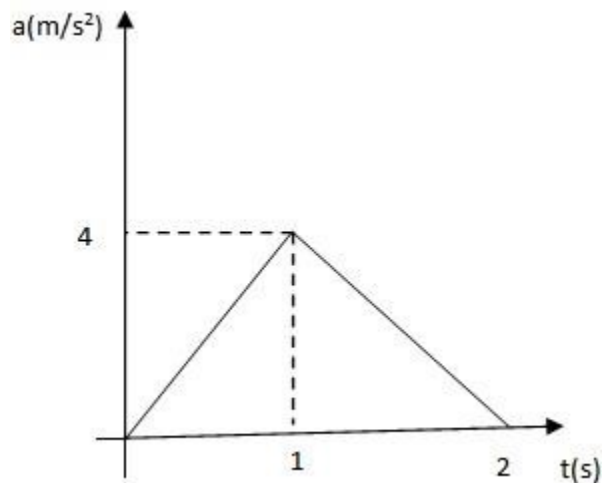


**PHYSICS**

1. A vector  $\vec{a}$  of magnitude two units lies in XY plane. It is inclined at  $30^\circ$  with a positive X-axis and at  $60^\circ$  with a positive Y-axis. Another vector of magnitude 5 units lies along the positive x-axis. is equal to  $\vec{a} \cdot \vec{b}$ 
  - A.  $5\sqrt{3}$
  - B.  $3\sqrt{5}$
  - C.  $2\sqrt{3}$
  - D.  $3\sqrt{2}$
2. A bus is moving with a velocity of  $10\text{ms}^{-1}$  on a straight road. A scooterist wishes to overtake the bus in the 100s. If the bus is at a distance of 1 km from the scooterist, what velocity should the scooterist chase the bus?
  - A.  $50\text{ms}^{-1}$
  - B.  $40\text{ms}^{-1}$
  - C.  $30\text{ms}^{-1}$
  - D.  $20\text{ms}^{-1}$
3. The acceleration - time graph of a particle moving in a straight line is shown in the figure. The velocity of the particle at time  $t=0$  is  $2\text{m/s}$ . The velocity after 2s will be



- A. 6 m/s
- B. 4 m/s
- C. 2 m/s
- D. 8 m/s

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.

4. A particle is projected vertically upwards from point A on the ground. It takes time  $t_1$  to reach point B, but it continues to move up. If it carries further  $t_2$  time to reach the ground from point B. Then the height of the point B from the ground is

A.  $\frac{1}{2}g(t_1 + t_2)^2$

B.  $gt_1t_2$

C.  $\frac{1}{8}g(t_1 + t_2)^2$

D.  $\frac{1}{2}gt_1t_2$

5. A lead ball strikes a wall and falls down. A tennis ball has the same mass, and velocity strikes the same wall and bounces back. Which of the following is correct?

A. The tennis ball suffers a greater change in momentum

B. The lead ball suffers a greater change in momentum

C. Both balls suffer the same change in momentum

D. The momentum of the lead ball is greater than that of the tennis ball

6. Consider the following statements and identify the correct answer  
(A) The moment of inertia of a rigid body about an axis of rotation is numerically equal to twice the kinetic energy of rotation of the body, when rotating with angular velocity about that axis

(B) Radius of gyration of a body changes with change in location of the axis of rotation

A. A is false, but B is true

B. Both A and B are true

C. A is true, but B is false

D. Both A and B are false

7. A tensile force of  $2 \times 10^5$  dyne doubles the length of an elastic cord whose cross section area is  $2 \text{ cm}^2$ . Young's modulus of the material of the cord is

A.  $2 \times 10^5 \text{ N/m}^2$

B.  $2 \times 10^5 \text{ dyne/cm}^2$

C.  $10^{10} \text{ dyne/cm}^2$

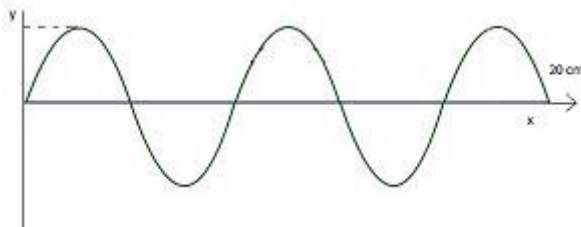
D.  $10^4 \text{ N/m}^2$

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8. Starting with the same initial conditions, an ideal gas expands from volume  $V_1$  to  $V_2$  in three different ways. The work done by the gas is  $W_1$  if the process is purely isothermal,  $W_2$  if purely isobaric and  $W_3$  if purely adiabatic, then

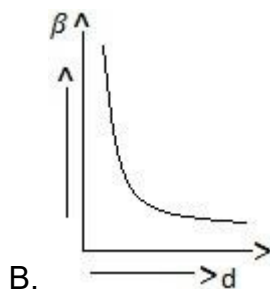
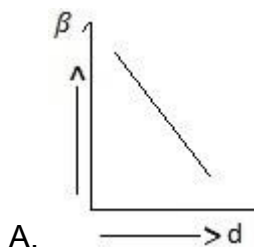
- A.  $W_1 > W_2 > W_3$
- B.  $W_2 > W_3 > W_1$
- C.  $W_2 > W_1 > W_3$
- D.  $W_1 > W_3 > W_2$

