

Biology

1.

Parts of grasses removed by the grazing herbivores are regenerated due to the activity of:

1. Apical meristem
2. Intercalary meristem
3. Interfascicular cambium
4. Fascicular vascular cambium

2.

Read the following statement carefully:

"Further development of zygote depends on the type of life cycle the organism has and the environment it is exposed to."

Identify the correctly matched pair w.r.t the above statement

- | | |
|---|---------------------------|
| 1. Thick walled zygote | Haplontic life cycle |
| 2. Zygote forms new generation, by mitosis, represented by one cell | Haplodiplontic life cycle |
| 3. Zygote undergoes meiosis to form haploid generation | Diplontic life cycle |
| 4. Zygote forms multicellular diploid generation | Haplontic life cycle |

3.

What is true about cork cambium?

1. It is extrastelar cambium in dicot stem.
2. In dicot stem it arises from the cells of cortex region.
3. It is also known as phellogen.
4. All the above

4.

Coralloid roots of gymnosperms are/have

1. Irregular and possess large number of roots hairs.
2. Symbiotic association with Rhizobium.
3. Symbiotic association with N_2 - fixing cyanobacteria.
4. VAM

5.

Which of the following characters, are defining features of all living organisms?

- (A) Growth from inside
- (B) Sexual reproduction
- (C) Metabolism
- (D) Response to stimuli
- (E) Cellular organisation

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

6.

The maximum volume of air that can be moved in and out during a single breath is called the _____.

1. vital capacity
2. tidal volume
3. residual volume
4. dead space

7.

The diaphragm and external intercostal muscles are _____ when expiration occurs.

1. contracted
2. relaxed
3. flexed
4. both relaxed (diaphragm) and flexed (intercostal muscles)

8.

The greater the number of blood vessels dilated, the _____.

1. higher the blood pressure
2. lower the blood pressure
3. faster the heartbeat
4. slower the heartbeat

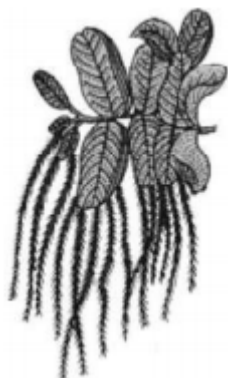
9.

Which of the following statements is not correct with respect to the epithelial tissue?

1. It covers the external surface of the body and internal surface of many organs.
2. The neighbouring cells are held together by cell junctions and there is very little intercellular material.
3. The epithelial cells rest on a cellular basement membrane that separates it from underlying connective tissue.
4. There is no blood vessel supplying the nutrients to the epithelial cells.

10.

Select incorrect option w.r.t. given diagram



1. Heterosporous.
2. Aquatic fern.
3. Belongs to class Pteropsida.
4. Gametophytic main plant body.

11.

Select the incorrect statement w.r.t vessel

1. Devoid of protoplasm.
2. Lignified wall.
3. Long cylindrical tube like cells.
4. Presence of vessel is characteristic of gymnosperm.

12.

Which of the following statement is incorrect w.r.t. endomembranous system?

1. Found only in eukaryotes.
2. The organelle of this system function in coordinated manner.
3. It includes endoplasmic reticulum, golgi complex, lysosome and vacuole.
4. Found in that cell in which cyclosis is absent

13.

In which phase of mitosis, chromosomes are moved to spindle equator and get aligned at equatorial plate through spindle fibers to both poles, is

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase

14.

NADH synthesized in glycolysis of aerobic respiration is transferred into

1. Cytoplasm for oxidative phosphorylation.
2. Mitochondria for oxidative phosphorylation.
3. Mitochondria for photo oxidation.
4. ETS for photo oxidation.

15.

By convention the water potential of pure water at standard temperatures, which is not under any pressure, is taken to be

1. 100 atm
2. Zero
3. More than 0 atm
4. Less than 0 atm

16.

During catalytic cycle of an enzyme—

1. Enzyme alter its shape to fit the substrate molecule.
2. Substrate alter its shape to get fit into the enzyme molecule.
3. Both enzyme and substrate changes its shape during transition state.
4. Enzyme and substrate are rigid molecular structure and it never changes its shape.

17.

How many statements are false from given information?

- (a) Ribozymes are enzyme made up of protein.
- (b) In every chemical reaction transition state energy is always greater than activation energy.
- (c) Co-factors are always proteinous in nature
- (d) Enzyme inhibition can not be removed.
- (e) Enzyme action can be stopped at low temp.
- (f) K_m value (Michaelis constant) is the specific concentration of substrate molecule.

- 1. 2
- 2. 3
- 3. 4
- 4. 5

18.

Erythroblastosis fetalis condition arises when a

- 1. Rh (+) female carries a Rh(−) foetus for the first time.
- 2. Rh (+) female carries a Rh(−) foetus for the second time.
- 3. Rh (−) female carries a Rh (+) foetus for the first time.
- 4. Rh (−) female carries a Rh (+) foetus for the second time

19.

Select the true statement(s)

- A. Growth factors are hormones secreted by several non-endocrine tissues.
- B. Estradiol is synthesised and secreted mainly by growing ovarian follicles.
- C. Catecholamines stimulate the breakdown of glycogen.
- D. Adrenal cortex secrete androgen like hormone.

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

20.

Eustachian tube connects

- 1. External ear with middle ear
- 2. External ear with internal ear
- 3. Middle ear with pharynx
- 4. Middle ear with internal ear

21.

The excess of nutrients which are not used immediately are converted into fats and stored in

- 1. Areolar tissue
- 2. Adipose tissue
- 3. Dense regular connective tissue
- 4. Dense irregular connective tissue

22.

Which of the following sequences best represents the pathway of an action potential through the Heart's conduction system?

- (i) Sino-atrial (SA) node
- (ii) Purkinje fibres
- (iii) Bundle of His
- (iv) Atrio-ventricular (AV) node
- (v) Right and left bundle branches

- 1. (i),(iv),(iii),(ii),(v)
- 2. (iv), (i),(iii),(v),(ii)
- 3. (iii),(iv),(i),(ii),(v)
- 4. (i),(iv),(iii),(v),(ii)

23.

Match the organism in Column-I with its excretory structure in Column-II

Column-I		Column-II
(A) Cockroach	(p)	Nephridia
(B) Earthworm	(q)	Proboscis gland
(C) Balanoglossus	(r)	Kidney
(D) Clarias	(s)	Malpighian tubules

1. (A)→(s), (B)→(p), (C)→(q), (D)→(r)
2. (A)→(s), (B)→(p), (C)→(r), (D)→(q)
3. (A)→(q), (B)→(p), (C)→(r), (D)→(s)
4. (A)→(s), (B)→(q), (C)→(r), (D)→(p)

24.

