

## High Yielding Test Series

### Part Test 6 - Half XIth



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1.

Which of the following is/are essential for imbibitions to take place?

I. Water potential gradient between the absorbent and the liquid imbibed

II. Affinity between the adsorbant and the liquid

1. Only II
2. Only I
3. Both I and II
4. None

2.

Consider the following statements and select the option that correctly fill in the blanks.

A. \_\_\_\_\_ is used to induce the dormancy of buds and storage organs.

B. \_\_\_\_\_ speed up the malting process in brewing industry.

C. Senescence is prevented by \_\_\_\_\_.

A	B	C
1. Gibberellin	Cytokinin	GAs
2. Ethylene	ABA	Cytokinin
3. Cytokinin	Auxins	ABA
4. ABA	GAs	Cytokinin

3.

Select the correct match w.r.t. mineral as activator/components of enzymes.

- |                          |          |
|--------------------------|----------|
| a. Nitrogenase           | (i) Zn   |
| b. PEPcase               | (ii) Fe  |
| c. Alcohol dehydrogenase | (iii) Mo |
| d. Catalase              | (iv) Mg  |

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

4.

Low intelligence quotient abnormal skin and deafmutism

is related to

1. Low secretion of growth hormone.
2. Hypothyroidism.
3. Hyperparathyroidism.
4. Hyposecretion of adrenal cortex hormone.

5.

During the process of respiration redox equivalents are removed

1. In form hydrogen atom.
2. In form of electron.
3. In form of H<sub>2</sub>O.
4. In form of ATP.

6.

Which of the following is not modified mucosal epithelium?

1. Goblet cells
2. Brunner's glands
3. Crypts of Lieberkuhn
4. Gastric glands

7.

The resting axonal membrane of a neuron:

1. is not polarized
2. has excess of anions on the outside
3. is more permeable to potassium ions than to sodium ions
4. cannot be excited by a stimulus

8.

The essential element which maintains the ribosome structure is

1. Responsible for carbohydrate translocation.
2. Needed during mitotic spindle formation.
3. Constituent of ring structure of chlorophyll.
4. Needed in the synthesis of auxin.

9.

Consider the characters of a respiratory control center in humans:

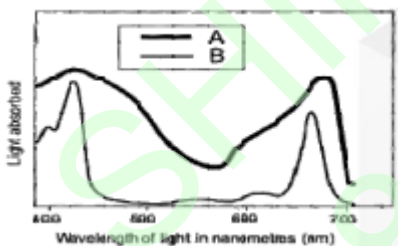
- I. It is located in pons  
 II. It moderates the functions of respiratory rhythm center  
 III. Its absence results in an increase in depth of respiration

The respiratory control center is:

1. Pneumotaxic center
  2. Apneustic center
  3. Chemosensitive zone
  4. Dorsal group
10.  
 Consider the characters of a particular type of joint:  
 I. It is a type of synovial joint  
 II. It enables the bone to move in a 360° angle.  
 III. It is exemplified by joint between humerus and pectoral girdle

What is this type of joint called?

1. Hinge
  2. Ball and socket
  3. Pivot
  4. Saddle
11.  
 In the given graph what does A, B represent?



1. A - Absorption spectrum; B - Action spectrum (Chl. a).
  2. A - Action spectrum; B - Absorption spectrum (carotenoids).
  3. A - Absorption spectrum; B - Action spectrum (Ch. b).
  4. A - Action spectrum; B - Absorption spectrum (Ch.a).
- 12.

An acromian process is characteristically found in the -

1. Skull of frog
2. Sperm of mammals
3. Pelvic girdle of mammals

4. Pectoral girdle of mammals

13.

According to mass flow hypothesis

(a) Sucrose is moved into the companion cells and then into the sieve tube by passive transport.

(b) Inside the phloem, an osmotic pressure gradient is generated that facilitates the mass movement in the phloem.

(c) Water in the adjacent xylem moves into the phloem by active process.

1. (a) and (c) are correct.
2. (b) and (c) are incorrect.
3. (a) and (c) are incorrect.
4. (a) and (b) are correct.

14.

Enzymes and electron carriers for the formation of cellular energy are present in the mitochondria at

1. Outer membrane only.
2. Inner membrane only.
3. Both outer and inner membrane.
4. Mitochondrial matrix only.

15.

The "sodium-potassium pump" pumps \_\_\_\_\_.

1. sodium ions out and potassium ions in
2. sodium ions in and potassium ions out
3. sodium and potassium ions in
4. sodium and potassium ions out

16.

Mark the correct statement

1. Electrical synapses are more common in our neural system than chemical synapses
2. The new potential in post synaptic neuron may be either excitatory or inhibitory
3. Hypothalamus is the major coordination centre for sensory and motor signaling
4. The tracts of nerve fibres that connect two cerebral hemispheres are called corpora quadrigemina.

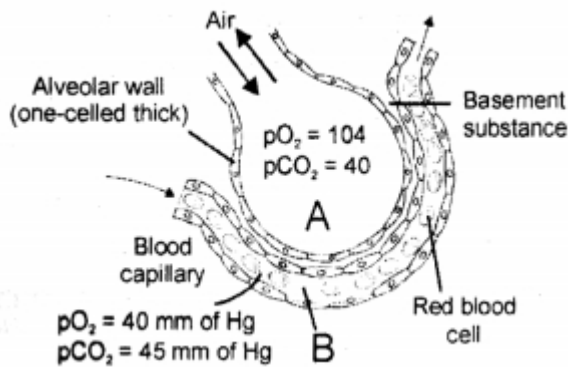
17.

Pyruvic acid + CoA + NaD<sup>+</sup>  $\xrightarrow{A}$  B + CO<sub>2</sub> + NADH<sup>+</sup> + H<sup>+</sup>  
 in the above given reaction of respiration what can be placed at the place of A and B respectively?

1. Iron and Citric acid.
2. Magnesium and Citric acid.
3. Dehydrogenase and Acetyl CoA.
4. Iron and Acetyl CoA

18.

- A. \_\_\_\_\_ hormone is most widely used PGR in agriculture.
- B. \_\_\_\_\_ hormone is related with Richmond Lang effect.
- |             |    |
|-------------|----|
| A           | B  |
| 1. Auxin    | CK |
| 2. Auxin    | GA |
| 3. Ethylene | CK |
| 4. ABA      | CK |
19.  
Congestive heart failure is often linked to
1. Congestion of lungs which commonly occur in asthmatics and smokers.
  2. Damage of heart muscles by an inadequate blood supply.
  3. Deposition of calcium, fat, cholesterol and fibrous tissues in the coronary arteries.
  4. Blockage of AVN.
20.  
The choroid layer is thin over the posterior two-thirds of the eye ball, but it becomes thick in the anterior part to form the
1. Iris
  2. Ciliary body
  3. Pupil
  4. Suspensory ligament
21.  
Which one is correct regarding electrocardiograph?
1. P-wave represents the electrical excitation of the ventricle
  2. QRS complex represent repolarization of the ventricles
  3. T-wave represents repolarization of the atria
  4. By counting the number of QRS complexes one can determine the pulse rate
22.  
Diabetes insipidus is due to
1. Hyposecretion of vasopressin (ADH)
  2. Hypersecretion of insulin
  3. Hypersecretion of vasopressin (ADH)
  4. None
23.  
The contractile protein of skeletal muscle involving ATPase activity is
1. Tropomyosin
  2. Myosin
  3. or-Actinin
  4. Toponin
24.  
If Henle's loop were absent from man nephron, which of the following is to be expected?
1. The urine will be more dilute
  2. The urine will be more concentrated
  3. There will be thardly any change in the quality and quantity of urine formed
  4. There will be no urine formation
25.  
Osmotic pressure of a solution is
1. more than that of pure solvent
  2. less than that of pure solvent
  3. variable depending upon concentration
  4. equal to that of pure solvent
26.  
Which of the following structures or regions is incorrectly paired with its function?
1. limbic system—screening of information between the spinal cord and the brain; regulates arousal and sleep
  2. medulla oblongata—homeostatic control center
  3. cerebellum—unconscious coordination of movement and balance
  4. corpus callosum—band of fibers connecting left and right cerebral hemispheres
27.  
Given below a diagram of a section of an alveolus with a pulmonary capillary  
Which of the following is a correct statement for diffusion of gases?



