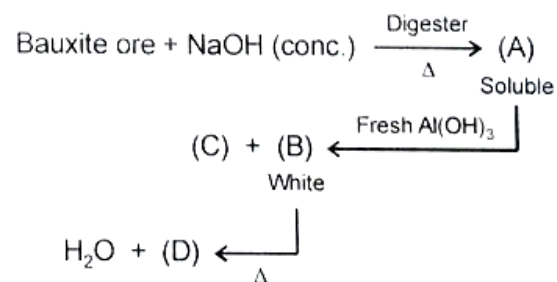
145.

For reaction $2NOCl_{(g)} = 2NO_{(g)} + Cl_{2(g)}$,

K_C at $427^\circ C$ is $3 \times 10^{-6} L mol^{-1}$. The value of K_p is nearly

1. 1.72×10^{-4}
2. 7.50×10^5
3. 2.50×10^{-5}
4. 2.50×10^{-4}

146.

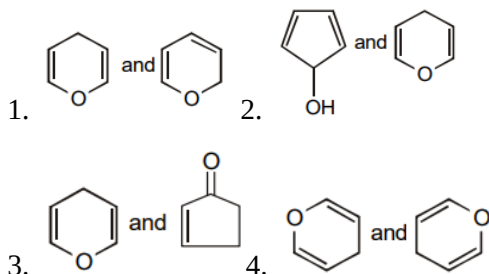


Compound (D) is

1. $NaAlO_2$
2. $Al(OH)_3$
3. Al_2O_3
4. Na_2O

147.

Which of the following pairs of structures does not represent isomers/



148.

Which of the following is not an example of condensation polymer:-

1. Dacron
2. Nylon-6
3. Glyptal
4. PTFE

149.

Which of the following shows acidic character?

1. $\text{CH}_3 - \text{CH}_3$
2. $\text{CH}_3 - \text{C} \equiv \text{CH}$
3. $\text{CH}_2 = \text{CH}_2$
4. $\text{CH}_3 \text{C} \equiv \text{C} - \text{CH}_3$

150.

An organic compound (A) contains 69.77% carbon, 11.63% hydrogen and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollens' reagent but forms an addition compound with sodium hydrogen sulphite and give a positive iodoform test. On vigorous oxidation, it gives ethanoic and propanoic acid. What is compound A?

1. Pentan-2-one
2. Butanone
3. 3-methylbutanone
4. Propan-2-ol

Physics - Section A

151.

For inputs A and B and output C, following truth table is for

A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

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

152.

A car A is travelling on a straight level road at a uniform speed of 60 km/h. It is followed by another car B which is moving at a speed of 70 km/h. When the distance between them is 2.5 km, car B is given a deceleration of 20 km/h^2 . After how much time will car B catch up with car A?

1. 1 hr
2. 1/2 hr
3. 1/4 hr
4. 1/8 hr

153.

The current in a wire varies with time according to the equation $I = 4 + 2t$, where I is in ampere and t is in sec. The quantity of charge which has passed through a cross-section of the wire during the time $t = 2 \text{ sec}$ to $t = 6 \text{ sec}$ will be:

- (1) 60 coulomb
- (2) 24 coulomb
- (3) 48 coulomb
- (4) 30 coulomb

154.

The reverse bias in a junction diode is changed from 5V to 15V then the value of current changes from $38\mu\text{A}$ to $88\mu\text{A}$. The resistance of junction diode will be:

1. $4 \times 10^5 \Omega$
2. $3 \times 10^5 \Omega$
3. $2 \times 10^5 \Omega$
4. $10^6 \Omega$

155.

A particle is projected from a horizontal plane (x-z plane) such that its velocity vector at time t is given by $\vec{V} = a\hat{i} + (b - ct)\hat{j}$. Its range on the horizontal plane is given by

1. $\frac{ba}{c}$
2. $\frac{2ba}{c}$
3. $\frac{3ba}{c}$
4. None

156.