Which one of the following is the correct description of a certain part of a normal human skeleton?

1. First vertebra is axis which articulates with the occipital condyles
2. The 9th and 10th pairs of ribs are called the floating ribs
3. Glenoid cavity is a depression to which the thigh bone articulates
4. Parietal bone and the temporal bone of the skull are joined by fibrous joint

25.

When a person is suffering from poor renal reabsorption, then which of the following will not help in the maintenance of blood volume?

1. Decreased glomerular filtration
2. Increased ADH secretion
3. Decreased arterial pressure in kidney
4. Increased arterial pressure in kidney

26.

Partial pressure of CO₂ in alveoli of lungs

1. Equal to that in the deoxygenated blood.
2. More than that in the deoxygenated blood.
3. Less than that in the deoxygenated blood.
4. More than that of CO₂ in alveoli.

27.

The correct sequences of layers in the wall of alimentary canal from lumen to outside is

1. Serosa→inner circular muscle→ outer longitudinal muscle→ sub-mucosa→ mucosa
2. Mucosa→sub-mucosa→inner circular muscle→ outer longitudinal muscle→serosa
3. Serosa→sub-mucosa→mucosa→inner circular muscle→outer longitudinal muscle
4. Mucosa→serosa→inner circular muscle→outer longitudinal muscle→sub-mucosa

28.

Select the correct statement

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

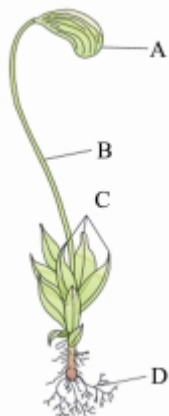
29.

Select the incorrect statement

1. Na⁺/K⁺ ATPase is an electrogenic pump that helps to maintain electrochemical ionic gradient across axolemma
2. At rest, axoplasm has lower Na⁺ ions concentration than K⁺ ion concentration
3. Brain stem comprises midbrain, pons and medulla oblongata
4. Thalamus part of hindbrain is responsible for emotions like anger and rage

30.

In the following diagram A, B, C and D represent



1. A - Seta, B - Leaves, C- Rhizoids, D - Capsule
2. A - Leaf, B - Rhizoids, C- Scales, D - Root hair
3. A - Capsule, B - Seta, C- Leaves, D - Rhizoids
4. A - Capsule, B - Foot, C- Leaves, D - Rhizoids

31.

Which one of the following elements in plants is not remobilized?

1. Calcium
2. Potassium
3. Zinc
4. Phosphorus

32.

The continuous excretion of watery substance from stump of a well-watered potted plant after cutting off the shoot slightly above the base is due to

1. root pressure
2. guttation
3. transpiration
4. imbibitions

33.

A land snail, a clam, and an octopus all share

1. a mantle
2. calcareous shell
3. a radula
4. distinct cephalization

34.

When you first walk from a brightly lit area into darkness which of the following occurs?

1. The photospins in your cones become bleached
2. Your rod cells become hyperpolarized
3. Your rhodopsin is still dossociated into retinal and opsin, and your rods are temporarily nonfunctional
4. Lateral inhibition caused by your horizontal cells ceases

35.

The atrial wall of our heart secretes a very important peptide hormone called_____, which_____ because it causes dilation of the blood vessels. Choose the option which correctly fills the blank

1. Rennin, increase the blood pressure
2. Angiotensiogen, decreases the blood pressure
3. Atrial natriuretic factor, increases the blood pressure
4. Atrial natriuretic factor, decreases the blood pressure

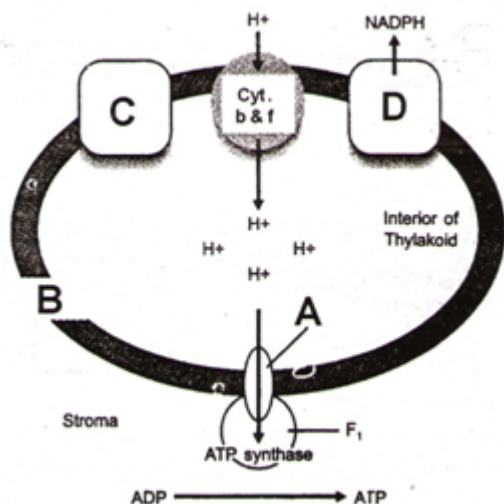
36.

In Rhizophora, roots are modified to form

1. Tuberous roots
2. Pneumatophores
3. Stilt roots
4. Storage roots

37.

Study the pathway ATP synthesis through chemiosmosis given below –



In which of the following options correct words for all the three blanks A, B, C and D are indicated –

1. A – F_1 , B – Thylakoid membrane, C – Photosystem (I), D – Photosystem (II)
2. A – F_0 , B – Thylakoid membrane, C – Photosystem (I), D – Photosystem (II)
3. A – F_1 , B – Thylakoid membrane, C – Photosystem (II), D – Photosystem (I)
4. A – F_0 , B – Thylakoid membrane, C – Photosystem (II), D – Photosystem (I)

38.

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

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

39.

Select the group of animals belonging to different phyla?

1. Hirudinaria, Limulus, Laccifer.
2. Nereis, Dentalium, Aplysia.
3. Pheretima, Chaetopleura, Ophiura.
4. Cucumaria, Antedon, Loligo.

40.

Nucleotide is made up of

1. Heterocyclic compound, Monosaccharide, Phosphoric acid.
2. Nitrogenous base, hexose sugar, phosphate.
3. Heterocyclic compound and pentose sugar only.
4. Heterocyclic compound and nucleoside.

41.

NAD and NADP are considered as

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

42.

Which of the following can not be expected in the filtrate when it arrives to descending limb of Henle's loop?

- I. Albumin
- II. Glucose
- III. Urea
- IV. Amino acid

1. I, II, III & IV

2. I only

3. II, IV only

4. I, II & IV

43.

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

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

44.

Why photorespiration does not take place in C_4 plants?

1. Do not contain RuBisCo.
2. Have a mechanism that increases the concentration of CO_2 at the enzyme site.
3. Cells do not allow oxygen to accumulate in them.
4. Cells are impermeable to oxygen.

45.

RQ of tripalmitin is

1. $\frac{6 \text{ CO}_2}{6 \text{ O}_2}$
2. $\frac{102 \text{ CO}_2}{145 \text{ O}_2}$
3. $\frac{2 \text{ CO}_2}{\text{Zero O}_2}$
4. $\frac{4 \text{ CO}_2}{10 \text{ O}_2}$

46.

