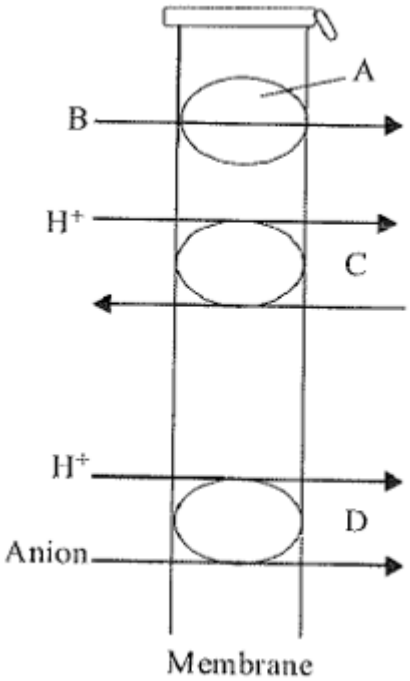
Botany - Section A

1. How statements are correct?
i. chlorophyll-a , xanthophylls and carotenoids are called as accessory pigments.
ii. accessory pigments protect chlorophyll-a from photo-oxidation.
iii. chlorophylla are the major pigments responsible for trapping of light
iv. chl-a and chl-b forms the reaction centre
v. chl-a transfers the energy to accessory pigments.
1. 2
2. 3
3. 4
4. 5

2. Who gave the law of limiting factors and when?
1. Lieman-1906
2. Blackman-1905
3. Lieman-1905
4. Blackman-1906

3. What do A, B, C and D represent in the following figure?



1. A : carrier protein, B : symport, C : uniport, D : antiport
2. A : carrier protein, B : uniport, C : antiport, D : symport
3. A : carrier protein, B : antiport, C : symport, D : uniport
4. A : carrier protein, B : uniport, C : symport, D : antiport

4. In respiration from 180g of glucose, which of the following is formed?
1. 264gm CO_2 +190gm H_2O + 391 Kcal
2. 264gm CO_2 +108gm H_2O + 686 Kcal
3. 390gm CO_2 +108gm H_2O + 686 Kcal
4. 390gm CO_2 + 264gm H_2O + 391 Kcal

5. After glycolysis, the fate of glucose in the mitochondrial matrix is
1. oxidation
2. reduction
3. oxidative decarboxylation
4. hydrolysis.

6. Which of the following statements are true for Heterotrophic bacteria?
1. They fix nitrogen in legume roots.
2. The majority are important decomposers
3. Helpful in making curd from milk and production of antibiotics
4. All of these

7. When water goes into the cell and out of the cell are in equilibrium, then the solution and cell are respectively
1. Isotonic, Flaccid
2. Hypotonic, Flaccid
3. Hypertonic, Turgid
4. Hypotonic, Turgid

8. The process which makes major difference between C3 and C4 plants is
1. glycolysis
2. Calvin cycle
3. photorespiration
4. respiration

9. Which among the following pteridophytes has compact structure strobili formed by sporophylls as well as it shows heterospory?

1. [A]
2. [B]
3. [C]
4. All the above

10. Growth is always restricted to the specialised regions in plants because of the presence of
1. meristems in some regions only
2. cell division in some regions only
3. differentiated cells in some regions only
4. dividing cells in some regions only

11. Which one is true of collenchyma?
1.forms the hypodermis of dicot stem
2. present below epidermis in layers or patches
3.thickened corners due to cellulose, hemicellulose, and pectin deposition
4.All of the above

12. Which of the following is true for vacuole

1. It is present in both plants and animals

2. Central vacuole is present in plant

3. It occupies 90% volume of the plants

4. All of these

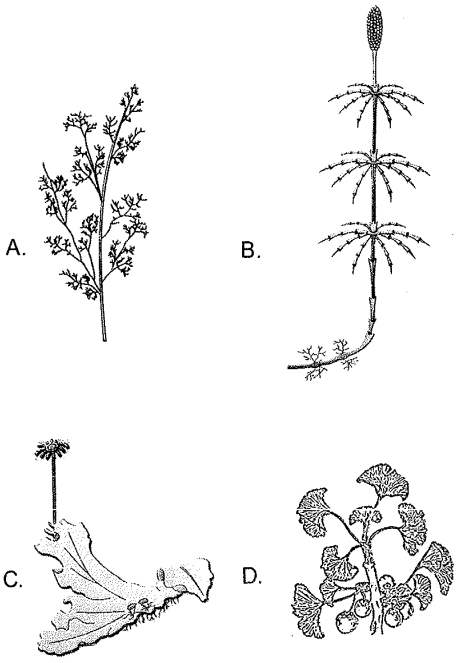
13. A mature corn plant absorbs…….. of water in a day while a mustard plant absorbs water equal to its own weight in about…….. 1. 5L, 3hours
2. 3L, 5 hours
3. 5L, 5 hours
4. 3L, 3 hours

14. Identify the **correct** statement:
1. A haploid plant does not produce gametes
2. Meiosis does not occur in haploid cells
3. All plants form gametes by meiosis
4. Mitosis cannot be the means for gamete formation

15. Essential elements are grouped into _____ broad categories on the basis of function while these elements divided into _____ broad categories based on their quantitative requirements.

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

16. Examine the figures A, B, C, and D in which one of the four options all labelings are **correct**?



	A	B	C	D
(1)	*Laminaria*	*Salvinta*	*Male thallus of Marchantia*	*Cayas*
(2)	*Polysiphonia*	*Equisetum*	*Female thallus of Marchantia*	*Ginkgo*
(3)	*Chara*	*Selaginella*	*Sphagnum*	*Ginkgo*
(4)	*Fucus*	*Fern*	*Funaria*	*Pinus*

17. Consider the statements a, b, c and d w.r.t. fermentation by yeast and select the correct choice

a. Production of CO_2 and ethanol

b. Complete oxidation of glucose

c. The reducing agent is NADH + H^+

d. It is achieved under anaerobic condition

1. a & b are incorrect

2. b is incorrect

3. a & c is incorrect

4. all are incorrect

18. Plant growth regulators which inhibit and promote the formation of lateral shoot respectively is

1. Auxin, gibberellins

2. Cytokinin, ethylene

3. Gibberellins, abscisic acid

4. Auxin, cytokinin

19. Select the **incorrect** statement w.r.t. light reaction

1 The primary acceptor of PS-ll is phaeophytin

2 The splitting of water is associated with PS-ll

3 In PS-l, the reaction centre Chlorophyll-a has an absorption peak at 680 nm

4 The LHC are made up of core and antenna molecules

20. Select the incorrect option with respect to the modified structural name, modified organ and examples

	Modified plant organ	**Modified structures**
	Examples	
1.	Tendril	Axillary bud
	Gourds	
2.	Thorn	Axillary bud
	Citrus	
3.	Phylloclade	Stem
	Opuntia	
4.	Cladode	Stem
	Australian Acacia	

21. Which one of the following is a correct statement?

1. In the cymose type of inflorescence, the main axis continues to grow

2. The ovary is half inferior in the flowers of cucumber

3. In castor, the endosperm is not present in mature seeds

4. Seeds of dicot and monocot plants vary is shape, size and period viability

22. **A:** Amount of secondary xylem produced is more than the secondary phloem in the dicot stem.

R: Cambium is generally more active on the inner side than on the outer.

1. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

2. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

3. If Assertion is a true statement but the reason is false.

4. If both Assertion and Reason are false statements.

23. Place stages of Prophase I in correct order.

1. diakinesis, diplotene, leptotene, pachytene, zygotene.

2. diplotene, leptotene, pachytene, zygotene, diakinesis.

3. leptotene, pachytene, diakinesis, diplotene, zygotene.