1. Diffusion of O<sub>2</sub> and CO<sub>2</sub> from A to B or B to A takes place with the same rate.

2. O<sub>2</sub> will diffuse faster from A to B than CO<sub>2</sub> from B to A

3. Only O<sub>2</sub> will diffuse from A to B not CO<sub>2</sub> from B to A

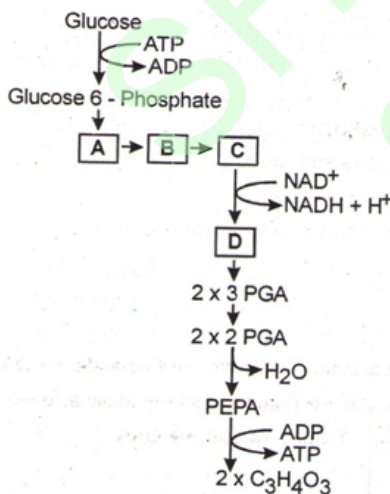
4. Only CO<sub>2</sub> will diffuse from B to A, not O<sub>2</sub> from A to B

28.

Nissl's granules are present in which part of a neuron?

1. Cyton
2. Synaptic knobs
3. Axon
4. Nerve endings

29.



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

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

30.

Common bile duct open into

1. Gall bladder.
2. Jejunum.
3. Hepato-pancreatic duct.
4. Stomach.

31.

In ECG the ventricular contraction occurs

1. Just after P wave and before Q wave.
2. Just after Q wave but before T wave.
3. In between S-T segment.
4. After the end of T wave

32.

Why breakdown of proton gradient is essential during photosynthesis

1. It leads to production of NADPH.
2. It leads to production of O<sub>2</sub>
3. It leads to production of ATP.
4. Both 1 and 3

33.

During aerobic respiration hydrogen from the system is removed by?

1. O<sub>2</sub>
2. NADP
3. FMN
4. UQ

34.

During 'Erythroblastosis fetalis' there is

1. Foetal stem cells fails to form RBC.
2. RBC fails to transport O<sub>2</sub> to foetal tissues.
3. Agglutination and phagocytosis of RBC.

4. RBC fails to develop Rh antigen on its surface

35.

Urinary excretion is equivalent to

GF = Glomerular filtration.

TR = Tubular reabsorption.

TS = Tubular secretion.

1.  $GF + TR + TS$
2.  $GF - (TR + TS)$
3.  $GF - TR + TS$
4.  $GF - TS + TR$

36.

Which of the following set of hormones can easily pass through the cell membrane of a target cell and bind to specific intracellular receptors ?

- a. Placental progesterone
- b. Aldosterone
- c. Estrogen
- d. Thyroxine

Mark the correct set

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

37.

Mark the incorrect statement regarding the transport of gas.

1. About 97% of  $O_2$  is transported by RBC.
2. Nearly 20-25% of  $CO_2$  is transported by RBC.
3. Every 100 ml of deoxygenated blood deliver 4 ml of  $CO_2$  to the alveoli.
4. Every 100 ml of oxygenated blood deliver 20 ml of  $O_2$  to the body tissues

38.

Scala vestibuli and scala tympani are linked with middle ear at

1. Oval window and round window, respectively
2. Round window and oval window, respectively
3. Oval window
4. Round window

39.

A peptide hormone which causes dilation of blood vessels and decreases blood pressure is

1. Aldosterone
2. Adrenaline
3. Vasopressin
4. Atrial Natriuretic factor

40.

The respiratory centre in the brain is stimulated by

1.  $CO_2$  concentration in venous blood
2.  $O_2$  concentration in arterial blood
3.  $CO_2$  concentration in arterial blood
4.  $O_2$  concentration in venous blood

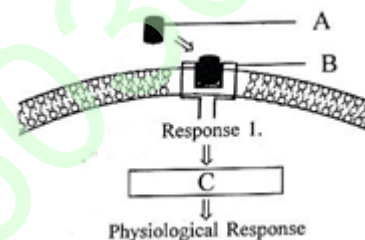
41.

In photorespiration ( $C_2$  cycle)

1. Glycolate is oxidised in mitochondria
2.  $CO_2$  is released in peroxisome
3. Expenditure of ATP occurs
4. Light is utilised by all three organelles involved

42.

Identify A, B and C in the diagrammatic representation of the mechanism of hormone action.



Select the correct option from the following:

1. A = Steroid Hormone; B = Hormone receptor Complex; C = Protein
2. A = Protein Hormone; B = Receptor; C = Cyclic AMP
3. A = Steroid Hormone; B = Receptor; C = Second Messenger
4. A = Protein Hormone; B = Cyclic AMP; C = Hormone-receptor Complex

43.

Which of the following statements is not correct?

1. An action potential in an axon does not move backward because the segment behind is in a refractory phase.
2. Depolarization of hair cells of cochlea results in the opening of the mechanically gated Potassium- ion channels.

3. Rods are very sensitive and contribute to daylight vision.
4. In the knee-jerk reflex, stimulus is the stretching of muscle and response is its contraction.
44. Which part of the human ear plays no role in hearing as such but is otherwise very much required?
1. Eustachian tube
  2. Organ of Corti
  3. Vestibular apparatus
  4. Ear ossicles
45. In ETS, complex V is
1. ATP synthase
  2. NADH dehydrogenase
  3. Cytochrome c oxidase
  4. Cytochrome bc<sub>1</sub> complex
46. Which of the following is the incorrectly matched set of the organisms and type of their excretory waste?
- | Organisms   | Excretory waste |
|---|-----------------|
| 1. Bony fishes, aquatic amphilians, aquatic insects | Ammonia         |
| 2. Terrestrial amphibians cartilaginous fishes      | Urea            |
| 3. Land snails                                      | Urea            |
| 4. Reptiles, birds and insects                      | Uric acid       |
47. Match the Source gland with its respective hormone and function and select the correct option.
- | Source gland           | Hormone     | Function  |
|------------------------|-------------|---|
| 1. Anterior pituitary  | Oxytocin    | Contraction of uterus muscles during child birth                      |
| 2. Posterior pituitary | Vasopressin | Stimulates reabsorption of water in the distil tubules in the nephron |
3. Corpus luteum      Estrogen      Supports Pregnancy
4. Thyroid      Thyroxine      Regulates blood calcium level
48. Which one plant factor affect the photosynthesis process?
1. CO<sub>2</sub> Concentration
  2. Light
  3. Availability of water in the soil
  4. Amount of chlorophyll
49. Phloem sap is mainly:-
1. Water and osmotically inactive disaccharides only
  2. Water and PGRs only
  3. Water and osmotically active disaccharides
  4. Minerals and PGRs only
50. When both ovaries of human females removed then which hormone will decrease in blood?
1. Oxytocin
  2. Estrogen
  3. Prolactin
  4. Gonadotropin hormone
51. Principal organ for the absorption of nutrients is
1. Buccal cavity
  2. Stomach
  3. Small intestine
  4. Large intestine
52. Why the partial pressure of CO<sub>2</sub> is high at tissue-site?