The organelles formed by the process of packaging in the golgi apparatus is

1. Double membrane organelle.
2. Possess single circular DNA molecule
3. Rich in hydrolases
4. Able to occupy up to 90 percent volume of the cell

47.

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

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

48.

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

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

49.

How many of the following can help in breaking seed dormancy?

1. Changing the environmental condition like light & temperature.
2. Application of GA_3 or nitrates.
3. Chilling condition.
4. All the above

50.

Most of the organelle duplication occurs during which phase?

1. G_1
2. G_2
3. S
4. M

51.

Mark the incorrect match

	Aerobic	Anaerobic
1.	Complete breakdown of glucose	- Partial breakdown.
2.	Net gain 38 ATP	- Net gain 2 ATP.
3.	Vigrously	- NADH oxidised slowly
4.	CO_2 released	- No CO_2 released.

52.

In floral diagram a dot at the top of diagram represents

1. Position of ovary
2. Aestivation
3. Mother axis
4. Cohesion

53.

Centromere is situated at the end in

1. Telocentric chromosome.
2. Acrocentric chromosome.
3. Metacentric chromosome.
4. Sub-metacentric chromosome

54.

Read the following statement (A-D) :-

- (a) Each protein is a polymer of amino acids.
- (b) A protein is a hetero polymer and not a homopolymer.
- (c) Dietary proteins are the source of essential amino acid.
- (d) Collagen is the most abundant protein in whole of the biosphere.

How many of the above statement are right ?

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

55.

Consider the following four statements (a-d) and select the option which includes all the correct :-

- (a) Coronary Artery disease, (CAD) often referred to as Atherosclerosis
- (b) Heart failure means when the heart muscle is suddenly damaged by an inadequate blood supply
- (c) High blood pressure leads to heart diseases and also affects vital organs like brain and kidney
- (d) Angina occurs due to conditions that affect the blood flow

Options :

- 1. Statements (b), (c) and (d).
- 2. Statements (a), (b).
- 3. Statements (b), (d).
- 4. Statement (a), (c) and (d).

56.

Which of the following is incorrect with respect to parathyroid hormone (PTH)?

- 1. Secretion of PTH is regulated by circulating levels of calcium ions
- 2. PTH acts on bones and stimulates the process of bone mineralisation
- 3. PTH stimulates reabsorption of Ca^{+2} by renal tubules
- 4. PTH increases absorption of Ca^{+2} from digested food

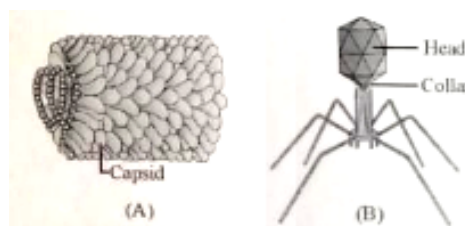
57.

Which of the following receptors are specifically responsible for maintenance of balance of body and posture ?

- 1. Basilar membrane and otoliths
- 2. Hair cells and organ of corti
- 3. Tectorial membrane and macula
- 4. Crista ampullaris and macula

58.

Which of the statement is not true for given structures?



- 1. They both are made up of nucleoprotein
- 2. They both infect plants and bacteria
- 3. They are obligate intracellular parasites
- 4. A and B have RNA & DNA as genetics material respectively

59.

Compound epithelium play major role in

- 1. Secretion
- 2. Absorption
- 3. Protection
- 4. Support

60.

Chief producers of oceans are :-

- 1. Dinoflagellates
- 2. Diatoms
- 3. Euglenoids
- 4. Cyanophycean algae

61.

Find out the wrongly matched pair :-

1. Tuber - Potato
2. Leaf buds - Banana
3. Bulbil - Agave
4. offset - Water hyacinth

62.

At anaphase-II, sister chromatids move towards opposite poles of the cell by :

1. Contraction in spindle fibre attached to kinetochores
2. Shortening of microtubules attached to kinetochores
3. Lengthening of microtubules attached to kinetochores
4. Relaxation in spindle fibre attached to kinetochores

63.

Which is correctly matched ?

1. Bowman's capsule - Ultrafiltration and secretion
2. Collecting duct - absorption of large amount of Urea
3. Ascending part of loop of Henle - Secretion of Glucose and amino acids
4. DCT - Reabsorption of HCO_3^-

64.

Following are the events occurs during meiosis :

- (A) Appearance of chiasmata
- (B) Synapsis
- (C) Assembly of meiotic spindle
- (D) Use of recombinase enzyme

Choose the correct sequence :-

1. $A \rightarrow B \rightarrow C \rightarrow D$
2. $B \rightarrow D \rightarrow A \rightarrow C$
3. $D \rightarrow C \rightarrow B \rightarrow A$
4. $B \rightarrow C \rightarrow A \rightarrow D$

65.

Select the correct statement:-

1. Pure water has minimum ψ_w
2. Pure water has maximum ψ_w
3. Pure water has maximum DPD
4. Pure water has variable DPD

66.

Reduction of nitrogen to ammonia by living organisms is called;-

1. Industrial N_2 fixation
2. Electrical N_2 fixation
3. Biological nitrogen fixation
4. Denitrification

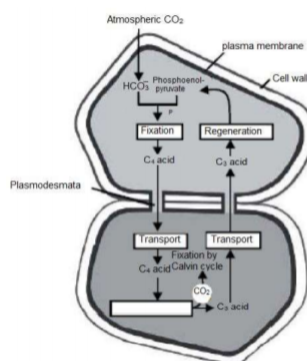
67.

Mode of nutrition in euglenoids is:

1. Photosynthetic
2. Heterotrophic
3. Chemosynthetic
4. Both (A) & (B)

68.

Observe the following diagram given below:



Which statement is correct for this?

1. Photosynthetic decarboxylation takes place in mesophyll cell
2. C_3 acid is transported from mesophyll to bundle sheath cell
3. O_2 evolve only in mesophyll cell
4. CO_2 refixation occurs in mesophyll cell

69.

Which of the following is the unique feature of mammal ?

1. Muscular diaphragm
2. Ear pinna
3. Mammary glands
4. All of the above

70.

Match the following:-

Column-I

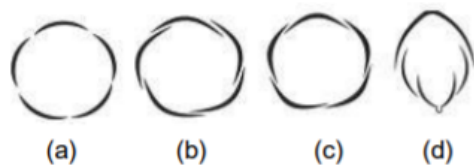
Column-II

- | | |
|-------------------|--------------------------|
| a. Alkaloid | (i) Vinblastin, Curcumin |
| b. Essential oils | (ii) Morphine, Codeine |
| c. Toxins | (iii) Lemongrass oil |
| d. Drugs | (iv) Abrin, Ricin |

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

71.