4. leptotene, zygotene, pachytene, diplotene, diakinesis

24. Which of the following characteristics of living beings is not said to be true for worker bees?

1. Anabolism

2. Reproduction

3. Consciousness

4. Growth

25. Match the following and choose the correct option.

Column I	Column II
A. Family	1. Tuberosum
B. kingdom	2. Polymoniales
C. Order	3. Solanum
D. Species	4. Plantae
E. Genus	5. Solanaceae

Codes

	A	B	C	D	E
1.	4	3	5	2	1
2.	5	4	2	1	3
3.	4	5	2	1	3
4.	5	3	2	1	4

26. During cell cycle, events are under

1. Genetic control

2. Metabolic control

3. Cytoplasmic control

4. Mitochondrial control

27. Neurospora, Ustilago and Agaricus are similar in presence of _____ during sexual life cycle

1. Endogenous megaspore

2. Dikaryophase

3. Esogenous meiospore

4. Basidiocarp

28. Which of the following statement is incorrect?

1. Cyanobacteria often form blooms in polluted water bodies

2. Body of slime moulds moves along decaying twigs and leaves engulfing inorganic material

3. RNA of the viroid is low molecular weight

4. Lichens do not grow in polluted areas

29. Match the following

Algae	Stored food	Flagellation
(a) Brown algae	(p) Floridean starch	(i) 2, lateral
(b) Red algae	(q) Mannitol	(ii) 2-4, apical
(c) Green alage	(r) Starch	(iii) absent

1 (a-r-ii), (b-p-iii), (c-q-i)

2 (a-q-i), (b-p-iii), (c-r-ii)

3 (a-q-i), (b-r-ii), (c-p-iii)

4 (a-q-i), (b-p-ii), (c-r-iii)

30. Find the incorrect statement

1. Middle lamella is mainly made up of calcium and magnesium pectate

2. Cell wall is formed on the inner side of the cell therefore secondary wall formed first

3. Middle lamella glues the neighbouring cells together

4. Cell wall helps in cell to cell interaction and provides barrier to undesirable macromolecules

31. Glycerol would enter the respiratory pathway after being converted to-

1. PGAL

2. DPGA

3. PGA

4. Acetyl CoA

32. Select the correct statement:

1. Cholera, typhoid, tetanus are well-known diseases caused by viruses.

2. Dinoflagellates, euglenoids and slime moulds are placed under kingdom Monera

3. Members of kingdom Protista are primarily aquatic

4. Dinoflagellates are the chief 'producers' in the oceans

33. Read the following statements and select the correct option.

Statement A : The M-phase represents the phase when actual cell division occurs
Statement B : Interphase represents the phase between two successive M-phases

1. Only statement A is correct

2. Only statement B is correct

3. Both statements are incorrect

4. Both statements are correct

34. Most dramatic period of cell cycle is-

1. Gap 1 only

2. M-phase

3. S-phase only

4. Interphase

35. Choose the incorrect match

1. Begin of movement of centrosome to opposite poles - Prophase

2. Two asters with spindle fibres - Mitotic apparatus

3. Attachment of spindle fibres to kinetochores - Metaphase

4. Chromosome move to opposite poles - Metaphase

Botany - Section B

36. Diffusion is very important to plants since:

1. The cells have a permeable cell wall

2. It is the only means for gaseous movement within the plant body.

3. Plants cannot transport material by active transport.

4. They are unable to move towards the source of the nutrients.

37. Consider the following statements:

I. Whorled phyllotaxy is seen in Alstonia.

II. Flowers of mustard, datura and chilli are actinomorphic

III. The ovary in plum, peach and rose is epigynous.

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

38. Match each item in Column I with one item in Column II regarding various classes of fungi and chose your answer from the codes given below:

Column I	Column II
I. Phycomycetes	1. Sac fungi
II. Ascomycetes	2. Aseptate fungi
III. Basidiomycetes	3. Imperfect fungi
IV. Deuteromycetes	4. Puffballs

Codes:

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

39. PGA as the frist CO_2 fixation was discovered in photosynthesis of

1. bryophyte

2. gymnosperm

3. angiosperm

4. algae

40. In Krebs' cycle, GTP is formed in

1. substrate level phosphorylation

2. oxidative phosphorylation

3. non-cyclic photophosphorylation

4. cyclic photophosphorylation

41. When xylem and phloem within a vascular bundle are arranged in an alternate manner on different radii such arrangement is called _____ and found mostly in _____.

1. Radial, roots

2. Radial, shoots

3. Conjoint, roots

4. Conjoint, shoots

42. Which of the following is true about primary metabolites?

1. compounds which are products of essential pathways of plants

2. Universally present in all plant kingdom

3. It’s absence leads to death of plant cell

4. All of the above

43.
Select the correct option with respect to mitosis.

1. Chromatids start moving towards opposite poles in telophase.

2. Golgi complex and endoplasmic reticulum are still visible at the end of prophase.

3. Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase.

4. Chromatids separate but remains in the center of the cell in anaphase.

44. The main arena of various types of activities of a cell is –
1. Plasma membrane
2. Mitochondrian
3. Cytoplasm
4. Nucleus

45. Which of the following is not matched correctly?
1. Artificial system of classification – Equal weightage to vegetative and sexual character.
2. Natural system of classification – Based on natural affinities.
3. Phylogenetic system – Common ancestor for unrelated taxa.
4. Numerical taxonomy – Equal importance to all character.

46. The region of meristematic activity has cells of

1. Small size, thin walled and with dense protoplasm

2. Large size, thick walled and with the loose protoplasm

3. Small size, thin walled with loose protoplasm

4. Large size,thin walled and with dense protoplasm

47. In nature, …….. and …….. provide enough energy to convert Nitrogen to nitrogen oxides (NO, NO_2, N_2O).

1. Lightning, Forest fires

2. Industrial combustions, UV radiation

3. Forest fire, Lightning

4. Lightning, UV radiation

48. All the following plants are biennials except:-
1. Sugarbeet
2. Cabbages
3. Carrots
4. Wheat

49. Find the correct match w.r.t. gynoecium and placentation in the respective family

Column l	Column ll
a. $G_{(3)}$, Axile	i. Brassicaceae
b. $G_{(2)}$, Basal	ii. Liliaceae
c. $G_{(2)}$, Parietal	iii. Solanaceae
d. $G_{(2)}$, Axile	iv. Asteraceae

1. a(i), b(ii), c(iv), d(iii)

2. a(ii), b(iv), c(i), d(iii)

3. a(ii), b(iv), c(iii), d(i)

4. a(iv), b(ii), c(i), d(iii)

50. Chloroplast differs from mitochondria in

1. Having circular DNA and 70S ribosomes

2. The phase of division or duplication during cell cycle

3. Having porins in the outer membrane

4. Having enzymes for carbohydrates synthesis in the stroma

Zoology - Section A

51. Which part of the nephrons is impermeable to water?
1. Proximal convoluted tubule
2. Distal convoluted tubule
3. Ascending limb of loop of Henle
4. Descending limb of loop of Henle

52. Nucleosides are acted upon by nucleosidases and give rise to

1. Sugars and bases

2. Sugars, bases and phosphates

3. Sugars and phosphates

4. Bases and phosphates

53. The common feature of Marasmus and Kawashiorkar are

1. Wasting of muscles

2. Failure of growth and brain development

3. Thinning of limbs

4. All of these

54. Glomerulus along with Bowman's Capsule is called as

1. Malpighian body
2. Renal capsule
3. Renal column
4. Malpighian Tubule

55. Which of the following is wrong with respect to Human skeleton?

1. Humans- 206 bones

2. Axial skeleton- 80 bones

3. Skull-24 bones

4. Ear ossicles- 6

56. What is coordination?
1. It is the process through which two or more organs interact and complement the functions of one another
2. It is the process of serving tissues
3. It is the process of giving blood and masses to other tissue at the level of structure
4. It is the ratio of functional and non functional organs

57. The neural cells of Retina of eye are-.

a. Bipolar cell

b. Ganglion cell

c. Photoreceptor cells

Arrange them in order from inside to outside.