1. Due to the saturation of  $O_2$  with Hb
2. Release of  $H^+$  at the tissue site
3. Due to metabolism
4. Due to the dissociation of  $HbO_2$
53.  
Presence of Ketone bodies in urine are indicative of
1. ARDS
  2. Acute Renal failure
  3. Diabetes Mellitus
  4. Snakebite
54.  
In the rest state, a subunit of Troponin masks
1. Active binding sites for actin on the myosin filaments
  2. Active binding sites for myosin on the myosin filaments
  3. Active binding sites for myosin on the actin filaments
  4. Active binding sites for actin on the actin filaments
55.  
A small region on the retina of the eye which contains only cones is called
1. Area centralis
  2. Fovea centralis
  3. Blindspot
  4. Ora Serrata
56.  
How many tropic hormones are secreted by pars distalis
1. Five
  2. Six
  3. Eight
  4. Ten
57.  
How many are associated with apoplastic movement of water?
1. Through cell wall
  2. Through intercellular space
  3. Through plasmodesmata
  - d. Through xylem
1. a, b, & d
  2. b, c & d
  3. a, c & d
  4. a, b & c
58.  
Read following statements and answer in suitable term given in option:-
- a. The promotion of flowering by a period of low temperature
  - b. Hormonal substance migrates from leaves to shoot for inducing flowering
  - c. The general metabolic activity of the embryo slow down or in inactive state
  - d. Formation of separation layer between tissue
1. Photoperiodism, vernalisation, abscission layer, dormancy
  2. Vernalisation, photoperiodism, dormancy, abscission layer
  3. Dormancy, photoperiodism, vernalisation, abscission layer
  4. Abscission layer, vernalisation, dormancy, photoperiodism
59.  
Match the Column-I and Column-II and select the correct option?
- | Column I              | Column II                             |
|-----------------------|---------------------------------------|
| a. Tetany             | i) Paralysis of skeletal muscle       |
| b. Muscular dystrophy | ii) Inflammation of joints            |
| c. Arthritis          | iii) Degeneration of skeletal muscles |
| d. Myasthenia gravis  | iv) Rapid spasm in muscle             |
1. b-i, a-ii, c-iii, d-iv
  2. a-iv, b-iii, c-ii, d-i
  3. d-iii, b-ii, c-i, a-iv
  4. a-iv, c-ii, b-i, d-iii



60. At low light condition, which of the following plants respond to high  $CO_2$  conditions ?
1. Only  $C_3$  plants
  2. Only  $C_4$  plants
  3. Neither  $C_3$  nor  $C_4$  plants
  4. Both  $C_3$  and  $C_4$  plants
61. According to essentiality criteria, how many elements are absolutely essential for plant growth :
1. 15
  2. 17
  3. 19
  4. 25
62. Read the following statement & select the correct sequence of steps during symbiotic nitrogen fixation?
- (a) interaction between Rhizobium & leguminous plant
  - (b) Root nodule formation
  - (c) Formation of ammonia
  - (d) leghaemoglobin
  - (e) Amino acid synthesis
1. a → b → c → e
  2. b → a → d → e
  3. a → b → c → d → e
  4. a → b → d → e → c
63. Cells of Human body exhibit which type of movement :-
1. Amoeboid
  2. Muscular
  3. Ciliary
  4. All of the above
64. Adult human has :-
1. Diphyodont and homodont dentition
  2. Thecodont homodont dentition
  3. Thecodont and monophyodont dentition
  4. Diphyodont and heterodont dentition
65. Every 2000 mL of deoxygenated blood delivers approximately, how much mL  $CO_2$  to alveoli?
1. 4 mL
  2. 4.2 mL
  3. 8 mL
  4. 80 mL
66. Which system of blood vessels is present in our body exclusively for the circulation of blood to and from the cardiac musculature?
1. Portal system
  2. Shunting
  3. Coronary system
  4. Double circulation
67. Increasing osmolarity towards the inner medullary interstitium is mainly caused by :-
1. NaCl and uric acid
  2. DCT and collecting duct
  3. PCT and vasa recta
  4. NaCl and urea
68. Consider the following four statements (a-d) and select the option which includes all the correct ones only :-
- a. Faecal accumulation in the rectum initiates a neural reflex causing an urge for its removal.
  - b. Reflex action for vomiting is controlled by medulla.
  - c. Irregular bowel movements cause constipation.
  - d. Vomiting is the ejection of stomach contents through anus.
1. Statements (b), (c) and (d)
  2. Statements (a), (b) and (d)
  3. Statements (c), (d)

4. Statements (a), (b) and (c) 2. (2)

69. 3. (3)

By the contraction in radial muscle of diaphragm it become flattened in shape, so, volume of thoracic cavity increases in :- 4. (4)

1. Anterior-posterior axis
2. Dorsal-ventral axis
3. Anterior-lateral axis
4. Dorsal-lateral axis

72.

Brain stem consists except one :-

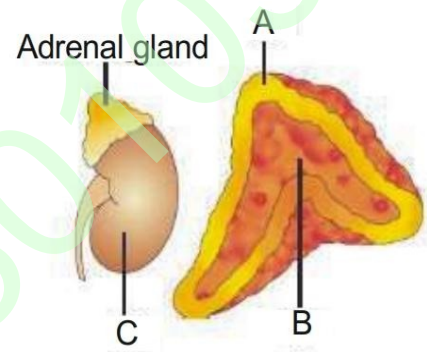
1. Pons
2. Medulla
3. Midbrain
4. Cerebellum & Cerebrum

70. 73.

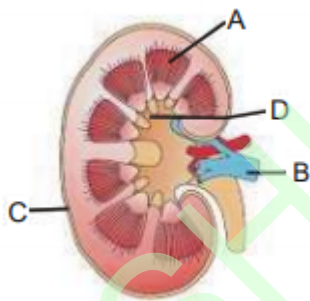
In which compounds does sucrose is broken by Enzyme Invertase?

1. Glucose and galactose
2. Galactose and Fructose
3. Manose and glucose
4. Glucose and Fructose

Sugar metabolisms, sex corticoids, salt retaining & stress management hormones releases from :-



71.



A	B	C	D
(1) Medullary pyramid	Renal Artery	Renal capsule	Papilla

(2) Cortex	Renal vein	Glisson's capsule	Calyx
------------	------------	-------------------	-------

(3) Medullary pyramid	Renal Artery	Glisson's capsule	Calyx
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(4) Medullary pyramid	Renal vein	Renal capsule	Calyx
-----------------------	------------	---------------	-------

1. Only A
2. Only B
3. A & B
4. A, B & C

74.

Function of eustachian tube is :-

1. Transfer of sound wave towards internal ear
2. Gives nutrition to ear ossicle
3. Equalising the pressure on either side of tympanum
4. Hearing

75.