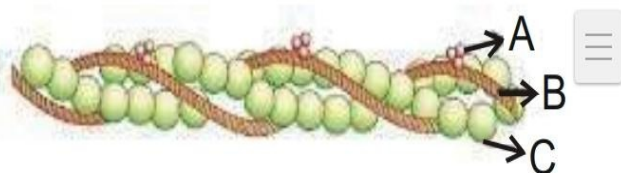
The aestivation in petals of ladyfinger and Calotropis plants are respectively:-



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

72.

In the given diagram identify A, B, C :-



- | (A) | (B) | (C) |
|------------------|-------------|----------|
| (i) Tropomyosin | F-Actin | Troponin |
| (ii) Troponin | Tropomyosin | F-Actin |
| (iii) F-Actin | Tropomyosin | Troponin |
| (iv) Tropomyosin | Troponin | F-Actin |

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

73.

Pneumotaxic centre is located in:

1. Pons
2. Cerebrum
3. Medulla oblongata
4. Thalamus

74.

One of these pairs are not correctly matched

1. Insulin – Raised blood sugar
2. Cretinism – Mental retardation
3. Grave's Disease – swollen facial tissues
4. Parathyroid – Tetany

75.

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

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

76.

Thorns of Bougainvillea are the modification of

1. Apical buds
2. Vegetative buds
3. Accessory buds
4. Axillary buds

77.

Two copper centers are found associated with

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

78.

Which of the given is not a defining property of living organisms?

1. Growth
2. Metabolism
3. Cellular organization
4. Consciousness

79.

How much CO₂ is delivered by 5 L of deoxygenated blood to alveoli?

1. 250 ml
2. 200 ml
3. 750 ml
4. 400 ml

80.

In a healthy person, the red muscle fibres appear red due to stored

1. Carboxyhemoglobin
2. Carbaminohemoglobin
3. Myoglobin
4. Erythropoietin

81.

Select the **correct** match

I

- (i) Loop of Henle
- (ii) Collecting Duct
- (iii) PCT
- (iv) DCT

II

- (a) 70-80% reabsorption
- (b) Conditional reabsorption of Na⁺
- (c) Renal medulla
- (d) Allows passage of urea

i ii iii iv

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

82.

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

83.

A part of brain that lies at the base of thalamus and controls body temperature, urge for eating and drinking is

1. Amygdala
2. Hippocampus
3. Hypothalamus
4. Cerebrum

84.

Mark the correct statement about centriole.

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

85.

Animals differ from plants in

1. Being multicellular
2. Having cell wall
3. Being heterotrophic
4. Being eukaryotic

86.

Life cycles of Ectocarpus and Polysiphonia are

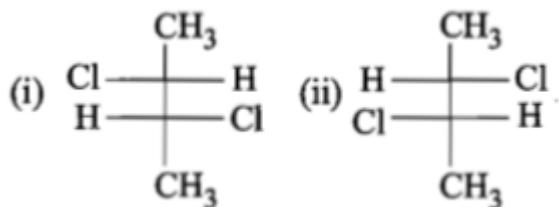
1. Haplontic and Diplontic respectively
2. Diplontic and Haplontic respectively
3. Haplodiplontic
4. Diplontic and Haplodiplontic respectively

87. Which of the following does not behave as sense organ in cockroach?
1. Maxillary palps
 2. Labial palps
 3. Anal cerci
 4. Phallomeres
88. A hormone promotes rapid petiole elongation in deep rice plants. This hormone is
1. Adenine derivative
 2. Produced by acetyl Co-A
 3. Made of violaxanthin
 4. Gaseous in nature
89. Which of the following do **not** belong to category of brush border enzymes?
1. Lactase, nucleotidase
 2. Aminopeptidase, sucrase
 3. Procarboxypeptidase, steapsin
 4. Nucleosidase, maltase
90. Which one of the following hormone does not require extracellular receptor?
1. Growth hormone
 2. PTH
 3. Thyrocalcitonin
 4. Thyroxine
91. The order of increasing energies of the orbitals follows:
1. 3s, 3p, 4s, 3d, 4p
 2. 3s, 3p, 3d, 4s, 4p
 3. 3s, 3p, 4s, 4p, 3d
 4. 3s, 3p, 3d, 4p, 4s
92. HI was heated in a sealed tube at 440°C till the equilibrium was reached, HI was found to be 22 % decomposed. The equilibrium constant for dissociation is:
1. 0.282
 2. 0.0796
 3. 0.0199
 4. 1.99
93. The ratio of number of atoms in 2.2 g CO_2 and 1.7 g NH_3 is
1. $1/2$
 2. $1/8$
 3. $3/8$
 4. $3/2$
94. In the reaction, $\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$, α is that part of N_2O_4 which dissociates, then the number of moles at equilibrium will be:
1. $(1 - \alpha)^2$
 2. 3α
 3. α
 4. $1 + \alpha$
95. How many spectral lines are obtained when an electron jumps from $n=5$ to $n=1$ hydrogen atom?
1. 3
 2. 4
 3. 6
 4. 10
96. Density ratio of O_2 and H_2 is 16 : 1. The ratio of their r.m.s. velocities will be
1. 4 : 1
 2. 1 : 16
 3. 1 : 4
 4. 16 : 1

Chemistry

97.

If optical rotation produced by the compound (i) is $+52^\circ$ then that produced by the compound (ii) is:

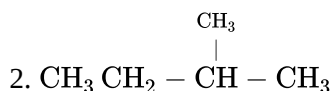


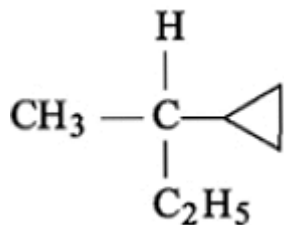
1. -52°
2. $+52^\circ$
3. 0°
4. unpredictable

98.

The optically active alkane with lowest molar mass is:

1. $\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH}$

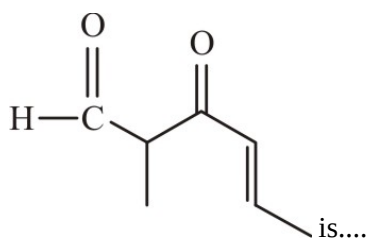
2. 