A ball is thrown from a point on ground at some angle of projection. At the same time a bird starts from a point directly above this point of projection at a height h horizontally with speed u. Given that in its flight ball just touches the bird at one point. Find the distance on ground where ball strikes

1. $2u\sqrt{\frac{h}{g}}$
2. $u\sqrt{\frac{2h}{g}}$
3. $2u\sqrt{\frac{2h}{g}}$
4. $u\sqrt{\frac{h}{g}}$

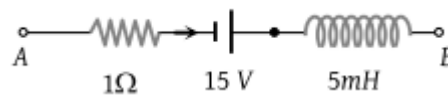
157.

A planet whose density is double of earth and radius is half of the earth, will produce gravitational field on its surface (g = acceleration due to gravity at the surface of earth):

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

158.

The network shown in the figure is a part of a complete circuit. If at a certain instant the current i is 5 A and is decreasing at the rate of 10^3 A/s then $V_B - V_A$ is



1. 5 V
2. 10 V
3. 15 V
4. 20 V

159.

A force F is given in terms of time t as $F = A\sin Ct$. The dimensions of $\frac{A}{C}$ are given by:

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

160.

Water is filled in a container up to height h . A narrow hole is made at the bottom. The velocity with which water will come out through-hole is proportional to-

1. h^3
2. $h^{\frac{1}{2}}$
3. h^2
4. h^0

161.

Surface charge density on the positive plate of a charged parallel plate capacitor is σ . Energy density in the electric field of the capacitor is:

1. $\frac{\sigma^2}{\epsilon_0}$
2. $\frac{\sigma^2}{2\epsilon_0}$
3. $\frac{\sigma}{\epsilon_0}$
4. $2\sigma^2\epsilon_0$

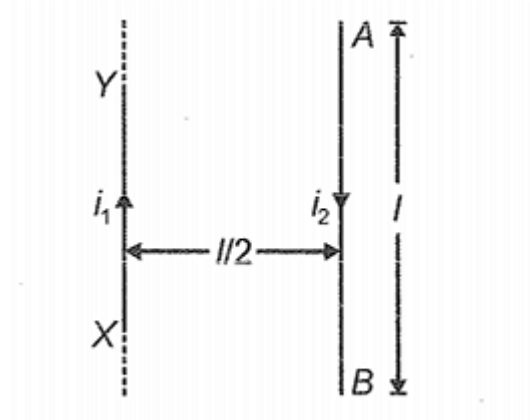
162.

Calculate the self-inductance of a solenoid having 1000 turns and length 1m. The area of cross-section is 7 cm^2 and $\mu_r = 1000$.

1. 888 H
2. 0.88 H
3. 0.088 H
4. 88.8 H

163.

A conductor AB of length l , carrying a current i_2 , is placed antiparallel to a long straight conductor XY carrying a current i_1 as shown. The force on AB has magnitude-



1. $\mu_0 i_1 i_2$
2. $\frac{\mu_0 i_1 i_2}{\pi}$
3. $\frac{\mu_0 i_1 i_2}{2\pi}$
4. $2\mu_0 i_1 i_2$

164.

In Y.D.S.E., the ratio of maximum intensity at a point to the intensity at same point when one slit is closed:

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

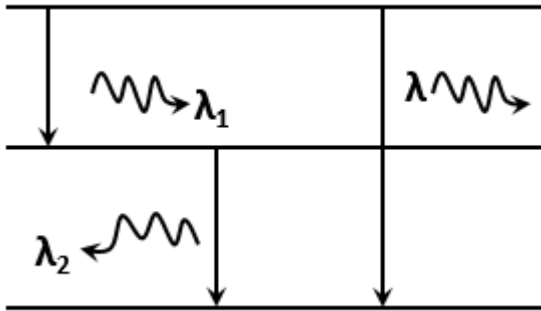
165.

A body having initial kinetic energy 2 J collides with the identical body at rest. The maximum loss of kinetic energy in the collision is-

- (1) 2 J
- (2) Zero
- (3) 1 J
- (4) 1.5 J

166.

In the diagram shown below, two atomic transitions are shown. If $\lambda_1 = 3000 \text{ \AA}$ and $\lambda_2 = 6000 \text{ \AA}$, then λ will be -



1. 2000 \AA
2. 4000 \AA
3. 4500 \AA
4. 9000 \AA

167.

When the pressure on the surface of water is increased, its boiling point will

1. Decrease
2. Increase
3. Remain same
4. Increase or decrease

168.