1. bca

2. abc

3. bac

4. None of these

58. Which of the following two senses are functionally similar and interrelated?

1. Optic sense and olfaction

2. Auditory sense and optic sense

3. Olfaction and Gustation

4. Gustation and auditory

59.
Which one of the following plasma proteins is involved in the coagulation of blood?

1. Serum amylase

2. A globulin

3. Fibrinogen

4. An albumin

60. Which of the following statement is correct w.r.t hair cell of internal ear?

1. It acts as an optic receptor

2. Its basal part is in contact of efferent nerve fibres

3. Stereo cilia are projected from apical part of each hair cell

4. It is arranged in columns in internal part of organ of corti

61. Myasthenia gravis is an autoimmune disease in which antibodies are formed against:
1. Myelin sheath
2. Articular cartilage
3. Neuro-muscular junctions
4. Thyroid follicle

62. Which of the following is true about glucocorticoids

1. Regulate Cardio-vascular and kidney functions

2.Anti-inflammatory agent

3. stimulate erythropoiesis

4. All of the above

63. Osteoporosis, an age-related disease of skeletal system, may occur due to

1. junction leading to fatigue

2. high concentration of ca++ and Na+

3. decreased level of oestrogen

4. accumulation of uric acid leading to inflammation of joints

64. Receptor sites for neurotransmitters are present on:

1. Pre-synaptic membrane

2. Tips of axons

3. Post-synaptic membrane

4. Membrane of synaptic vesicles

65. The number of cyclic rings present in purines and pyrimidines are

1. 2,1 respectively

2. 1,2 respectively

3. 2,2 respectively

4. 1,1 respectively

66. Find the correct statement

1.Catalysed reactions proceed at rates higher than that of uncatalysed ones.

2.In skeletal muscle under anaerobic conditions lactic acid is formed from pyruvic acid.

3.In yeast during fermentation ethanol is formed from pyruvic acid.

4.All of these

67. What does initiate a neural reflex to cause an urge or desire for removal of faeces?

1. Coherent faeces in rectum

2. Food in stomach

3. Coherent faeces in colon

4. Coherent faces in large intestine

68. Which of the following is the function of the conducting part of the respiratory system?
1. clears the foreign particle
2. humidifies air
3. brings air to body temperature
4. All of these

69. The binding of HB with oxygen forms

1. Methamoglobin

2. Carbhaminohaemoglobin

3. Oxyhaemoglobin

4. Carbaminohaemoglobin

70. When the plasma of a person has both anti A and anti B antibodies the blood group of this person would be:

1. A

2. B

3. AB

4. O

71. The……. difference across the resting membrane is called as Resting potential.

1. Chemical potential

2. Electrical potential

3. Chemical

4. Chemiosmotic

72. The immune responses in older people are weak due to the degeneration of:
1. Thyroid
2. Pineal
3. Adrenal
4. Thymus

73. Choose the incorrect match w.r.t. hormones and their functions

1.	Parathyroid hormone (PTH)	Hypercalcemic hormone, it increases the blood calcium level by increasing the bone resorption/demineralization
2.	Glucocorticoids	Stimulates lipolysis, proteolysis, and gluconeogenesis and also stimulates R.B.C. production
3.	Atrial natriuretic factor	Cause vasodilation and decreases the blood pressure
4.	Somatostatin	Increases the release of growth hormone and thus increases the growth of the body

74. Mark the incorrect statement with respect to the thyroid gland

1. Hypothyroidism during pregnancy causes defective development and maturation of a growing fetus leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc.

2. In adult women, hypothyroidism may cause the menstrual cycle to become irregular

3. Tuberculosis of the thyroid gland leads to hyperthyroidism which adversely affects the body physiology

4. Iodine is essential for the normal rate of hormone synthesis in the thyroid

75. On an average, a healthy human breathes

1. 12-16 times/min

2. 70-80 times/min

3. 80-120 times/min

4. 3-5 times/min

76. Glucocorticoids are involved in all the following, except

1. Produce anti-inflammatory reactions

2. Immunosuppressive function

3. Inhibit gluconeogenesis, lipolysis, and proteolysis

4. Stimulate RBC production

77. Which of the following biomolecule is not a biomacromolecule but present in the acid-insoluble fraction

1. Protein

2. Lipid

3. Nucleic acid

4. Polysaccharide

78. Which of the following statements is not correct ?

1. Carbonic anhydrase enzyme accelerate the rate of reaction $CO_2 + H_2CO_3$ by 10^7 times

2. Functional aspect of enzymes is related to the tertiary structure of proteins

3. Enzymes are composed of only one amino acid molecule

4. Low temperature not cause the denaturtion but inactivate the enzyme

79. Metameric segmentation is the main feature of

1. Annelida

2. Echinodermata

3. Hemichordata

4. Coelenterata

80. Pneumatic bones are seen in

1. Mammalia

2. Aves

3. Reptilia

4. Sponges

81. Which of the following are the sense organs of Cockroach?

1. Antennae, compound eyes, maxillary palps, anal cerci

2. Antennae, compound eye, axillary palps and tegmina

3. Antennae, ommatidia, maxillary palps, sternumv and anal style

4. Antennae, eyes, maxillary palps, tarsus of walking legs and coxa

82. Skeletal muscles are attached to the bones by

1. tendon

2. ligament

3. pectin

4. fibrin

83. Which of the following does not come under the class mammals?
1. flying fox
2. hedgehog
3. manatee
4. lamprey

84. Which of the following statements is true?
1. All chordates are vertebrates
2. All vertebrates are chordates
3. Invertebrates possess a tubular nerve cord
4. Nonchordates a have a vertebral column

85. Excretory organ in Balanoglossus is
1. nephridia
2. antennary gland
3. flame cells
4. proboscis gland

Zoology - Section B

86. In the average composition of a cell, the maximum % of total cellular mass [after water and protein] is constituted by:

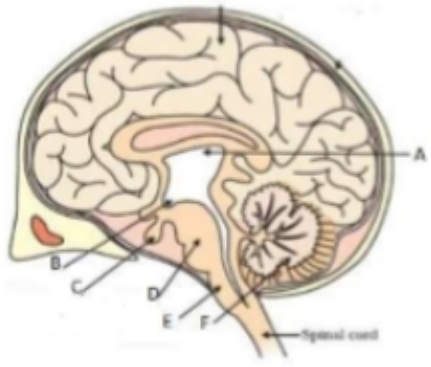
1. Carbohydrates

2. Lipid

3. Nucleic acids

4. Ions

87. A major coordinating center for sensory and motor signaling in the human brain is shown in the given sagittal section by the letter :



1. A

2. B

3. C

4. D

88. Uricotelic mode of passing out nitrogenous wastes is found in

1. birds and annelids

2. amphibians and reptiles

3. insects and amphibians

4. reptiles and birds

89. Which of the following human organs is called the 'graveyard of RBCs?
1. Gall bladder

2. Kidney

3. Spleen

4. Liver

90. Optimum pH of saliva action is:

1. 6.8

2. 8.6

3. 7

4. 9.5

91. During expiration which of the following events takes place
1. Diaphragm and external intercostal muscles contracts

2. Diaphragm and external intercostal muscles relax

3. Inter Pleural pressure is less than atmospheric pressure

4. Both 1 and 3

92. Which of the following is a monomeric protein of thick filament?

1. Meromyosins

2. Macromyosins

3. Tropomyosin

4. Troponin

93. All the following regarding regulation of a physiological function by either a neurotransmitter or a hormone are true except:
1. Target cells must have specific receptor proteins with which these molecules combine.
2. When these molecules bind to target cells, specific sequences of changes must occur.
3. There must be an “off-switch” that will stop the induced changes.
4. Second messengers will always be involved in the response of the target cell.