4. $\text{CH}_3\text{CH}_2\cdot\text{CH}_2\text{CH}_3$

99.

The IUPAC name of the compound



1. 3-keto-2-methylhex-4-enal
2. 5-formylhex-2-en-3-one
3. 5-methyl-4-oxohex-2-en-5-al
4. 3-keto-2-methylhex-5-enal

100.

An organic compound contains carbon, hydrogen, and oxygen. Its elemental analysis gave C, 38.7% and H, 9.67%. The empirical formula of the compound would be

1. CH_3O
2. CH_2O
3. CHO
4. CH_4O

101.

The shape of XeF_3^+ is :

1. Trigonal planar
2. Pyramidal
3. Bent T-shape
4. See-saw

102.

Which species does not exist?

1. $(\text{SnCl}_6)^{2-}$
2. $(\text{GeCl}_6)^{2-}$
3. $(\text{CCl}_6)^{2-}$
4. $(\text{SiF}_6)^{2-}$

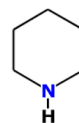
103.

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%

104.

In piperidine



N atom has hybridization:

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

105.

For $A \rightarrow B$,
 $\Delta H = 4 \text{ kcal mol}^{-1}$, $\Delta S = 10 \text{ cal mol}^{-1} \text{K}^{-1}$.
 Reaction is spontaneous when the temperature can be :

1. 400 K
2. 300 K
3. 500 K
4. none is correct

106.

Which of the following thermodynamic quantities is an outcome of the second law of thermodynamics?

1. Work
2. Enthalpy
3. Internal energy
4. Entropy

107.

Which of the following statements is correct for a reversible process in a state of equilibrium?

1. $\Delta G = -2.30RT \log K$
2. $\Delta G = 2.30RT \log K$
3. $\Delta G^0 = -2.30RT \log K$
4. $\Delta G^0 = 2.30RT \log K$

108.

Which of the following has the largest de Broglie wavelength (all have equal velocity)

1. CO_2 molecule
2. NH_3 molecule
3. Electron
4. Proton

109.

At what temperature will average speed of the molecules of the second member of the series C_nH_{2n} be the same of Cl_2 at 627°C ?

1. 259.4 K
2. 400 K
3. 532.4 K
4. None of these

110.

The quantum number not obtained from the Schrodinger's wave equation is -

1. n
2. l
3. m
4. s

111.

Which is not the correct order of electronegativity

1. $\text{Cl} > \text{S} > \text{P} > \text{Si}$
2. $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$
3. $\text{F} > \text{Cl} > \text{Br} > \text{I}$
4. None of these

112.

One mole of $\text{N}_2\text{O}_4(\text{g})$ at 300 K is kept in a closed container under one atmosphere. It is heated to 600 K when 20% by mass of $\text{N}_2\text{O}_4(\text{g})$ decomposes to $\text{NO}_2(\text{g})$. The resultant pressure is

1. 1.2 atm
2. 2.4 atm
3. 2.0 atm
4. 1.0 atm

113.

At 100°C and 1 atm, if the density of liquid water is 1.0 g cm^{-3} and that of water vapor is

0.0006 g cm^{-3} , then the volume occupied by water molecules in 1 liter of steam at that temperature is -

1. 6 cm^3
2. 60 cm^3
3. 0.6 cm^3
4. 0.06 cm^3

114.

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

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

115.

Among the following gases which one is damaging the ozone layer?

1. CFCs
2. CO_2
3. CH_4
4. SO_2

116.

Which of the following is/are incorrect for orthohydrogen?

1. Nuclei spins are in same direction
2. A sample of dihydrogen at room temperature contains 75% ortho-hydrogen
3. It is possible to obtain pure ortho-hydrogen at low temperature
4. All of these

117.

Volume strength of 1.5 N H_2O_2 solution is

1. 8.4 V
2. 16.8 V
3. 5.6 V
4. 22.4 V

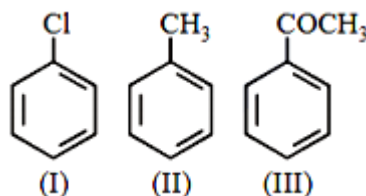
118.

Orthoboric acid when heated to red hot gives:

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

119.

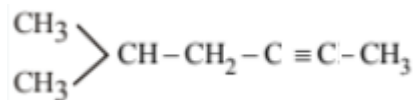
The increasing order of the reactivity of the following compounds towards electrophilic aromatic substitution reaction is:



1. $\text{III} < \text{I} < \text{II}$
2. $\text{III} < \text{II} < \text{I}$
3. $\text{II} < \text{I} < \text{III}$
4. $\text{II} < \text{III} < \text{I}$

120.

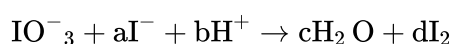
Which will undergo reaction with ammonical AgNO_3



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

121.

In the balanced chemical reaction



a, b, c and d respectively correspond to

1. 5, 6, 3, 3
2. 5, 3, 6, 3
3. 3, 5, 3, 6
4. 5, 6, 5, 5

122.

In diborane, the two H-B-H angles are nearly

1. 60° , 120°
2. 95° , 120°
3. 95° , 150°
4. 120° , 180°

123.

Which of the following gives propyne on hydrolysis

1. Al_4C_3
2. Mg_2C_3
3. B_4C
4. La_4C_3

124.

The isoelectronic pair is

1. ClO_2^- , ClF_2^+
2. IF_2^- , I_3^-
3. Cl_2O , ICl_2^-
4. ICl_2^- , ClO_2

125.

ΔH_f^0 (298K) of methanol is given by the chemical equation

1. $C(\text{diamond}) + \frac{1}{2}O_2 + 2H_2 \rightarrow CH_3OH$
2. $CH_4 + \frac{1}{2}O_2 \rightarrow CH_3OH$
3. $CO + 2H_2 \rightarrow CH_3OH$
4. $C(\text{graphite}) + \frac{1}{2}O_2 + 2H_2 \rightarrow CH_3OH$

126.

The most probable radius (in pm) for finding the electron in He^+ is

1. 26.5
2. 105.8
3. 0.0
4. 52.9

127.

For reaction $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$, 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}

128.

3-Phenylpropene on reaction with HBr gives (as a major product)

1. $C_6H_5CH(Br)CH_2 - CH_3$
2. $C_6H_5CH_2CH(Br)CH_3$
3. $C_6H_4(Br)CH_2CH_2CH_3$
4. $C_6H_5CH_2CH_2CH_2Br$

129.

The cation of alkali metals are found as $M(H_2O)_n^+$ in H_2O , value of 'n' is maximum for

1. Na^+
2. K^+
3. Rb^+
4. Li^+

130.