Four charges of $+1\mu\text{C}$, $+1\mu\text{C}$, $-1\mu\text{C}$ and $+1\mu\text{C}$ are placed at the vertices of a square of side $\sqrt{2} \text{ cm}$, in sequence. Net force experienced by $0.1 \mu\text{C}$ charge at the center of square

1. 9 N
2. 18 N
3. 36 N
4. Zero

169.

An ideal gas expands from the initial state of volume V_1 to the final state of volume V_2 . Work done is maximum in

1. Isothermal process
2. Isobaric process
3. Adiabatic process
4. Isochoric process

170.

The coefficient of performance of an ideal refrigerator is 3 which extracts heat from the sink at the rate of 399 J per cycle. The amount of heat it gives to the room per cycle is

1. 532 J
2. 250 J
3. 300 J
4. 496 J

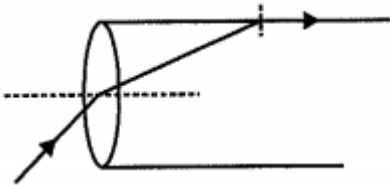
171.

The translational kinetic energy of oxygen molecules at room temperature is 60 J. Their rotational kinetic energy is:

1. 40 J
2. 60 J
3. 50 J
4. 20 J

172.

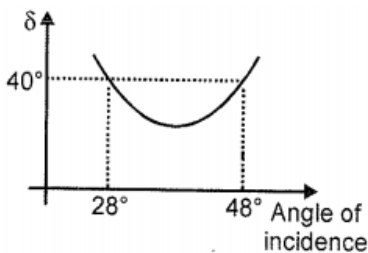
A cylindrical solid rod made up of material of refractive index $\frac{2}{\sqrt{3}}$ is given. A light beam enters from one circular end of the cylinder, and comes out just brushing the outer surface along the length. What should be the angle of incidence on the circular face?



1. $\sin^{-1}\left(\frac{1}{2}\right)$
2. $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$
3. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$
4. $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$

173.

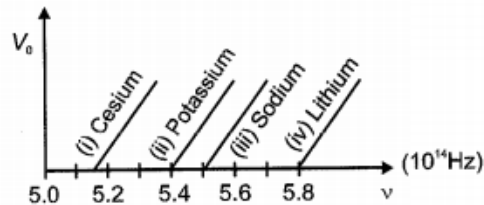
A graph is plotted between angle of deviation δ in a triangular prism and angle of incidence as shown in the figure. Refracting angle of the prism is



1. 28°
2. 48°
3. 36°
4. 46°

174.

The figure shows different graphs between stopping potential V_0 and frequency ν for photosensitive surfaces of cesium, potassium, sodium, and lithium. The plots are parallel. Which of the following about their work function is correct?



1. (i) > (ii) > (iii) > (iv)
2. (i) > (iii) > (ii) > (iv)
3. (iv) > (iii) > (ii) > (i)
4. (i) = (iii) > (ii) = (iv)

175.

What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?

1. $\sqrt{2gR}$
2. $\sqrt{3gR}$
3. $\sqrt{5gR}$
4. \sqrt{gR}

176.

A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force 30 N?

1. 0.25 rad s^{-2}
2. 25 rad s^{-2}
3. 5 m s^{-2}
4. 25 m s^{-2}

177.

A particle executing SHM crosses points A and B with the same velocity. Having taken 3 s in passing from A to B, it returns to B after another 3 s. The time period is

1. 15 s
2. 6 s
3. 12 s
4. 9 s

178.

A person standing between two parallel hills fires a gun and hears the first echo after t_1 sec and the second echo after t_2 sec. The distance between the two hills is-[Given:Speed of sound v]

1. $\frac{v(t_1 - t_2)}{2}$
2. $\frac{v(t_1 t_2)}{2(t_1 + t_2)}$
3. $v(t_1 + t_2)$
4. $\frac{v(t_1 + t_2)}{2}$

179.

An electric field $\vec{E} = 10x\hat{i}$ exists in a certain region of space. Then the potential difference $V = V_0 - V_A$, where V_0 is the potential at the origin and V_A is the potential at $x = 2$ m is:

1. 10 V
2. -20 V
3. +20 V
4. -10 V

180.