94. The right atria of the human heart receive:

1. Oxygenated blood

2. Deoxygenated blood

3. Arterial blood

4. Venous blood

95. Kidney matrix retains some amount of urea to

1. Maintain a desired osmolarity

2. Maintain metabolism

3. Maintain balance of the body

4. Maintain micturition

96. The statement (omniscellula-e cellula) was given by

1. The man who proposed modern cell theory

2. The man who gave final shape to the cell theory

3. The man who modified cell theory explaining that new cells are formed from pre-existing cells

4. All of the above

97. Which of the following diseases is not associated with hypersecretion of a hormone?

1. Acromegaly

2. Cushing's disease

3. Addison's disease

4. Osteitis fibrosa cystica

98. Enzyme, which catalyze the breakdown of hydrogen peroxide to water and oxygen, is associated with which of the following types of cofactors?

1. Organic and tightly bound

2. Organic and loosely bound

3. lnorganic and loosely bound

4. lnorganic and tightly bound

99. The ciliated epithelium lines the

1. Skin

2. Digestive tract

3. Gall bladder

4. Trachea

100. Which of the following have an open circulatory system?

1. Frog

2. Earthworm

3. Pigeon

4. Cockroach

Chemistry - Section A

101.
MY and NY_3, two nearly insoluble salts, have the same K_{sp} values of 6.2 x 10^{-13} at room temperature. The true statement regarding to MY and NY_3 is-

1. The molar solubility of MY in water is less than that of NY_3.

2. The salts MY and NY_3 are more soluble in 0.5 M KY than in pure water

3. The addition of the salt of KY to a solution of MY and NY_3 will have no effect on their solubilities

4. The molar solubilities of MY and NY_3 in water are identical.

102. Pollution can be controlled by :

(1) Sewage treatment.

(2) Checking atomic blasts.

(3) Manufacturing electrically operated vehicles.

(4) All of the above.

103. Identify the option which is correct with respect to Vanderwaal constant-a & b for gases.

1. $aNH_3 < aH_2 \& bH_2 > bHe$

2. a CO_2 > a H_2 & bCO_2 >b H_2

3. $aH_2O > aH_2$ & $bH_2 < bHe$

4. $aNH_3 < a\ He$ & $b\ CO_2 > bH_2$

104. The most abundant hydrocarbon pollutant is :

1. Methane

2. Ethane

3. Propane

4. Butane

105. The density of gas A is twice that of B and the molecular weight of A is half of that of B. The Ratio of partial pressures of P_A and P_B is

1. $\frac{1}{4}$

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

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

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

106. Match the species in Column I with the type of hybrid orbitals in Column II.

Column I	Column II
A. SF_4	1. sp^3d^2
B. IF_5	2. d^2sp^3
C. NO_2^+	3. sp^3d
D. NH_4^+	4. sp^3
	5. sp

Codes

	A	B	C	D
1.	3	1	5	4
2.	1	2	3	5
3.	5	4	3	2
4.	4	5	3	2

107. CO is isoelectronic with

(a) NO^+

(b) N_2

(c) $SnCl_2$

(d) NO_2^-

Choose the correct option

1. (a), (b)

2. (b), (c)

3. (c), (d)

4. (b), (d)

108. If solubility product of $Zr_3(PO_4)_4$ is denoted by K_{Sp} and its molar solubility is denoted by S, then which of the following relation between S and K_{Sp} is correct ?

1. $S = \left(\frac{K_{sp}}{216}\right)^{1/7}$

2. $S = \left(\frac{K_{sp}}{6912}\right)^{1/7}$

3. $S = \left(\frac{K_{sp}}{144}\right)^{1/6}$

4. $S = \left(\frac{K_{sp}}{929}\right)^{1/9}$

109. The correct statement about ICl_5 and ICl_4^-

1. Both are isostructural

2. ICl_5 is square pyramidal and ICl_4^- is square planar

3. ICl_5 is trigonal bipyramidal and ICl_4^- is tetrahedral

4. ICl_5 is square pyramidal and ICl_4^- is tetrahedral

110. For the reaction, $2SO_{2(g)} + O_{2(g)} = 2SO_{3(g)}$, $\Delta H = -57.2$ kJ mol^{-1} and $K_C = 1.7 \times 10^{16}$. Among the following the incorrect statement is-

1. The equilibrium will shift in forward direction as the pressure increase.

2. The addition of inert gas at constant volume will be not affect the equilibrium constant.

3. The equilibrium constant is large suggestive of reaction going to completion and so no catalyst is required.

4. The equilibrium constant decreases as the temperature increase.

111. Enthalpy of sublimation of iodine is 24 cal g^{-1} at 200 °C. If specific heat of I_2(s) and l_2 (vap) are 0.055 and 0.031 cal g^{-1}K^{-1} respectively, then enthalpy of sublimation of iodine at 250°C in cal g^{-1} is :

1. 2.85
2. 22.8
3. 11.4
4. 5.7

112. The reagents used to convert ethanoic acid into ethane are-

1. a-$SOCl_2$; b-NH_3; c-$LiAlH_4$; d-CH_3Cl
2. a-NaOH(aq); b-Sodalime and heat; c-Cl_2, hv; d-Na/dry ether
3. a-$LiAlH_4$; b-HCl and heat; c-Na/dry ether
4. None of the above

113. Hydrogen peroxide oxidises $[Fe(CN)_6]^{4-}$ to $[Fe(CN)_6]^{3-}$ in acidic medium but reduces $[Fe(CN)_6]^{3-}$ to $[Fe(CN)_6]^{4-}$ in alkaline medium. The other products formed are, respectively.

1. ($H_2O + O_2$) and H_2O

2. ($H_2O + O_2$) and ($H_2O + OH^-$)

3. H_2O and ($H_2O + O_2$)

4. H_2O and ($H_2O + OH^-$)

114. The value of K_C is 64 at 800 K for the reaction

$$N_2((g)) + 3H_{2(}(g)) \rightleftharpoons 2\,NH_{3(}(g))$$

The value of K_c for the following reaction is:

$$NH_3((g)) \rightleftharpoons \tfrac{1}{2}N_{2(}(g)) + \tfrac{3}{2}H_2((g))$$

1. $\frac{1}{4}$

2. $\frac{1}{8}$

3. 8

4. $\frac{1}{64}$

115. The molarity of a solution obtained by mixing 750 mL of 0.5(M)HCl with 250 ml of 2(M)HCl will be-

1. 1.75 M

2. 0.975 M

3. 0.875 M

4. 1.00 M

116. Among the following, the correct statement is-

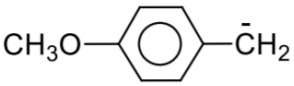
1. Beryllium exhibits coordination number of six

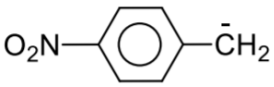
2. Chlorides of both beryllium and aluminum have bridged chloride structures in solid phase

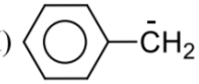
3. $B_2H_6.2NH_3$ is known as 'inorganic benzene'

4. Boric acid is a protonic acid

117. Consider the following carbanions

(I) 

(II) 

(III) 

Correct order of stability is-

1. I>II>III

2. III>II>I

3. II>III>I

4. I>III>II

118. Diamond and graphite both are made of carbon atoms. Diamond is extremely hard whereas graphite is soft. This is because :