A substance which gives a brick red flame and breaks down on heating giving oxygen and a brown gas is

1. Calcium carbonate
2. Magnesium carbonate
3. Calcium nitrate
4. None of these

131.

For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the correct option is:

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

132.

Sodium nitrate decomposes above $800^\circ C$ and does not give:

1. N_2
2. O_2
3. NO_2
4. Na_2O

133.

How many moles are present in 2.5 litre of 0.2 M H_2SO_4 ?

1. 0.25
2. 0.5
3. 0.75
4. 0.2

134.

Plants and living beings are examples of

1. isolated system
2. adiabatic system
3. open system
4. closed system

135.

Which one of the alkali metals forms only, the normal oxide, M_2O on heating in air?

1. Rb
2. K
3. Li
4. Na

137.

The potential energy of a particle oscillating along the x-axis is given as $U = 20 + (x-2)^2$ where U is in joules and x in meters. The total mechanical energy of the particle is 36 J.

The maximum kinetic energy of the particle is-

1. 24 J
2. 36 J
3. 16 J
4. 20 J

138.

A 4.0 m long copper rod of cross-sectional area 1 cm^2 is stretched by a force of $4.8 \times 10^3 \text{ N}$. If Young's modulus for copper is $Y = 1.2 \times 10^{11} \text{ N/m}^2$. Calculate strain.

1. 1×10^{-4}
2. 2×10^{-4}
3. 3×10^{-4}
4. 4×10^{-4}

139.

A ball is thrown vertically upwards with a velocity 'u' from the balloon descending with velocity v. The ball will pass by the balloon after time.

1. $\frac{u-v}{2g}$
2. $\frac{u+v}{2g}$
3. $\frac{2(u-v)}{g}$
4. $\frac{2(u+v)}{g}$

Physics

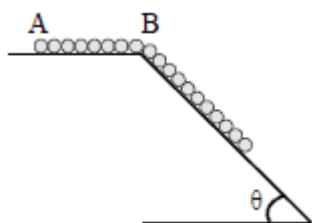
136.

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

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

140.

A chain of length L and mass m is placed upon a smooth surface. The length of BA is $(L-b)$. Calculate the velocity of the chain when its end reaches B .



1. $\sqrt{\frac{2g \sin \theta}{L}(L^2 - b^2)}$
2. $\sqrt{\frac{g \sin \theta}{2L}(L^2 - b^2)}$
3. $\sqrt{\frac{g \sin \theta}{L}(L^2 - b^2)}$
4. None of these

141.

The M.K.S units of the coefficient of viscosity is:

1. $\text{kg m}^{-1}\text{s}^{-1}$
2. kg ms^{-2}
3. $\text{kg m}^2\text{s}^{-1}$
4. $\text{kg}^{-1} \text{m}^{-1}\text{s}^2$

142.

The coordinates of the positions of particles of masses $m_1 = 7 \text{ gm}$, $m_2 = 4 \text{ gm}$, $m_3 = 10 \text{ gm}$ are $\vec{r}_1 = (\hat{i} + 5\hat{j} - 3\hat{k})$, $\vec{r}_2 = (2\hat{i} + 5\hat{j} + 7\hat{k})$, $\vec{r}_3 = (3\hat{i} + 3\hat{j} - \hat{k})$ respectively in cm. The position of the centre of mass of the system would be:

1. $(-\frac{15}{7}, \frac{85}{17}, \frac{1}{7}) \text{ cm}$
2. $(\frac{15}{7}, -\frac{85}{17}, \frac{1}{7}) \text{ cm}$
3. $(\frac{15}{7}, \frac{85}{21}, -\frac{1}{7}) \text{ cm}$
4. $(\frac{15}{7}, \frac{85}{21}, \frac{7}{3}) \text{ cm}$

143.

If the radius of a planet is R and its density is ρ , the escape velocity from its surface will be:

1. $v_e \propto \rho R$
2. $v_e \propto \sqrt{\rho} R$
3. $v_e \propto \frac{\sqrt{\rho}}{R}$
4. $v_e \propto \frac{1}{\sqrt{\rho} R}$

144.

In a sinusoidal wave, the time required for a particular point to move from maximum displacement to zero displacements is 0.170 seconds. The frequency of the wave is:

1. 1.47 Hz
2. 0.36 Hz
3. 0.73 Hz
4. 2.94 Hz

145.

A man is crossing a river flowing with a velocity of 5 m/s. He reaches a point directly across the river at a distance of 60 m in 5 s. His velocity in still water should be:

1. 12 m/s
2. 13 m/s
3. 5 m/s
4. 10 m/s

146.

1 kg of gas does 20 kJ of work and receives 16 kJ of heat when it is expanded between two states. The second kind of expansion can be found between the same initial and final states, which requires a heat input of 9 kJ. The work done by the gas in the second expansion is:

1. 32 kJ
2. 5 kJ
3. -4 kJ
4. 13 kJ

147.

The rms speed of oxygen atoms is v . If the temperature is halved and the oxygen atoms combine to form oxygen molecules, then the rms speed will be-

1. $\frac{v}{\sqrt{2}}$
2. $v\sqrt{2}$
3. $2v$
4. $\frac{v}{2}$

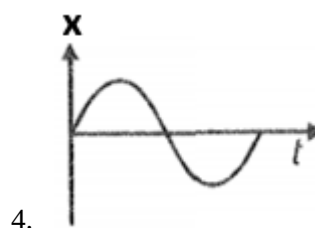
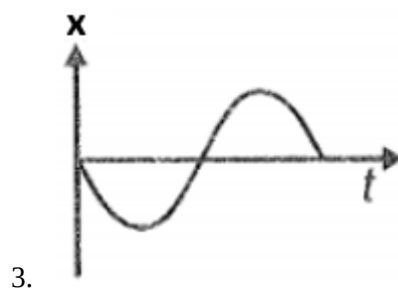
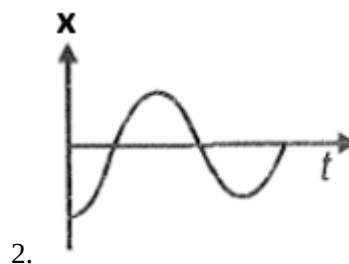
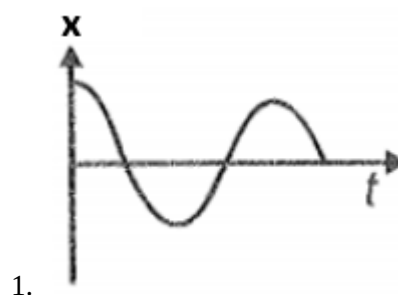
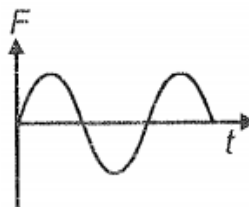
148.