PS II is not found involved in

1. Non-cyclic photophosphorylation
2. Cyclic photophosphorylation
3. Photolysis of H<sub>2</sub>O

1. (1)

4. Formation of NADPH
76. A cell is placed in an isotonic solution, the cell will remain
1. Remain unchanged
  2. Plasmolysed
  3. Become Turgid
  4. Deplasmolysed
77. Match the following columns and select the correct option.
- |                                   | Hormone Name | Source organ | Function        |   |
|-----------------------------------|--------------|--------------|-----------------|---|
| A. IAA i. Herring sperm DNA       | 1.           | Gastrin      | Stomach         | Stimulates gastric secretion              |
| B. ABA ii. Bolting                | 2.           | GIP          | Duodenum        | Inhibits gastric secretion                |
| C. Ethylene iii. Stomatal closure | 3.           | Secretin     | Duodenum        | Stimulates gastric secretion and motility |
| D. GA iv. Weed-free lawns         | 4.           | CCK-PZ       | Duodenum mainly | Stimulates secretion of Pancreatic juice  |
- E. Cytokinin v. Ripening of fruits
1. A-iv, B-iii, C-v, D-ii, E-i
  2. A-v, B-iii, C-iv, D-ii, E-i
  3. A-iv, B-i, C-v, D-iii, E-ii
  4. A-v, B-iii, C-ii, D-i, E-iv
78. Arrange the following events involved in muscular contraction
- (i) Action potential enters muscle fibre through T-tubules
  - (ii)  $Ca^{2+}$  binds with troponin-C
  - (iii) Actomyosin cross bridge formation
  - (iv) Sliding of thin myofilament along the thick myofilament
  - (v) Exposure of active sites on actin filaments
  - (vi) Release of  $Ca^{2+}$  from sarcoplasmic reticulum
1. (i) → (ii) → (iii) → (iv) → (v) → (vi)
  2. (vi) → (v) → (iv) → (iii) → (ii) → (i)
  3. (i) → (ii) → (vi) → (v) → (iii) → (iv)
  4. (i) → (vi) → (ii) → (v) → (iii) → (iv)
79. The maximum volume of air a person can breathe in after a forced expiration is
1. TV + IRV
  2. TV + ERV
  3. ERV + TV + IRV
  4. ERV + RV
80. Select the incorrect statement.
1. Carotenoids protect the plant from excessive heat and prevent photo-oxidation of chlorophyll pigments
  2. All pigments other than chlorophyll are called accessory pigments
  3. The electrons removed from PS II are never replaced
  4. Cyclic photophosphorylation occurs mostly in stroma lamellae membrane
81. Which statement is not correct for Krebs' cycle
1. Krebs' cycle occurs in mitochondrial matrix
  2. Pyruvic acid condense with OAA to form citric acid
  3. 3  $NADH_2$  and 1  $FADH_2$  are produced during one Krebs' cycle
  4. Succinate dehydrogenase is found attached to inner

mitochondrial membrane

83.

Which of the following plant growth regulators is derived from adenine but does not occur naturally in plants.

1. NAA
2. Zeatin
3. Kinetin
4. 2, 4-D

84.

Match Column-I with Column-II

Column I

Column II

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

Choose the correct option

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

85.

Red muscle fibres differs from white muscle fibres in having

1. More sarcoplasmic reticulum
2. Less myoglobin content
3. More number of mitochondria
4. High lactic acid due to anaerobic oxidation

86.

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

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

87.

Insulin causes A and stimulates B.

Choose the option that correctly fills A and B.

A B

1. Hypoglycemia Gluconeogenesis
2. Hyperglycemia Glycogenesis
3. Hyperglycemia Gluconeogenesis
4. Hypoglycemia Glycogenesis

88.

*Nitrococcus* is

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

89.

How many of the following elements are considered to be micronutrients for plants?

Iron, Phosphorus, Sulphur, Magnesium, Copper, Boron, Zinc, Chlorine.

1. Four
2. Three
3. Six
4. Five

90.

When (i) are used in respiration the RQ is (ii). Select the correct option for (i) and (ii) that make the sentence a correct sense.

1. (i) Carbohydrates, (ii)  $> 1$
2. (i) Proteins, (ii)  $> 1$
3. (i) Fats, (ii)  $< 1$
4. (i) Malic acid, (ii)  $< 1$

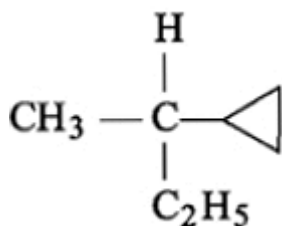
91.

The optically active alkane with lowest molar mass is:

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

2.  $\text{CH}_3\text{CH}_2 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_3$

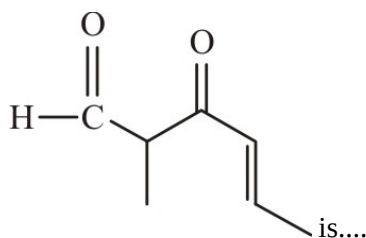
3.



4. CH<sub>3</sub>CH<sub>2</sub>·CH<sub>2</sub>CH<sub>3</sub>

92.

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

93.

Hydrogen exists in the atomic state in these compounds –

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

94.

In the Solvay process of manufacture of sodium carbonate, the raw materials used are :

1. Aqueous NaOH, NH<sub>3</sub> and CO<sub>2</sub>
2. Molten NaOH, NH<sub>3</sub> and CO
3. Brine NaCl, NH<sub>3</sub> and CO
4. Brine NaCl, NH<sub>3</sub> and CO<sub>2</sub>

95.

Alkali metal ions are-

1. Diamagnetic and colored

2. Diamagnetic and colorless

3. Paramagnetic and colored

4. Paramagnetic and colorless

96.

Insoluble compound in acetic acid is-

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

97.

The no. of isomeric sodium salt that will be required to obtain neopentane.

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

98.

Which one is the correct order of acidity?

1. CH<sub>3</sub>-C≡CH > CH<sub>3</sub>-C≡CH > CH<sub>2</sub>=CH<sub>2</sub> > CH<sub>3</sub>-CH<sub>3</sub>
2. CH<sub>3</sub>-C≡CH > CH<sub>2</sub>=CH<sub>2</sub> > CH<sub>3</sub>-C≡CH > CH<sub>3</sub>-CH<sub>3</sub>
3. CH<sub>3</sub>-CH<sub>3</sub> > CH<sub>2</sub>=CH<sub>2</sub> > CH<sub>3</sub>-C≡CH > CH<sub>3</sub>-C≡CH
4. CH<sub>2</sub>=CH<sub>2</sub> > CH<sub>3</sub>-CH<sub>3</sub> > CH<sub>3</sub>-C≡CH > CH<sub>3</sub>-C≡CH

99.

The most suitable method of separation of 1:1 mixture of ortho and para-nitrophenols is:

1. Chromatography
2. Crystallization
3. Steam distillation
4. Sublimation

100.

The correct statement regarding electrophile is

1. Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from another electrophile

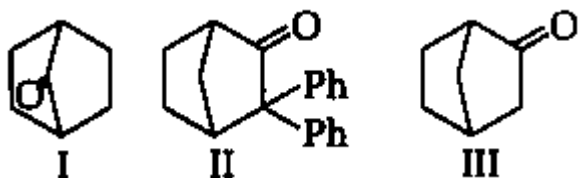
2. Electrophiles are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile

3. Electrophile can be either neutral or positively charged species and can form a bond accepting a pair of electrons from a nucleophile

4. Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from a nucleophile

101.

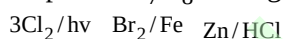
Which among the given molecules can exhibit tautomerism?



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

102.

The compound  $C_7H_8$  undergoes the following reactions :



The product 'C' is

1. m-bromotoluene
2. o-bromotoluene
3. 3-bromo-2,4,6-trichlorotoluene
4. p-bromotoluene

103.

Consider the nitration of benzene using mixed conc.  $H_2SO_4$  and  $HNO_3$ . If a large amount of  $KHSO_4$  is added to the mixture, the rate of nitration will be

1. slower
2. unchanged
3. doubled
4. faster

104.

Two possible stereo-structures of  $CH_3CHOH.COOH$ , which are optically active, are called

1. Diastereomers
2. Atropisomers

3. Enantiomers

4. Mesomers

105.

Which one of the following is not a common component of Photochemical Smog?