1. Diamond has carbon-carbon double bond while graphite has carbon-carbon single bond

2. Diamond is ionic whereas graphite is covalent

3. Diamond has a strong covalent bond with regular tetrahedron pattern

4. Certain atoms in diamond are smaller in size

119. The molecular shapes of SF_4, CF_4, and XeF_4 are:

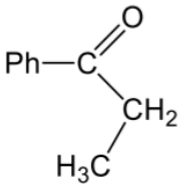
1. Different with 1, 0, and 2 lone pairs of electrons on the central atom, respectively

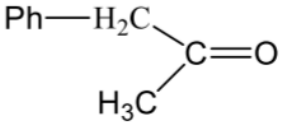
2. Different with 0, 1, and 2 lone pairs of electrons on the central atom, respectively

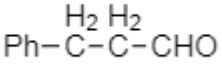
3. The same with 1, 1, and 1 lone pair of electrons on the central atoms, respectively

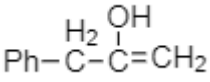
4. The same with 2, 0, and 1 lone pair of electrons on the central atom, respectively

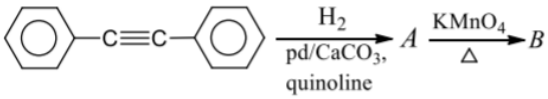
120. $Ph - C \equiv C - CH_3 \xrightarrow{Hg^{2+}/H^+} A,$

1. 

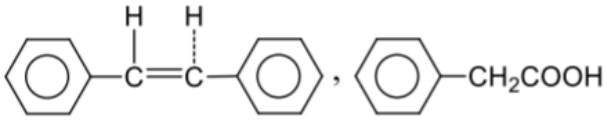
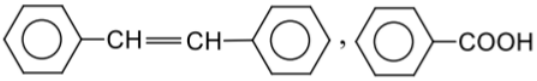
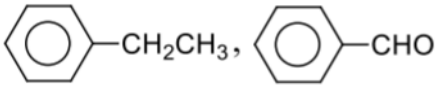
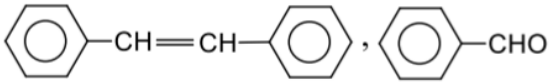
2. 

3. 

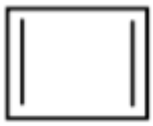
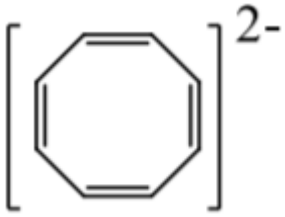
4. 

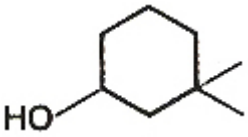
121. 

Identify A and B

1. 
2. 
3. 
4. 

122. The aromatic compound among the following is-

1. 
2. 
3. 
4. 

123. The IUPAC name of the compound  is:

1. 3, 3-Dimethyl-1-hydroxycyclohexane
2. 1,1-Dimethyl-3-hydroxycyclohexane
3. 3,3-Dimethyl-1-cyclohexanol
4. 1,1-Dimethyl-3-cyclohexanol

124. The increasing order of the first ionization enthalpies of the elements B, P , S and F (lowest first) is :

1. F < S < P < B
2. P < S < B < F
3. B < P < S < F
4. B < S < P < F

125. For a given solution pH = 6.9 at 60℃, where $K_w = 10^{-12}$. The solution is-

1. Acidic
2. Basic
3. Neutral
4. Unpredictable

126. For preparing a buffer solution of pH 6 by mixing sodium acetate and acetic acid, the ratio of concentration of salt and acid ($K_a = 10^{-5}$) should be:

1. 1 : 10
2. 10 : 1
3. 100 : 1
4. 1 : 100

127. According to Fajan's rule polarization is more when:

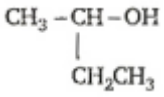
1. Small cation and large anion
2. Small cation and small anion
3. Large cation and large anion
4. Large cation and small anion

128. A reaction is non-spontaneous at the freezing point of water but is spontaneous at the boiling point of water then-

ΔH	ΔS
1. +ve	+ve
2. -ve	-ve
3. -ve	+ve
4. +ve	-ve

129. Following types of compounds (as I, II)

(I) $CH_3CH=CHCH_3$

(II) 

are studied in terms of isomerism in :

1. Chain isomerism
2. Position isomerism
3. Conformers
4. Stereisomerism

130. Oxidation number of Cl in $CaOCl_2$ (bleaching powder) is :

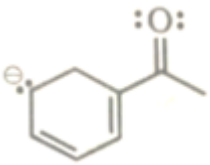
1. zero, since it contains Cl_2
2. -1 , since it contains Cl^-
3. +1, since it contains ClO^-
4. +1 and -1 since it contains ClO^- and Cl^-

131. If at 298 K the bond energies of C-H , C-C , C = C and H-H bonds are respectively 414 , 347, 615 and 435 kJ mol $^{-1}$, the value of enthalpy change for the reaction at 298 K will be-

$$H_2C = CH_2(g) + H_2(g) \longrightarrow H_3C - CH_3(g)$$

1. + 250 kJ
2. -250 kJ
3. +125 kJ
4. -125 kJ

132. The number of resonating structures that can be drawn for the following anion (including those without separation of charge) is-



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

133. 0.2 g of an organic compound containing C, H, and O, on combustion gave 0.147 g CO_2 and 0.12 g water. The percentage of oxygen in an organic compound is :
1. 73.29%
2. 70.51%
3. 77.24%
4. 80.50%

134.

(I) $CH_2 = CH - CH = CH - {}^{\oplus}NH_3$

(II) ${}^{\oplus}CH_2 - CH = CH - {}^{\ominus}CH - {}^{\oplus}NH_3$

(III) ${}^{\oplus}CH_2 - CH = CH - CH = NH_3$

Which of these structures is not a valid canonical structure?
1. I
2. II
3. III
4. None of the above

135. The secondary air pollutant among the following is-

1. CO
2. Hydrocarbon
3. Peroxyacetyl Nitrate
4. None of the above

Chemistry - Section B

136. Orbital angular momentum depends on _____.

1. l
2. n and l
3. n and m_l
4. m_l and m_s

137. **Assertion:** Electron gain enthalpy becomes less negative as we go down a group.

Reason: The size of the atom increases on going down the group and the added electron would be farther from the nucleus.

1. Both assertion and reason are true and the reason is the correct explanation of assertion.
2. Both assertion and reason are true and the reason is not the correct explanation of assertion.
3. Assertion is true but the reason is false.
4. Assertion is false but the reason is true.

138. When zeolite, which is hydrated sodium aluminium silicate is treated with hard water, the sodium ions are exchanged with which of the following ion(s)?

a. H^+ ions

b. Mg^{2+} ions

c. Ca^{2+} ions

d. SO_4^{2-} ions

Choose the correct option
1. (a, b)
2. (b, c)
3. (c, d)
4. (a, d)

139. A compound X, of boron, reacts with NH_3 on heating to give another compound Y which is called inorganic benzene. The compound X can be prepared by treating BF_3 with lithium aluminum hydride. The compounds X and Y are represented by the formulas.

1. B_2H_6, $B_3N_3H_6$
2. B_2O_3, $B_3N_3H_6$
3. BF_3, $B_3N_3H_6$
4. $B_3N_3H_6$, B_2H_6

140. Electrophiles are electron-seeking species. Which of the following groups contain only electrophiles?

(a) $BF_3,\ NH_3,\ H_2O$

(b) $AlCl_3,\ SO_3,\ NO_2^+$

(c) $NO_2^+.\ CH_3^+,\ CH_3 - C^+ = O$

(d) $C_2H_5^-,\ C_2H_5,\ C_2H_5^+$

Choose the correct option

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

141. The correct statements among (a) to (d) are:

(a) Saline hydrides produce H_2 gas when reacted with H_2O.