Hot coffee in a mug cools from 90°C to 70°C in 4.8 minutes. The room temperature is 20°C . Applying Newton's law of cooling, the time needed to cool it further by 10°C should be nearly-

1. 4.2 minute
2. 3.8 minute
3. 3.2 minute
4. 2.4 minute

149.

Force on a particle F varies with time t as shown in the given graph. The displacement x vs time t graph corresponding to the force-time graph is:



150.

A body of mass 20 g is executing S.H.M with amplitude 5 cm. When it passes through equilibrium position its speed is 20 cm/s. Find the distance from equilibrium when its speed becomes 10 cm/s.

1. $\frac{5\sqrt{3}}{4}$ cm
2. $\frac{5\sqrt{3}}{2}$ cm
3. $\frac{25\sqrt{7}}{2}$ cm
4. $5\sqrt{3}$ cm

151.

The amplitude of a damped oscillator becomes one-third in 10 minutes and it becomes $\frac{1}{n}$ times of the original in 30 minutes. The value of n is:

1. 81
2. 3
3. 9
4. 27

152.

A man standing near a well is supporting a bucket full of water with the help of a massless rope. The mass of bucket and water together is 30 kg. The length of rope in the well is 5 m. The amount of work done in pulling the bucket up onto the top of the well is:

1. 1470 J
2. 1125 J
3. 1062.5 J
4. 562.5 J

153.

In the case of collision (one dimension or two dimensions):-

1. Momentum remains conserved and total energy not
2. Momentum and total energy both are conserved
3. Momentum is not conserved and total energy remains conserved
4. Momentum and total energy both are not conserved

154.

Car with a siren is moving towards a hill with a speed of 108 km/h. A person is standing at the foot of the hill. The frequency observed by a person is: (frequency of siren is 600 Hz, velocity of sound is 330 m/s)

1. 720 Hz
2. 660 Hz
3. 600 Hz
4. 630 Hz

155.

The transverse displacement of a string clamped at both ends is given by $y(x,t)=12(\text{cm}) \sin(6.28x)\cos(3.14 t)$, where x is in cm and t is in second then which of the following is not true?

1. Velocity of the component wave is 0.5 cm/s
2. Amplitude of one of the component wave is 6 cm
3. Distance between two consecutive nodes is 0.5 cm
4. $x= 0.25$ cm is the first node except the nodes at the ends

156.

Stationary waves can be obtained in the air column even if interfering waves are of different-

1. Amplitude
2. Wavelength
3. Velocity
4. Frequency

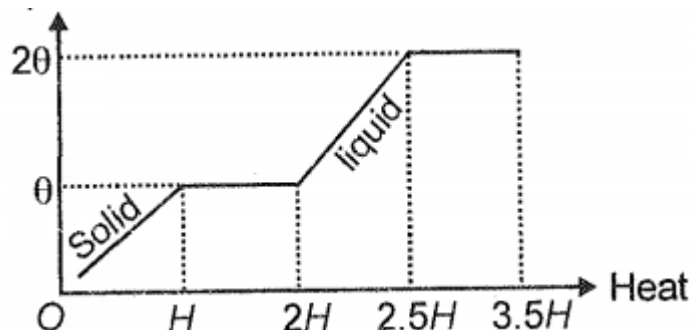
157.

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

158.

In the given heat and temperature graph of a substance, choose the correct statement-



1. Latent heat of fusion is more than latent heat of vapourisation
2. Latent heat of vapourisation is more than latent heat of fusion
3. Specific heat in solid state is more than the specific heat in liquid state
4. Specific heat in liquid state is more than the specific heat in solid-state

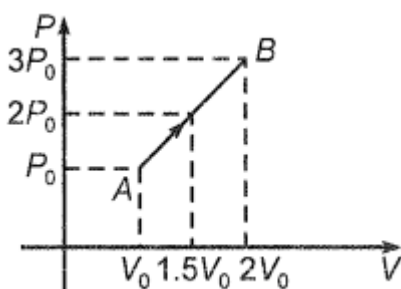
159.

The thermal conductivities of two identical rods are k and $2k$ respectively. If they are joined in parallel, then the ratio of heat flowing through them per second will be:

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

160.

The pressure in a diatomic gas increases from P_0 to $3P_0$, when its volume increases from V_0 to $2V_0$. The increase in internal energy is:



1. $6P_0V_0$
2. $8.5P_0V_0$
3. $12.5P_0V_0$
4. $14.5P_0V_0$

161.

A practical heat engine operates between the temperatures 27°C and 627°C . The efficiency of the engine maybe-

1. 75%
2. 70%
3. 68%
4. 50%

162.

Heat is supplied to a diatomic gas in an isochoric process. The ratio $\Delta Q : \Delta U$ is: (Symbols have usual meanings)

1. 5 : 3
2. 5 : 2
3. 1 : 1
4. 5 : 7

163.

A particle is dropped from a height $h = 3R$ above the earth's surface, where R is the radius of the earth. If g is the acceleration due to gravity on the earth surface, then the speed with which the particle strikes the earth surface is:

1. $\sqrt{3gR}$
2. $\sqrt{2gR}$
3. $\sqrt{1.5gR}$
4. \sqrt{gR}

164.

A refrigerator whose coefficient of performance is 5 extracts heat from the cooling chamber at a rate of 250 J per cycle. For refrigeration, work done required per cycle is:

1. 150 J
2. 200 J
3. 100 J
4. 50 J

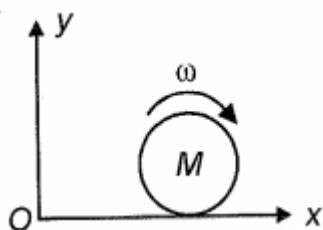
165.

The translational kinetic energy of n moles of a diatomic gas at absolute temperature T is given by-

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

166.

A solid sphere of mass M and radius R is in pure rolling with angular speed ω on a horizontal plane as shown. The magnitude of angular momentum of the sphere about origin O is:



1. $\frac{7}{5}MR^2\omega$
2. $\frac{3}{2}MR^2\omega$
3. $\frac{1}{2}MR^2\omega$
4. $\frac{2}{3}MR^2\omega$

167.