1. Ozone
2. Acrolein
3. Peroxyacetyl nitrate
4. Chlorofluorocarbons

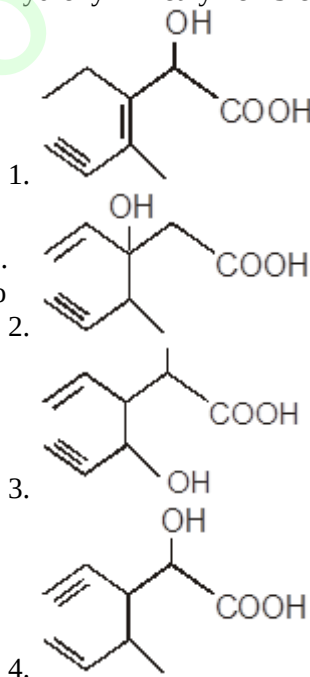
106.

In Kjeldahl's method for estimation of nitrogen present in the soil sample, ammonia evolved from 0.75g of sample neutralized 10ml. of 1M  $H_2SO_4$ . The percentage of nitrogen in the soil is:

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

107.

Structure of the compound whose IUPAC name is 3-Ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid is :



108.

The correct order of increasing bond length of C-H, C-O, C-C and C=C is

1.  $C - C < C = C < C - O < C - H$
2.  $C - O < C - H < C - C < C = C$
3.  $C - H < C - O < C - C < C = C$
4.  $C - H < C = C < C - O < C - C$

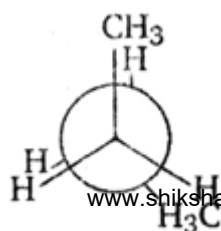
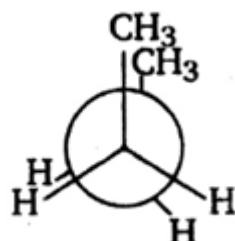
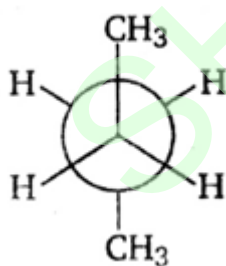
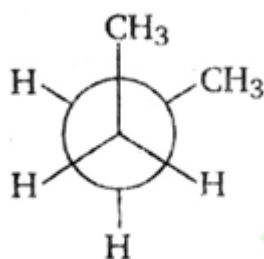
109.

The Lassaigne's extract is boiled with conc  $HNO_3$  while testing for halogens. Because ..

1. help in the precipitation of  $AgCl$
2. increases the solubility product of  $AgCl$
3. increase the concentration of  $NO_3^-$  ions
4. decomposes  $Na_2S$  and  $NaCN$ , if formed

110.

In the following the most stable conformation of n-butane is



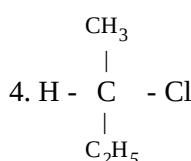
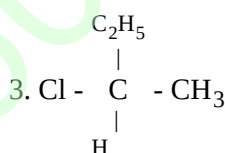
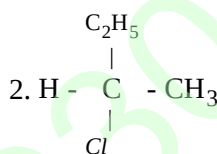
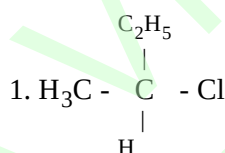
111.

Green chemistry means such reactions which

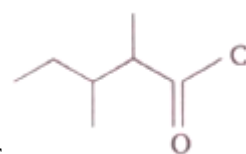
1. produce colour during reactions
2. reduce the use and production of hazardous chemicals
3. are related to the depletion of ozone layer
4. study the reactions in plants

112.

$CH_3-CHCl-CH_2-CH_3$  has a chiral center. Which one of the following represents its *R* configuration?



113.



The IUPAC name of \_\_\_\_\_ is :

1. 3, 4-dimethylpentanoyl chloride
2. 1-chloro-1-oxo-2,2-dimethylpentane
3. 2-ethyl-3-methylbutanoyl chloride

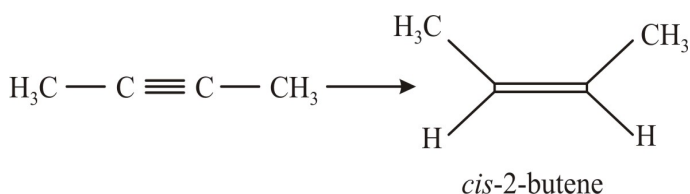
4. 2, 3-dimethylpentanoyl chloride

3.  $H_2O_2$

114.

4.  $O_3$

The most suitable reagent for the following conversion, is:



1.  $Hg^{2+}/H^+$ ,  $H_2O$

2. Na/liquid  $NH_3$

3.  $H_2$ , Pd/C, quinoline

4. Zn/HCl

115.

The most harmful air pollutant produced by automobiles is

1.  $HNO_2$

2. NO

3.  $SO_2$

4. CO

116.

$SO_2$  pollution is indicated by

1. Grasses

2. Mosses

3. Lichens

4. Fossils

117.

Soil erosion can be prevented by

1. Overgrazing

2. Removal of vegetation

3. Afforestation (Plantation)

4. Increasing bird population

118.

For the bleaching of hair, the substance used is:

1.  $SO_2$

2. bleaching powder

119.

Para- hydrogen at room temp is:

1. less stable than ortho- hydrogen

2. more stable than ortho- hydrogen

3. as stable as ortho- hydrogen

4. none of these

120.

In which of the following reactions  $H_2O_2$  acts as a reducing agent?

a.  $H_2O_2 + 2H^+ + 2e^- \rightarrow 2H_2O$

b.  $H_2O_2 - 2e^- \rightarrow O_2 + 2H^+$

c.  $H_2O_2 + 2e^- \rightarrow 2OH^-$

d.  $H_2O_2 + 2OH^- - 2e^- \rightarrow O_2 + 2H_2O$

1. a, b

2. c, d

3. a, c

4. b, d

121.

Hydrogen peroxide in its reaction with  $KIO_4$  and  $NH_2OH$  respectively is acting as a

1. reducing agent, oxidising agent

2. reducing agent, reducing agent

3. oxidising agent, oxidising agent

4. oxidising agent, reducing agent

122.

When  $SnCl_2$  reacts with  $HgCl_2$ , the product formed are:

1.  $Sn + HgCl_4$

2.  $Sn + Cl_2 + Hg_2Cl_2$

3.  $SnCl_4$  and  $Hg_2Cl_2$

4. None of these

123.



Which of the following is amphoteric?

1.  $\text{CO}_2$
2.  $\text{PbO}_2$
3.  $\text{SiO}_2$
4.  $\text{SeO}_2$

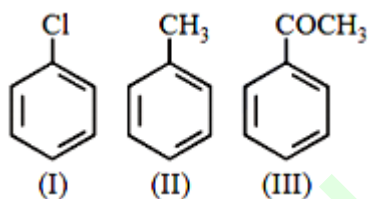
124.

Litharge is not commonly used in:

1. manufacture of special glasses
2. glazing pottery
3. preparing paints
4. lead storage battery

125.

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.  $\text{I} < \text{III} < \text{I}$

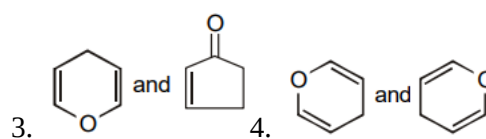
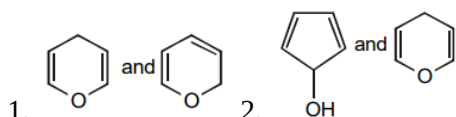
126.

The liquefied gas that is used in dry cleaning along with a suitable detergent is-

1. Water gas
2. Petroleum gas
3.  $\text{NO}_2$
4.  $\text{CO}_2$

127.

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



128.