(b) Reaction of $LiAlH_4$ with BF_3 leads to B_2H_6

(c) PH_3 and CH_4 are electron-rich and electron-precise hydrides, respectively.

(d) HF and CH_4 are called molecular hydrides.

1. (a), (b), (c) and (d)

2. (a), (c) and (d) only

3. (c) and (d) only

4. (a), (b) and (c) only

142. During compression of a spring, the work done is 10 kJ and 2 kJ escaped to the surroundings as heat. The change in internal energy, ΔU (in kJ) is:

1. 12
2. –8
3. 8
4. –12

143. The ionization constant of the hypochlorous acid is 2.5×10^{-5}. The concentration of hypochlorous acid 0.08 M. The percent dissociation of HOCl is-

1. 2.56 %
2. 1.21 %
3. 1. 76 %
4. 2.21 %

144. A mixture of one mole each of H_2, He, and O_2 each are enclosed in a cylinder of volume V at temperature T. If the partial pressure of H_2 is 2 atm, the total pressure of the gases in the cylinder is -

1. 14 atm
2. 22 atm
3. 38 atm
4. 6 atm

145. The ratio of masses of oxygen and nitrogen in a particular gaseous mixture is 1 : 4. The ratio of number of their molecule is -

1. 7 : 32

2. 1 : 8

3. 3 : 16

4. 1 : 4

146. The reaction, $5H_2O_2 + XClO_2 + 2\,OH^- \rightarrow XCl^- + YO_2 + 6H_2O$ is balanced if :

1. X = 5, Y = 2

2. X = 2, Y = 5

3. X = 4, Y = 10

4. X = 5, Y = 5

147. In which of the following will the Kharasch effect operate?

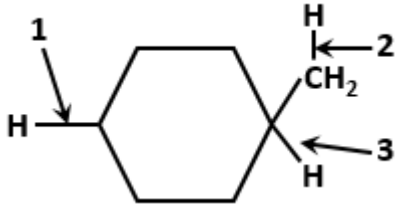
1. $CH_3CH_2CH = CH_2 + HCI$

2. CH_3CH_2—$CH = CH_2 + HBr$

3. $CH_3CH = CH$—$CH_3 + HBr$

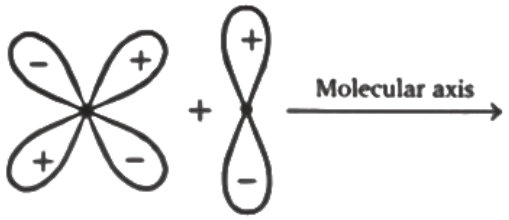
4. $CH_3CH_2CH = CH_2 + HI$

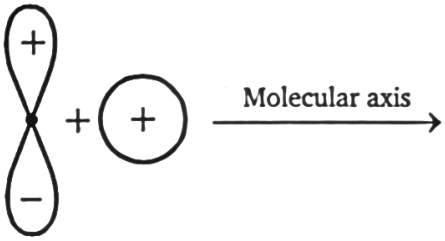
148. The correct order of bond dissociation energies of the bonds indicated with the arrows among the following is-

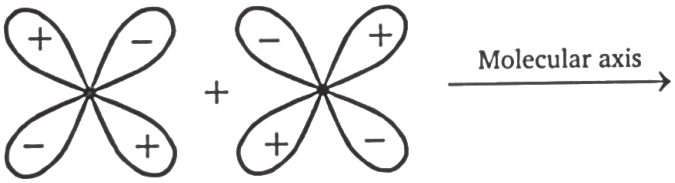


1. 1 < 2< 3
2. 3 < 2 < 1
3. 2 < 3 < 1
4. 3 < 1 < 2

149. The combination of atomic orbitals leads to the formation of antibonding molecular orbital among the following is-

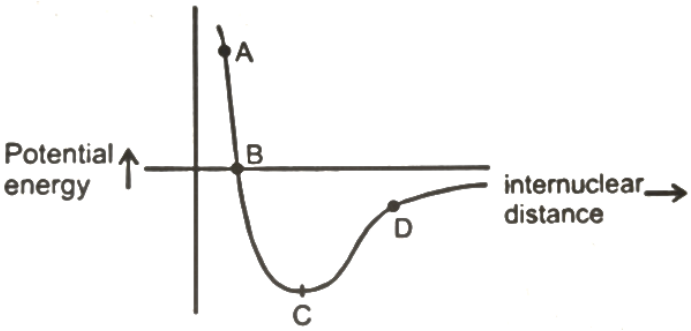
1. 

2. 

3. 

4. None of the above

150. The point represents bond formation condition as per the graph given below among the following is-



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

Physics - Section A

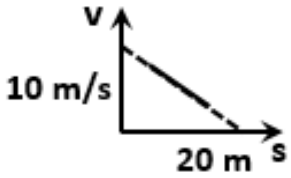
151. Which of the following is not an illustration of Newton's third law?
1. Flight of a jet plane
2. A cricket player lowering his hands while catching a cricket ball
3. Walking on the floor
4. Rebounding of a rubber ball

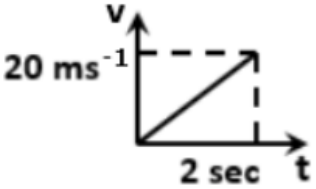
152. A block of mass 5 kg is moving horizontally at speed of 1.5 ms^{-1}. A vertically upward force 5 N acts on it for 4 seconds. What will be the distance of the block from the point where the force starts acting, after 4 seconds? (Ignore gravity)
1. 2m
2. 6 m
3. 14 m
4. 10 m

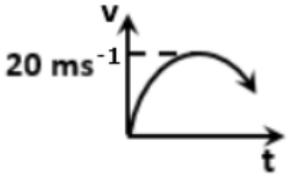
153. A bird is sitting in a wire cage hanging from the spring balance. Let the reading of the spring balance be W_1. If the bird flies about inside the cage, the reading of the spring balance is W_2. Which of the following is true?
1. $W_1 = W_2$
2. $W_1 > W_2$
3. $W_1 < W_2$
4. Nothing definite can be predicted

154. The side of a cube is measured by Vernier calipers (20 divisions of Vernier scale coincide with 19 divisions of main scale, where 1 division of main scale is 1mm). The main scale reads 10 mm and first division of Vernier scale coincides with the main scale. The side is
1. 10.02 mm
2. 10.05 mm
3. 10.04 mm
4. 10.06 mm

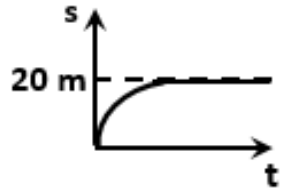
155. If the velocity-displacement graph of a particle is as shown in the adjacent figure, then choose the correct graph from the following if the particle starts motion at t = 0.



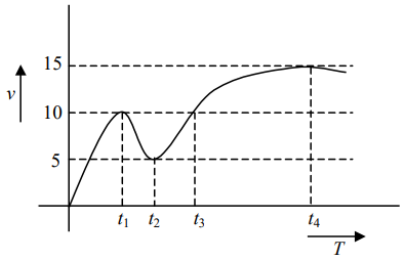
1. 

2. 

3. 

4. 

156. Velocity time graph of a particle undergoing rectilinear motion is plotted upto T = t_4 as shown in the figure. Average acceleration of the particle is zero in the time interval between

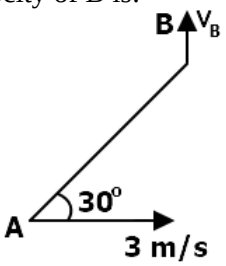


1. 0 and t_1
2. t_1 and t_2
3. t_1 and t_3
4. t_2 and t_4

157. A ball is released from the top of a building 180 m high. It takes time t to reach the ground. With what speed should it be projected down so that it reaches the ground in time $\frac{5t}{6}$?