What is the moment of inertia of a solid sphere of mass m and radius R kept with its centre at $(2R, 0)$, about the y -axis?

1. $\frac{44}{7}mR^2$
2. $\frac{22}{5}mR^2$
3. $\frac{2}{5}mR^2$
4. $\frac{2}{3}mR^2$

168.

A ring and a solid cylinder both are allowed to roll down without slipping from a certain height on an incline simultaneously. If the time taken to reach the bottom by them are t_1 and t_2 respectively, then-

1. $t_1 < t_2$
2. $t_1 > t_2$
3. $t_1 = t_2$
4. Relation between t_1 and t_2 depends on their masses

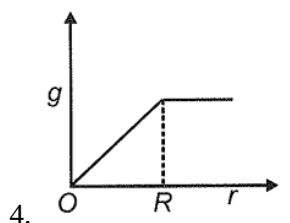
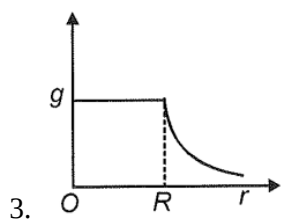
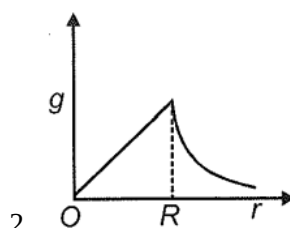
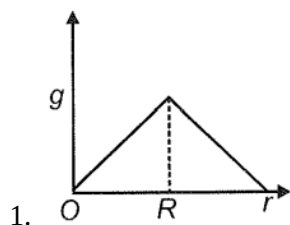
169.

The total kinetic energy of a solid sphere of mass 1 kg rolling with velocity 1 m/s is-

1. $\frac{2}{5}J$
2. $\frac{1}{2}J$
3. $\frac{7}{10}J$
4. $\frac{3}{5}J$

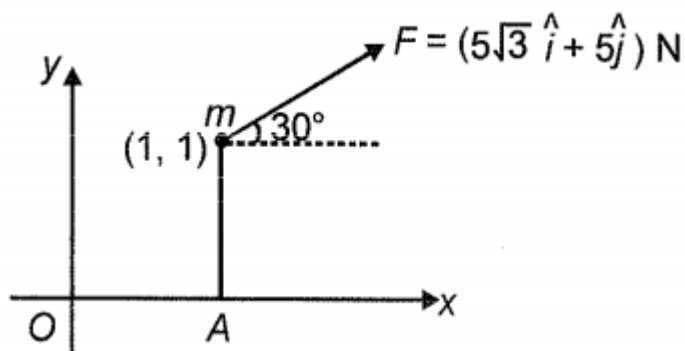
170.

Which of the following graphs correctly represents the variation of acceleration due to gravity g with distance r from the center of the earth? (where R is the radius of the earth)



171.

The torque of force F about origin O is-



1. $\vec{\tau} = 5(1 - \sqrt{3})\hat{k} \text{ Nm}$

2. $\vec{\tau} = 5(1 - \sqrt{3})\hat{j} \text{ Nm}$

3. $\vec{\tau} = 5(\sqrt{3} - 1)\hat{i} \text{ Nm}$

4. $\vec{\tau} = \sqrt{3}\hat{j} \text{ Nm}$

172.

A particle moves with a velocity $v = \alpha t^3$ along a straight line. The average speed in time interval $t=0$ to $t=T$ is-

1. αT^3

2. $\frac{\alpha T^3}{2}$

3. $\frac{\alpha T^3}{3}$

4. $\frac{\alpha T^3}{4}$

173.

A ball falling in the lake of depth 200 m experiences a decrease of 0.1% in its volume at the bottom. The bulk modulus of the material of the ball is: ($g = 9.8 \text{ m/s}^2$)

1. $19.6 \times 10^{-10} \text{ N/m}^2$

2. $19.6 \times 10^{10} \text{ N/m}^2$

3. $19.6 \times 10^{-8} \text{ N/m}^2$

4. $19.6 \times 10^8 \text{ N/m}^2$

174.

A metallic sphere with an internal cavity weighs 40 g wt in air and 20 g wt in water. If the density of the material with the cavity be 8 g/cm^3 , then the volume of the cavity is:

1. 0 cm^3
2. 5 cm^3
3. 20 cm^3
4. 15 cm^3

175.

The surface tension of a liquid is 10 N/m. If a thin film of liquid is developed in a ring of wire of radius 0.1 m, then surface energy of liquid film will be-

1. 0.314 J
2. 0.48 J
3. 0.56 J
4. 0.63 J

176.

The diameter of a syringe is 4 mm and the diameter of its nozzle (opening) is 1 mm. The syringe is placed on the table horizontally at a height of 1.25 m. If the piston is moved at a speed of 0.5 m/s, then considering the liquid in the syringe to be ideal, the horizontal range of liquid is-

($g = 10 \text{ m/s}^2$)

1. 4 m
2. 8 m
3. 0.4 m
4. 0.2 m

177.

Raindrops are falling with speed v vertically down and a man is running on a horizontal road with speed u . The magnitude of the velocity of the raindrops with respect to the man is:

1. $v - u$
2. $v + u$
3. $\sqrt{\frac{v^2 + u^2}{2}}$
4. $\sqrt{v^2 + u^2}$

178.

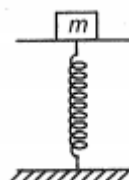
The equation of trajectory of a projectile is given by $y = x - 10x^2$. Its speed of projection is:

($g = 10 \text{ m/s}^2$)

1. 1 m/s
2. 2 m/s
3. 3 m/s
4. 4 m/s

179.

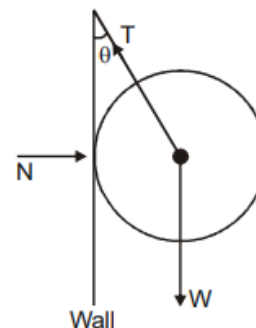
A mass of 1 kg is put on a pan and the spring is stretched from its equilibrium position by 10 cm. When the pan is released, the block just gets detached for a moment. What should be the minimum value of the spring constant for which this can happen? [Take $g = 10 \text{ ms}^{-2}$]



1. 10 N/m
2. 100 N/m
3. 1000 N/m
4. 1 N/m

180.

A metal sphere is hung by a string fixed to a wall. The forces acting on the sphere are shown in the figure. Which of the following statements is NOT correct?



1. $\vec{N} + \vec{T} + \vec{W} = 0$
2. $T^2 = N^2 + W^2$
3. $T = N + W$
4. $N = W \tan \theta$

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