(+)-mandelic acid has a specific rotation of  $+158^\circ$ . What would be the observed specific rotation of a mixture containing 25% (-)-mandelic acid and 75% (+)-mandelic acid?

1.  $+79^\circ$
2.  $-118.5^\circ$
3.  $-79^\circ$
4.  $+118.5^\circ$

129.

The total number of optically active isomers for  $\text{CH}_2\text{OH}(\text{CHOH})_3\text{CHO}$  are

1. 16
2. 8
3. 4
4. 2

130.

The compound with an isopropyl group is

1. 2, 2, 3, 3-tetramethylpentane
2. 2, 2-dimethylpentane
3. 2, 2, 3-trimethylpentane
4. 2-methylpentane

131.

Which of the following compounds will show geometrical isomerism?

1. 2-butene
2. Propene
3. 1-phenylpropene
4. 2-methylbut-2-ene

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

132.

How many optically active stereoisomers are possible for butan-2-, 3-diol?

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

133.

Arrange the following groups in order of decreasing - I (inductive) effects:

$\text{NO}_2$ ,  $\text{C}(\text{CH}_3)_3$ ,  $\text{CH}_3$ ,  $\text{OCH}_3$ ,  $\text{Br}$

1.  $\text{NO}_2 > \text{Br} > \text{OCH}_3 > \text{C}(\text{CH}_3)_3 > \text{CH}_3$
2.  $\text{NO}_2 > \text{Br} > \text{OCH}_3 > \text{CH}_3 > \text{C}(\text{CH}_3)_3$
3.  $\text{NO}_2 > \text{OCH}_3 > \text{Br} > \text{C}(\text{CH}_3)_3 > \text{CH}_3$
4.  $\text{NO}_2 > \text{OCH}_3 > \text{C}(\text{CH}_3)_3 > \text{Br} > \text{CH}_3$

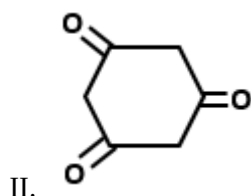
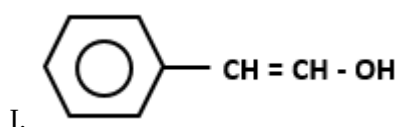
134.

The product(s) obtained via oxymercuration ( $\text{HgSO}_4 + \text{H}_2\text{SO}_4$ ) of but-1-yne would give

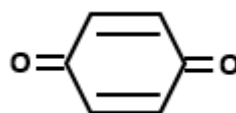
1.  $\text{CH}_3\text{CH}_2 - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3$
2.  $\text{CH}_3\text{CH}_2\text{CH}_2 - \text{CHO}$
3.  $\text{CH}_3\text{CH}_2\text{CHO} + \text{HCHO}$
4.  $\text{CH}_3\text{CH}_2\text{COOH} + \text{HCOOH}$

135.

Tautomerism is exhibited by



III.



IV.

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

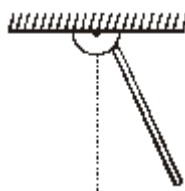
136.

A block of mass 4 kg hangs from a spring of spring constant  $k = 400 \text{ N/m}$ . The block is pulled down through 15 cm below the equilibrium position and released. What is its kinetic energy when the block is 10 cm below the equilibrium position? [Ignore gravity]

1. 5 J
2. 2.5 J
3. 1 J
4. 1.9 J

137.

A metre stick is swinging in vertical plane about a horizontal axis passing through its one end, undergoes small oscillation of frequency  $f_0$ . If the bottom half of the stick were cut off, then its new frequency of small oscillation would become -



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

138.

A traveling wave in a stretched string is described by

the equation  $y = A \sin(kx - \omega t)$ . The maximum particle velocity is-

1.  $A\omega$
2.  $\omega/k$
3.  $d\omega/dk$
4.  $x/t$

139.

The ratio of the speed of sound in nitrogen gas to that in helium gas, at 300 K is -

1.  $\sqrt{\frac{2}{7}}$
2.  $\sqrt{\frac{1}{7}}$
3.  $\frac{\sqrt{3}}{5}$
4.  $\frac{\sqrt{6}}{5}$

140.

A cubical block of wood of side 10 cm floats at the interface between oil and water with its lower surface horizontal and 4 cm below the interface. The density of oil is  $0.6 \text{ g cm}^{-3}$ . The mass of block is

1. 706 g
2. 607 g
3. 760 g
4. 670 g

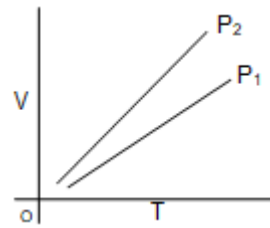
141.

A diver is 10 m below the surface of water. The approximate pressure experienced by the diver is

1.  $10^5 \text{ Pa}$
2.  $2 \times 10^5 \text{ Pa}$
3.  $3 \times 10^5 \text{ Pa}$
4.  $4 \times 10^5 \text{ Pa}$

142.

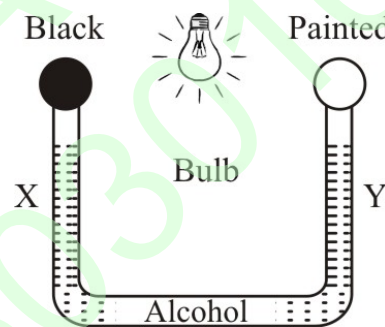
The volume  $V$  versus temperature  $T$  graphs for a certain amount of a perfect gas at two pressures  $P_1$  and  $P_2$  are shown in the figure. Here



1.  $P_1 < P_2$
2.  $P_1 > P_2$
3.  $P_1 = P_2$
4. Pressures can't be related

143.

The following figure shows two air-filled bulbs connected by a U-tube partly filled with alcohol. What happens to the levels of alcohol in the limbs X and Y when an electric bulb placed midway between the bulbs is lighted?



1. The level of alcohol in limb X falls while that in limb Y rises
2. The level of alcohol in limb X rises while that in limb Y falls
3. The level of alcohol falls in both limbs
4. There is no change in the levels of alcohol in the two limbs

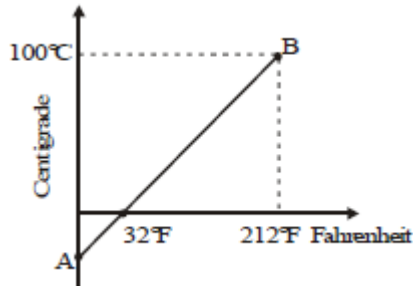
144.

Find the rate of flow of glycerine of density  $1.25 \times 10^3 \text{ kg/m}^3$  through the conical section of a pipe, if the radii of its ends are 0.1m and 0.04 m and the pressure drop across its length is  $10 \text{ N/m}^2$ .

1.  $3.14 \times 10^{-4} \text{ m}^3/\text{s}$
2.  $6.28 \times 10^{-4} \text{ m}^3/\text{s}$
3.  $12.56 \times 10^{-4} \text{ m}^3/\text{s}$
4.  $1.57 \times 10^{-4} \text{ m}^3/\text{s}$

145.

The graph AB shown in figure is a plot of temperature of a body in degree Celsius and degree Fahrenheit. Then



1. slope of line AB is 9/5
2. slope of line AB is 5/9
3. slope of line AB is 1/9
4. slope of line AB is 3/9

146.

At a pressure of  $24 \times 10^5$  dyne/cm<sup>2</sup>, the volume of O<sub>2</sub> is 10 litre and mass is 20g. The r.m.s velocity will be-

1. 800 m/s
2. 400 m/s
3. 600 m/s
4. Data is incomplete

147.

Three liquids of densities  $d, 2d$  and  $3d$  are mixed in equal proportions of weights. The relative density of the mixture is

1.  $\frac{11d}{7}$
2.  $\frac{18d}{11}$
3.  $\frac{13d}{9}$
4.  $\frac{23d}{18}$

148.