1. 50 ms^{-1}
2. 61 ms^{-1}
3. 11 ms^{-1}
4. 2 ms^{-1}

158. A thin rod AB is moving in a vertical plane. At a certain instant when the rod is inclined at 30^o to the horizontal, point A is moving horizontally with 3 m/s while B is moving in the vertical direction. Then the velocity of B is:

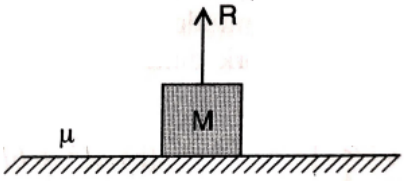


1. $\frac{1}{\sqrt{3}}$ m/s
2. $\sqrt{3}$ m/s
3. $3\sqrt{3}$ m/s
4. $\frac{\sqrt{3}}{2}$ m/s

159. A particle of mass m is moving in a horizontal circle of radius r, under a centripetal force $F=\frac{k}{r^2}$, where k is a constant:

1. The potential energy of a particle is zero
2. The potential energy of the particle is $\frac{k}{r}$
3. The total energy of the particle is $-\frac{k}{2r}$
4. The kinetic energy of the particle is $-\frac{k}{r}$

160. If the reaction is R and coefficient of friction is μ, what is work done against friction in moving the body horizontally by distance d



1. $\frac{\mu Rd}{4}$
2. $2\mu Rd$
3. μRd
4. $\mu Rd/2$

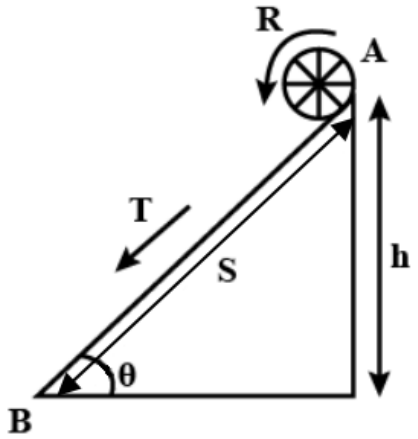
161. If a number of forces act on body and the body is in static or dynamic equilibrium, then:
1. work done by individual forces must be zero
2. net work done is +ve
3. net work done is -ve
4. net work done is zero

162. A 500 kg boat is 9 m long and is floating without motion on still water. A man of mass 100 kg is at one end and if he runs to the other end of the boat and stops, the displacement of the boat is:
1. 1.5 m in the direction of displacement of the man
2. 0.75 m in the direction of displacement of the man
3. 1.5 m in the direction opposite to the displacement of the man
4. 0.75 m in the direction opposite to the displacement of the man

163. Two circular discs A and B are of equal masses and thicknesses but made of metal with densities d_A and d_B ($d_A > d_B$). If their moments of inertia about an axis passing through their centres and perpendicular to circular faces be I_A and I_B, then:
1. $I_A = I_B$
2. $I_A > I_B$
3. $I_A < I_B$
4. $I_A \geq I_B$

164. A flywheel of mass 50 kg and radius of gyration about its axis of rotation of 0.5 m is acted upon by a constant torque of 12.5 N-m. Its angular velocity at t = 5 sec is:
1. 2.5 rad/sec
2. 5 rad/sec
3. 7.5 rad/sec
4. 10 rad/sec

165. Suppose a body of mass M and radius R is allowed to roll on an inclined plane without slipping from its topmost point A. The velocity acquired by the body, as it reaches the bottom of the inclined plane, is given by:



1. $\sqrt{2gh}$
2. $\sqrt{\beta \times 2gh}$
3. $\sqrt{\frac{2gh}{\beta}}$
4. $\frac{2gh}{\beta}$

(Where $\beta = 1 + \frac{I}{MR^2}$. I is the moment of inertia of the body about its axis of rotation)

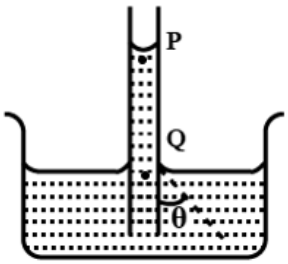
166. What should be the minimum coefficient of static friction between the plane and the cylinder, for the cylinder not to slip on an inclined plane?
1. $\frac{1}{3}\tan\theta$
2. $\frac{1}{3}\sin\theta$
3. $\frac{2}{3}\tan\theta$
4. $\frac{2}{3}\sin\theta$

167. If three particles each of mass M are placed at the corners of an equilateral triangle of side a, the potential energy of the system and the work done if the side of the triangle is changed from a to 2a, are:
1. $\frac{3GM}{a^2}, \frac{3GM}{2a}$
2. $-\frac{3GM^2}{a}, \frac{3GM^2}{2a}$
3. $-\frac{3GM^2}{a^2}, \frac{3GM^2}{4a^2}$
4. $-\frac{3GM^2}{a}, \frac{3GM}{2a}$

168. The Young's modulus of brass and steel are respectively $1 \times 10^{10}\ N/m^2$ and $2 \times 10^{10}\ N/m^2$. A brass wire and a steel wire of the same length are extended by 1 mm under the same force; the radii of brass and steel wires are R_B and R_S respectively. Then,

1. $R_S = \sqrt{2} R_B$
2. $R_S = \frac{R_B}{\sqrt{2}}$
3. $R_S = 4R_B$
4. $R_S = \frac{R_B}{4}$

169. The liquid reaches equilibrium as shown, in a capillary tube of internal radius r. If the surface tension of the liquid is T, the angle of contact θ and density of liquid ρ, then the pressure difference between P and Q is:



1. $\left(\frac{2T}{r}\right)\cos\theta$
2. $\frac{T}{r\cos\theta}$
3. $\frac{2T}{r\cos\theta}$
4. $\left(\frac{4T}{r}\right)\cos\theta$

170. A piece of wax weighs x g in air. A piece of metal is found to weigh y g in water. It is tied to the wax and both together weigh z g in water. Then, the specific gravity of wax is: (z > y)

1. $\frac{x}{y}$
2. $\frac{y}{x}$
3. $\frac{x}{x-(z-y)}$
4. $\frac{x}{x-z}$

171. A steel ball is floating in a trough of mercury. If we fill the empty part of the trough with water, what will happen to the steel ball?

1. It will continue in its position
2. It will move up
3. It will move down
4. It will execute vertical oscillations

172. On which of the following scales of temperature, the temperature is never negative?

1. Celsius
2. Fahrenheit
3. Reaumur
4. Kelvin

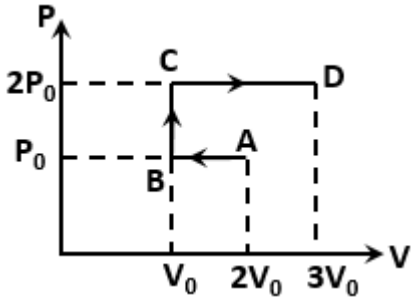
173. A thick and thin wire of the same material and same length are heated from 10^oC to 90^oC. Which expands more?

1. Thick wire
2. Thin wire
3. Both show same expansion
4. None of the above

174. In a thermodynamic process, pressure of fixed mass of a gas is changed in such a manner that the gas releases 29 J of heat and 8 J of work is done on the gas. If the initial internal energy of the gas was 30 J, what will be the final internal energy?