A particle having mass m and charge q is accelerated through a potential difference V . Find the force experienced when it is kept under perpendicular magnetic field \vec{B} .

1. $\sqrt{\frac{2q^3 BV}{m}}$
2. $\sqrt{\frac{q^3 B^2 V}{2m}}$
3. $\sqrt{\frac{2q^3 B^2 V}{m}}$
4. $\sqrt{\frac{2q^3 BV}{m^3}}$

181.

The wavelength λ_e of an electron and λ_p of a photon of same energy E are related by

1. $\lambda_p \propto \lambda_e$
2. $\lambda_p \propto \sqrt{\lambda_e}$
3. $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$
4. $\lambda_p \propto \lambda_e^2$

182.

A 100 Ω resistor is connected to a 220 V, 50 Hz ac supply. The net power consumed over a full cycle is:

1. 484 W
2. 848 W
3. 400 W
4. 786 W

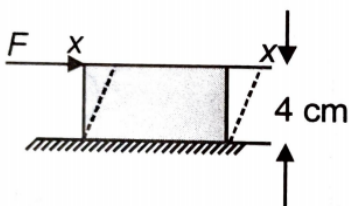
183.

A plane electromagnetic wave travels in a vacuum along the z-direction. Then the directions of its electric and magnetic field vectors will be in:

1. The x-y plane and they are parallel to each other.
2. The x-y plane and they are mutually perpendicular to each other.
3. The y-z plane and they are mutually perpendicular to each other.
4. The z-x plane and they are parallel to each other.

184.

A steel plate of face area 1 cm^2 and thickness 4 cm is fixed rigidly at the lower surface. A tangential force $F=10 \text{ kN}$ is applied on the upper surface as shown in the figure. The lateral displacement x of upper surface w.r.t. the lower surface is (Modulus of rigidity for steel is $8 \times 10^{11} \text{ N/m}^2$)



1. $5 \times 10^{-5} \text{ m}$
2. $5 \times 10^{-6} \text{ m}$
3. $2.5 \times 10^{-3} \text{ m}$
4. $2.5 \times 10^{-4} \text{ m}$

185.

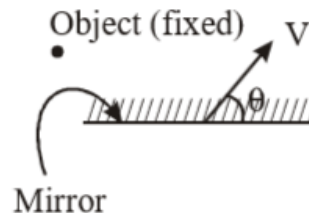
Choose the incorrect statement.

1. The centre of mass of a two-particle system lies on the line joining the two particles, being closer to the heavier particle
2. In rolling, the point of contact of the rolling body remains at rest relative to the surface on which it is rolling
3. Parallel axis theorem is applicable only for laminar bodies
4. A particle moving on a straight line may have non-zero angular momentum about a point

Physics - Section B

186.

An object and a plane mirror are shown in figure. Mirror is moved with velocity V as shown. The velocity of image is-



1. $2V \sin \theta$
2. $2V$
3. $2V \cos \theta$
4. None of these

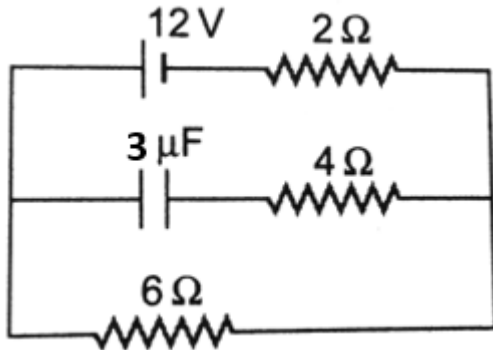
187.

A point starts moving in a straight line with a certain acceleration. At a time 't' after beginning of motion the acceleration suddenly becomes retardation of the same value. The time in which the point returns to the initial point is-

1. $\sqrt{2}t$
2. $(2 + \sqrt{2})t$
3. $\frac{t}{\sqrt{2}}$
4. Cannot be predicted unless acceleration is given

188.

The charge on the plates of the capacitor in steady state will be



1. $3 \mu C$
2. $9 \mu C$
3. $27 \mu C$
4. $36 \mu C$

189.

In the following questions, a statement of assertion (A) is followed by a statement of the reason (R).

1. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).
2. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).
3. If Assertion is a true statement but Reason is false, then mark (3).
4. if both Assertion and Reason are false statements, then mark (4).

A: When the angular amplitude of a simple pendulum is large, then $T = 2\pi\sqrt{\frac{l}{g}}$ is not valid.

R: Time period of a simple pendulum depends on angular amplitude for large magnitude of angular displacement

190.

Soft iron is used to manufacture electromagnets because-

1. It has a high permeability.
2. Its retentivity and coercivity are small.
3. Its retentivity and coercivity are high.
4. Both (1) & (2)

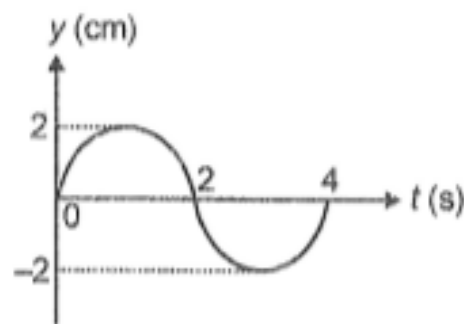
191.

When a 1Ω resistor is connected in parallel with a moving coil galvanometer in parallel, then its deflection reduces from 50 division to 5 divisions. The resistance of galvanometer is :

1. 9Ω
2. 10Ω
3. 11Ω
4. 1Ω

192.

Find the acceleration of the particle at $t = \frac{8}{3}$ s from the graph between displacement (y) versus time (t).



1. $\frac{\sqrt{3}\pi^2}{4} \text{ cm/s}^2$
2. $-\frac{\sqrt{3}\pi^2}{4} \text{ cm/s}^2$
3. $-\pi^2 \text{ cm/s}^2$
4. Zero

193.

In which of the following, the number of significant figures is different from that in the others?

1. 2.003 kg
2. 12.23 m
3. 0.002×10^5 m
4. 2.001×10^{-3} kg

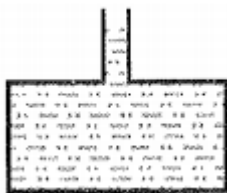
194.

The activity of a radioactive substance decays from 8000 becquerel to 4000 becquerel in 5 days. The activity of the substance after the next 10 days will be:

1. 500 becquerel
2. 1500 becquerel
3. 2000 becquerel
4. 1000 becquerel

195.

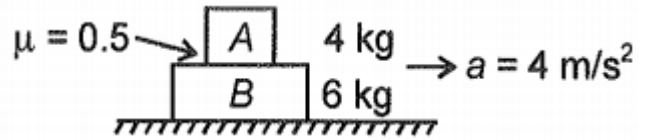
A liquid is filled in a container as shown in the figure. The force exerted by the liquid on the base of the container must be



1. Equal to weight of the liquid
2. More than the weight of the liquid
3. Less than the weight of the liquid
4. More or less than the weight of the liquid

196.

What is the friction force acting on the upper block when the system of two blocks moves with an acceleration of 4 m/s^2 ?



1. 20 N
2. 16 N
3. 12 N
4. Zero

197.

A body is dropped from a height of 10 m. After striking the surface it rises to 8 m, what is the fractional loss in kinetic energy during impact? (Assuming no air resistance)

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

198.

A force $\vec{F} = 4\hat{i} - 5\hat{j} + 3\hat{k}$ is acting at point $\vec{r}_1 = \hat{i} + 2\hat{j} + 3\hat{k}$. Then, the torque acting about point $\vec{r}_2 = 3\hat{i} - 2\hat{j} - 3\hat{k}$ is

1. Zero
2. $42\hat{i} - 30\hat{j} + 6\hat{k}$
3. $42\hat{i} + 30\hat{j} + 6\hat{k}$
4. $42\hat{i} + 30\hat{j} - 6\hat{k}$

199.

For an object projected from ground with speed u , horizontal range is two times the maximum height attained by it. The horizontal range of object is-

1. $\frac{2u^2}{3g}$
2. $\frac{3u^2}{4g}$
3. $\frac{3u^2}{2g}$
4. $\frac{4u^2}{5g}$

200.

If the light is polarised by reflection, then the angle between reflected and refracted light is-

1. π
2. $\pi/2$
3. 2π
4. $\pi/4$

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