In thermodynamic process, 200 Joules of heat is given to a gas and 100 Joules of work is also done on it. The change in internal energy of the gas is

1. 100 J
2. 300 J
3. 419 J

4. 24 J

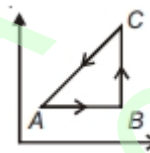
149.

If the ratio of specific heat of a gas at constant pressure to that at constant volume is  $\gamma$ , the change in internal energy of a mass of gas, when the volume changes from  $V$  to  $2V$  at constant pressure  $p$ , is

1.  $R/(\gamma - 1)$
2.  $pV$
3.  $pV/(\gamma - 1)$
4.  $pV(\gamma - 1)$

150.

In the thermodynamic process shown in figure, the work done by the system along  $A \rightarrow B \rightarrow C$  is 50 J and change in internal energy during  $C \rightarrow A$  is 30 J, then heat supplied during  $A \rightarrow B \rightarrow C$  is



1. 50 J
2. 20 J
3. 10 J
4. 80 J

151.

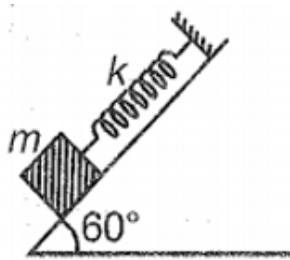
If the length of a cylinder on heating increases by 2%, the area of its base will increase by:

1. 0.5%
2. 2%
3. -2%
4. 4%

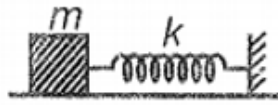
152.

The time periods for the figures (a) and (b) are  $T_1$  and  $T_2$  respectively. If all surfaces shown below are smooth,

then the ratio  $\frac{T_1}{T_2}$  is-



(a)



(b)

Four rods of same material with different radii  $r$  and length  $l$  are used to connect two heat reservoirs at different temperatures. In which of following case, heat conduction is fastest?

1.  $r = \frac{1}{3}\text{cm}, l = \frac{1}{9}\text{cm}$

2.  $r = 3\text{cm}, l = 9\text{cm}$

3.  $r = 4\text{cm}, l = 8\text{cm}$

4.  $r = 1\text{cm}, l = 1\text{cm}$

1.  $1:\sqrt{3}$

2.  $1:1$

3.  $2:1$

4.  $\sqrt{3}:2$

153.

The displacement  $x$  of a particle varies with time  $t$  as

$$x = A \sin\left(\frac{2\pi}{T}t + \frac{\pi}{3}\right)$$

Time taken by particle to reach

from  $x = \frac{A}{2}$  to  $x = -\frac{A}{2}$  is-

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

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

3.  $\frac{T}{12}$

4.  $\frac{T}{6}$

154.

The displacements of the particle from the extreme position when its kinetic energy is  $\frac{1}{4}$ th of the maximum value and  $\frac{3}{4}$ th of the maximum value are

$x_A$  and  $x_B$  respectively. The ratio  $\frac{x_A}{x_B}$  is :

1.  $\sqrt{3}:1$

2.  $1:2$

3.  $1:\sqrt{3}$

4.  $(2 - \sqrt{3}):1$

155.

156.

A gas performs minimum work when it expands-

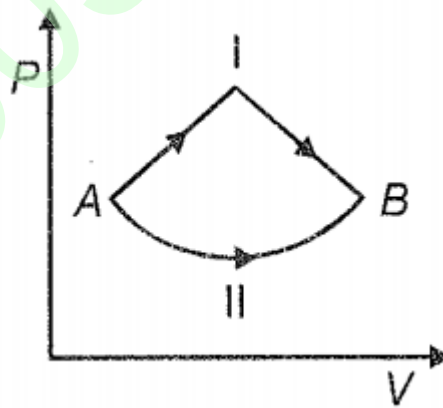
1. Isochorically

2. Isobarically

3. Adiabatically

3. Isothermally

An ideal gas goes from A to B via two processes I and II as shown. If  $\Delta U_1$  and  $\Delta U_2$  are the changes in internal energies in the process I and II respectively, then (P: pressure, V: volume)



1.  $\Delta U_1 > \Delta U_2$

2.  $\Delta U_1 < \Delta U_2$

3.  $\Delta U_1 = \Delta U_2$

4.  $\Delta U_1 \leq \Delta U_2$

158.

The internal energy of ideal gas increases in-

1. Adiabatic expansion

2. Adiabatic compression

3. Isothermal expansion

4. 2 m/s

4. Isothermal compression

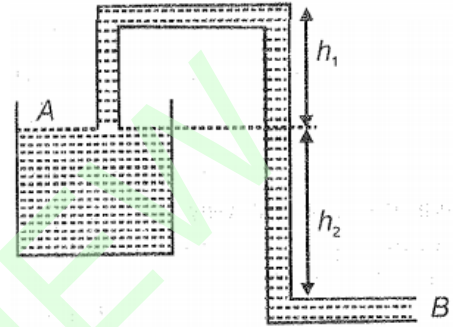
163.

From the given diagram, the speed with which water leaves the tube B of small diameter is-

159.

A liquid filled in a container has plane meniscus. If  $\theta$  is angle of contact, then

1.  $\theta = 0^\circ$
2.  $\theta = 90^\circ$
3.  $\theta < 90^\circ$
4.  $\theta = 180^\circ$



160.

A large open tank with a square hole of side 0.1 cm in the wall at a depth of 0.2 m from the top is completely filled with a liquid. The rate of flow of liquid (in  $\text{cm}^3/\text{s}$ ) through the hole will be-

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

1.  $\sqrt{2gh_1}$
2.  $\sqrt{2gh_2}$
3.  $\sqrt{2g(h_1 + h_2)}$
4.  $\sqrt{2g(h_2 - h_1)}$

161.

The property of surface tension of the liquid is due to

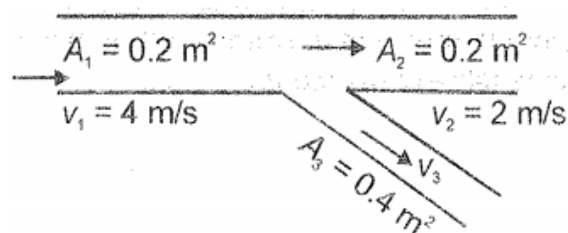
1. The gravitational force of attraction between molecules
2. Cohesive forces between molecules
3. The adhesive force between molecules
4. Formation of ionic bonds among molecules

164. Two cylinders A and B of equal capacity are connected to each other via a stopcock. A contains a gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stopcock is suddenly opened. Then the change in internal energy of the gas is:

1. 0
2. 5 J
3. 1 J
4. 3 J

162.

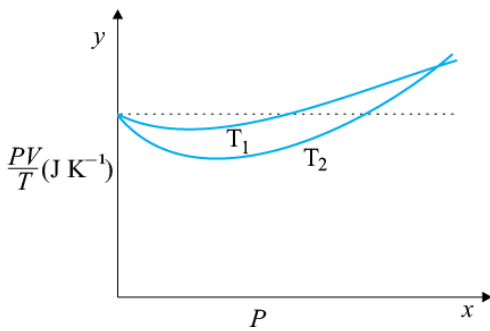
From the given diagram the velocity  $v_3$  is



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

165.

The figure shows a plot of  $PV/T$  versus  $P$  for  $1.00 \times 10^{-3} \text{ kg}$  of oxygen gas at two different temperatures.