1. 42 J
2. 12 J
3. 10 J
4. 9 J

175. P-V diagram of an ideal gas is as shown in the figure. Work done by the gas in the process ABCD is:



1. $4\ P_0V_0$
2. $2\ P_0V_0$
3. $3\ P_0V_0$
4. P_0V_0

176. A box (thermally insulated) has two chambers separated by a membrane. One of volume V contains an ideal gas at temperature T. The other $\left(\frac{1}{2}V\right)$ volume is evacuated. If the membrane breaks down, the gas temperature will be:

1. $\frac{3}{2}T$
2. $\frac{2T}{3}$
3. T
4. none of these

177. Under which of the following conditions is the law PV = RT obeyed most closely by a real gas?
1. High pressure and high temperature
2. Low pressure and low temperature
3. Low pressure and high temperature
4. High pressure and low temperature

178. The displacement of an object attached to a spring and executing simple harmonic motion is given by: $x=2\times10^{-2}\cos\pi t$. The time at which the maximum speed does not occur is:
1. 0.25 s
2. 0.5 s
3. 2.5 s
4. 1.5 s

179. The displacement of a particle along x-axis is given by $x=a\sin 2\omega t$. The motion of the particle corresponds to:
1. simple harmonic motion of frequency ω/π
2. simple harmonic motion of frequency $3\omega/2\pi$
3. non-simple harmonic motion
4. simple harmonic motion of frequency $\omega/2\pi$

180. If the displacement (x) and velocity v of a particle executing simple harmonic motion are related through the expression $4v^2=25-x^2$, then its time period is:
1. π
2. 2π
3. 4π
4. 6π

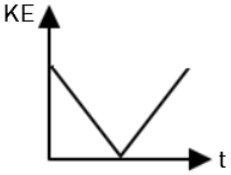
181. If the temperature is raised by 1 K from 300 K, then the percentage change in the speed of sound in the gaseous mixture is: (R = 8.31 J/mol-K)
1. 0.167 %
2. 2 %
3. 1 %
4. 0.334 %

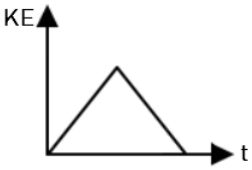
182. A wave is represented by the equation:
$y=7\sin\left(7\pi t-0.04x+\frac{\pi}{3}\right)$
Where, x is in metres and t in seconds. The speed of the wave is:
1. $(175\pi)\ m/s$
2. $(49\pi)\ m/s$
3. $(49/\pi)\ m/s$
4. $(0.28\pi)\ m/s$

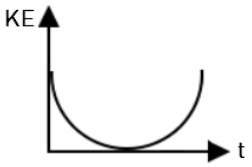
183. In two similar wires of tensions 16 N and T, 3 beats are heard. If the wire of tension 16 N has a frequency 4 Hz, then T =
1. 49 N
2. 64 N
3. 25 N
4. none of these

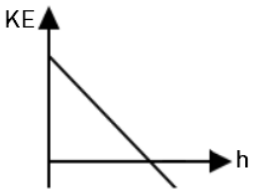
184. If a stretched wire is vibrating in the second overtone, then the number of nodes and antinodes between the ends of the string are respectively:
1. 2 and 2
2. 1 and 2
3. 4 and 3
4. 2 and 3

185. A ball is projected vertically up with an initial velocity. Which of the following graphs represent the KE of the ball?

1. 

2. 

3. 

4. 

Physics - Section B

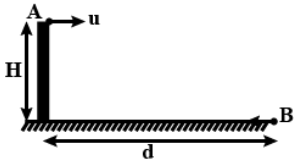
186. Two blocks of masses 2 kg and 1 kg are placed on a smooth horizontal table in contact with each other. A horizontal force of 3 Newton is applied on the first so that the blocks move with constant acceleration. The force between the blocks would be:
1. 3 N
2. 2 N
3. 1 N
4. zero

187. Suppose the velocity of water waves is equal to $\lambda^K a^L \rho^M$, where λ is wavelength, a is acceleration due to gravity and ρ is the density of water. Then, the values of K, L, M are:
1. $\frac{1}{2}, 0, \frac{1}{2}$
2. $\frac{1}{2}, \frac{1}{2}, 0$
3. $\frac{1}{2}, -\frac{1}{2}, 0$
4. $\frac{1}{2}, 0, 1$

188. In an imaginary atmosphere, the air exerts a small force F on any particle in the direction of the particle's motion. A particle of mass 'm' projected upward takes a time t_1 in reaching the maximum height and t_2 in the return journey to the original point then
1. $t_1 < t_2$
2. $t_1 > t_2$
3. $t_1 = t_2$
4. The relation between t_1 and t_2 depends on the mass of the particle

189. A particle is moving along a straight line such that its position depends on time as $x = 1 - at + bt^2$, where a = 2 m/s, b = 1 m/s^2 then distance covered by the particle during first 3 seconds from starting of the motion
1. 2m
2. 5 m
3. 7 m
4. 4 m

190. Two particles A and B are placed as shown in the figure. The particle A, on the top of tower, is projected horizontally with a velocity u and particle B is projected along the surface towards the tower simultaneously. If both particles meet each other, then speed of projection of particle B is [Ignore any friction]



1. $d\sqrt{\frac{g}{2H}} - u$
2. $d\sqrt{\frac{g}{2H}}$
3. $d\sqrt{\frac{g}{2H}} + u$
4. u

191. A ball strikes against the floor and returns with double the velocity. In which type of collision is it possible?
1. Perfectly elastic
2. Inelastic
3. Perfectly inelastic
4. It is not possible

192. A uniform metre stick of mass M is hinged at one end and supported in a horizontal direction by a string attached to the other end. What should be the initial acceleration (in rad/sec^2) of the stick if the string is cut?
1. $\frac{3}{2}g$
2. g
3. 3g
4. 4g

193. A ball is dropped from a spacecraft revolving around the earth at a height of 120 km. What will happen to the ball?
1. It will go very far in the space
2. It will fall down on the earth gradually
3. It will move with the same speed, tangentially to the spacecraft
4. It will continue to move with the same speed along the original orbit of the spacecraft

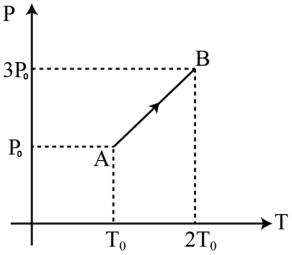
194. A metal wire is first stretched beyond its elastic limit and then released. It:
1. lost its elastic property completely and it will not contract
2. will contract to its original length
3. will contract to its length at elastic limit
4. will contract but the final length will be greater than the original length

195. Tanks A and B open at the top contain two different liquids upto a certain height in them. A hole is made in the wall of each tank at a depth h from the surface of the liquid. The area of the hole in A is twice that of in B. If the mass flow rate through each hole is equal, then the ratio of densities of the liquids respectively is:
1. 2/1
2. 3/2
3. 2/3
4. 1/2

196. A tap supplies water at 10^{o}C and another tap at 100^{o}C. How much hot water must be taken so that we get 20 kg water at 35^{o}C?
1. 7.2 kg
2. 10 kg
3. 5.6 kg
4. 14.4 kg

197. A Carnot engine takes heat from a reservoir at 627^{o}C and rejects heat to the sink at 27^{o}C. Its efficiency will be:
1. 3/5
2. 1/3
3. 2/3
4. 200/209

198. The pressure versus temperature graph of an ideal gas is as shown in the figure. The density of the gas at point A is ρ_0. Density at point B will be:



1. $\frac{3}{4}\rho_0$
2. $\frac{3}{2}\rho_0$
3. $\frac{4}{3}\rho_0$
4. $2\rho_0$

199. For a simple pendulum, the graph between T^2 and L is:
1. a straight line passing through the origin
2. parabola
3. circle
4. ellipse

200. Two travelling waves $y_1 = A\sin[(kx+ct)]$ and $y_2 = A\sin[(kx-ct)]$ are superposed on a string. The distance between adjacent antinodes is:
1. $\frac{ct}{\pi}$
2. $\frac{ct}{2\pi}$
3. $\frac{\pi}{2k}$
4. $\frac{\pi}{k}$