Then relation between  $T_1$  and  $T_2$  is:

1.  $T_1 = T_2$
2.  $T_1 < T_2$
3.  $T_1 > T_2$
4.  $T_1 \geq T_2$

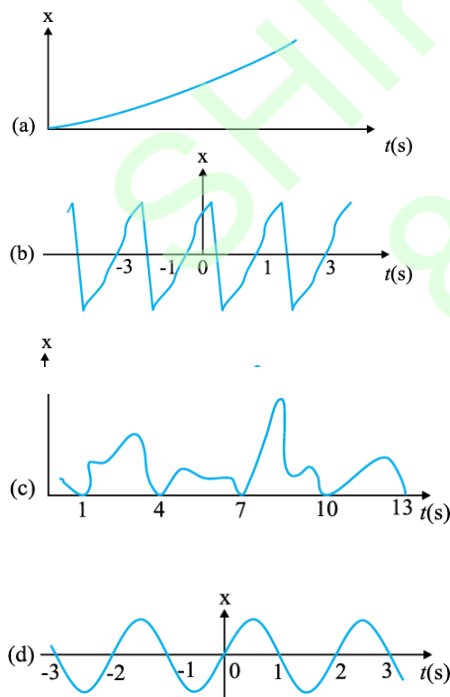
166.

Which of the following examples represent simple harmonic motion?

1. the rotation of the earth about its axis.
2. the motion of an oscillating mercury column in a U-tube.
3. general vibrations of a polyatomic molecule about its equilibrium position.
4. A fan rotating with constant angular velocity.

167.

The figure depicts four x-t plots for the linear motion of a particle.



Which of the following is true?

1. (a) is periodic but (c) is not periodic.

2. (b) is periodic but (d) is not periodic.

3. (b) and (d) are periodic.

4. Only (c) is periodic.

168.

A steel wire has a length of 12.0 m and a mass of 2.10 kg. What should be the tension in the wire so that the speed of a transverse wave on the wire equals the speed of sound in dry air at  $20^\circ\text{C} = 343 \text{ m/sec}$ .

1.  $4.3 \times 10^3 \text{ N}$

2.  $3.2 \times 10^4 \text{ N}$

3.  $2.06 \times 10^4 \text{ N}$

4.  $1.2 \times 10^4 \text{ N}$

169.

A bat emits an ultrasonic sound of frequency 1000 kHz in air. If the sound meets a water surface, what is the wavelength of the reflected sound? (Speed of sound in air is 340 m/sec and in water 1486 m/sec)

1.  $3.4 \times 10^{-4} \text{ m}$

2.  $1.49 \times 10^{-3} \text{ m}$

3.  $2.34 \times 10^{-2} \text{ m}$

4.  $1.73 \times 10^{-3} \text{ m}$

170.

What is the total number of air molecules (inclusive of oxygen, nitrogen, water vapour and other constituents) in a room of capacity  $25.0 \text{ m}^3$  at a temperature of  $27^\circ\text{C}$  and 1 atm pressure?

1.  $6.1 \times 10^{23} \text{ molecules}$ .

2.  $6.1 \times 10^{26} \text{ molecules}$ .

3.  $7.1 \times 10^{23} \text{ molecules}$ .

4.  $7.1 \times 10^{26} \text{ molecules}$ .

171.

What is the average thermal energy of a helium atom at room temperature ( $27^\circ\text{C}$ )?

1.  $11.21 \times 10^{-20} \text{ J}$

2.  $3.09 \times 10^{-16} \text{ J}$

3.  $6.21 \times 10^{-21} \text{ J}$

4.  $5.97 \times 10^{-19} \text{ J}$

172.

$8 J$  of work per minute and extracts  $3.6 \times 10^9 J$  of heat per minute from its boiler. The efficiency of the engine is:

1. 15%
2. 18%
3. 13%
4. 11%

173.

A refrigerator is to maintain eatables kept inside at  $9^\circ\text{C}$ . If room temperature is  $36^\circ\text{C}$ , the coefficient of performance is:

1. 9.3
2. 12.4
3. 11.2
4. 10.4

174.

In an experiment on the specific heat of a metal, a  $0.20 \text{ kg}$  block of the metal at  $150^\circ\text{C}$  is dropped in a copper calorimeter (of water equivalent  $0.025 \text{ kg}$ ) containing  $150 \text{ cm}^3$  of water at  $27^\circ\text{C}$ . The final temperature is  $40^\circ\text{C}$ . The specific heat of the metal is:

(Heat losses to the surroundings are negligible)

1.  $0.40 \text{ J g}^{-1} \text{ K}^{-1}$
2.  $0.43 \text{ J g}^{-1} \text{ K}^{-1}$
3.  $0.54 \text{ J g}^{-1} \text{ K}^{-1}$
4.  $0.61 \text{ J g}^{-1} \text{ K}^{-1}$

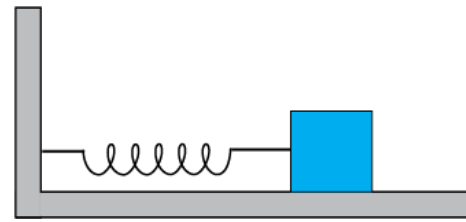
175.

Which of the following relationships between the acceleration 'a' and the displacement 'x' of a particle involve simple harmonic motion?

1.  $a = 0.7x$
2.  $a = -200x^2$
3.  $a = -10x$
4.  $a = 100x^3$

176.

A spring having a spring constant  $1200 \text{ N/m}$  is mounted on a horizontal table as shown in the figure. A mass of  $3 \text{ kg}$  is attached to the free end of the spring. The mass is then pulled sideways to a distance of  $2.0 \text{ cm}$  and released. The frequency of oscillations is:



1.  $3.0 \text{ s}^{-1}$
2.  $2.7 \text{ s}^{-1}$
3.  $1.2 \text{ s}^{-1}$
4.  $3.2 \text{ s}^{-1}$

177.

For the travelling harmonic wave  $y(x, t) = 2.0 \cos 2\pi(10t - 0.0080x + 0.35)$  where  $x$  and  $y$  are in  $\text{cm}$  and  $t$  in  $\text{sec}$ . The phase difference between the oscillatory motion of two points separated by a distance of  $4 \text{ m}$  will be:

1.  $0.8\pi \text{ rad}$
2.  $\pi \text{ rad}$
3.  $6.4\pi \text{ rad}$
4.  $4\pi \text{ rad}$

178.

A one meter long tube open at one end, with a movable piston at the other end, shows resonance with a fixed frequency source (a tuning fork of frequency  $340 \text{ Hz}$ ) when the minimum tube length is  $25.5 \text{ cm}$ . The speed of sound in air at the temperature of the experiment is: (The edge effects may be neglected.)

1.  $324.16 \text{ m/s}$
2.  $320 \text{ m/s}$
3.  $345 \text{ m/s}$
4.  $346.8 \text{ m/s}$

179.

Two sitar strings A and B playing the note 'Ga' are slightly out of tune and produce beats of frequency  $6 \text{ Hz}$ . The tension in the string A is slightly reduced and the beat frequency is found to be reduced to  $3 \text{ Hz}$ . If the original frequency of A is  $324 \text{ Hz}$ , what is the frequency of B?

1.  $316 \text{ Hz}$
2.  $318 \text{ Hz}$
3.  $319 \text{ Hz}$
4.  $314 \text{ Hz}$



180.

A bat is flitting about in a cave navigating via ultrasonic beeps. Assume that the sound emission frequency of the bat is 40 kHz. During one fast swoop directly toward a flat wall surface, the bat is moving at 0.03 times the speed of sound in the air. What frequency does the bat hear reflected off the wall?

1. 41.27 kHz
2. 42.67 kHz
3. 41.23 kHz
4. 42.47 kHz

VIEW  
3