9. For the wave shown in the fig, the frequency and wavelength if its speed is 320 m/sec are

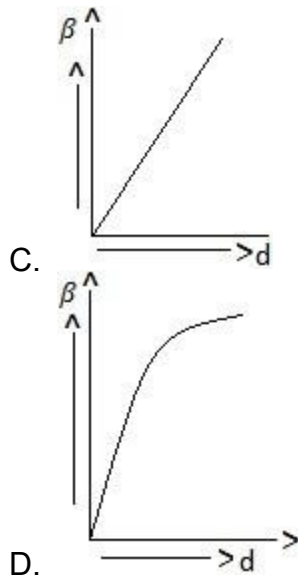


- A. 8 cm, 400Hz
- B. 80 cm, 40Hz
- C. 8 cm, 4000Hz
- D. 40 cm, 8000Hz

10. The correct between fringe width  $\beta$  and distance between the slits ( $d$ ) is



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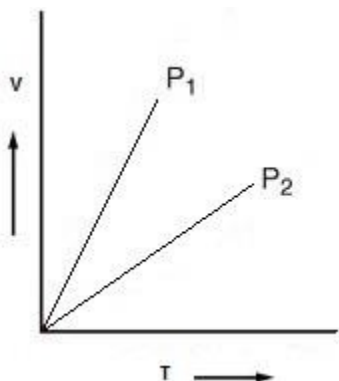
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## CHEMISTRY

- The number of spectral lines possible when an electron falls from the fifth orbit to ground state in a hydrogen atom is
  - 4
  - 15
  - 10
  - 21
- The octet rule is not valid for molecules
  - CO<sub>2</sub>
  - H<sub>2</sub>O
  - O<sub>2</sub>
  - CO
- BCl<sub>3</sub> is a planar molecule, whereas NCl<sub>3</sub> is pyramidal because
  - BCl<sub>3</sub> has no lone pair of electrons, but NCl<sub>3</sub> has a lone pair of electrons
  - B-Cl bond is more polar than N-Cl bond
  - Nitrogen atom is smaller than boron atom
  - N-Cl bond is more covalent than B-Cl bond
- I<sub>1</sub> and I<sub>2</sub> of Mg are 178 and 348 Kcal/mole, respectively. The energy required for the reaction  $Mg_{(g)} \rightarrow Mg_{(g)}^{+2} + 2e$  is
  - +170 Kcal
  - +526 Kcal
  - 170 Kcal
  - 525 Kcal
- In the redox reaction,  
 $KMnO_4 + 3H_2SO_4 + 5H_2C_2O_4 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 10CO_2$   
The volume of 0.1M KMnO<sub>4</sub> required to oxidize 25ml of 0.25M H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> solution is
  - 25litre
  - 125ml
  - 25ml
  - 1.25litre

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.

6. V vs T curves at constant pressure  $P_1$  and  $P_2$  for an ideal gas is shown below



Which is correct

- A.  $P_1 > P_2$
  - B.  $P_1 < P_2$
  - C.  $P_1 = P_2$
  - D. All of the above
7. If  $R$  is the radius of the spheres in the close-packed arrangement and  $r$  is the radius of the octahedral void, then
- A.  $R=0.414r$
  - B.  $r=0.414R$
  - C.  $R=0.225r$
  - D.  $r=0.224R$
8. In the reaction  $4\text{NH}_3+5\text{O}_2 \rightarrow 4\text{NO}+6\text{H}_2\text{O}$ , the rate of formation of  $\text{NO}$  is  $1 \times 10^{-3}$  mole/litre-sec. The rate of disappearance of  $\text{O}_2$  is
- A.  $4 \times 10^{-3}$
  - B.  $5 \times 10^{-3}$
  - C.  $1.25 \times 10^{-3}$
  - D.  $0.8 \times 10^{-3}$
9. Duralumin is an alloy of
- A. Al and Mg
  - B. Al, Mg and Ni
  - C. Al, Mg, Mn and Cu
  - D. Al and Ni

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.

10. Copper on reaction with dil  $\text{HNO}_3$  give

- A.  $\text{Cu}(\text{NO}_3)_2 + \text{N}_2\text{O}$
- B.  $\text{Cu}(\text{NO}_3)_2 + \text{NO}$
- C.  $\text{Cu}(\text{NO}_3)_2 + \text{NO}_2$
- D.  $\text{CuNO}_3 + \text{NO}$

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.

## **BOTANY**

1. Floridean starch is found in
  - E. Chlorophyceae
  - F. Myxophycere
  - G. Phaeophyceae
  - H. Rhodophyceae
2. The fruits of annoma squamosa develop from
  - A. Multicarpellary, syncerpous superior gynoecium
  - B. Monocarpellary, syncerpous superior gynoecium
  - C. Multicarpellary syncerpous inferior gynoecium
  - D. Multicarpellary, apocerpous, superior gynoecium
3. Which of the following statements are true?
  - I). Uneven thickening of cellwall is a characteristic of sclerenchyma.
  - II). Periblem forms the cortex of the stem and the root.
  - III). Tracheids are the chief water transport elements in gymnosperms.
  - IV). Companion cell is devoid of nucleus at maturity.
  - V). The commercial cork is obtained from quercus subes
  - A. I and IV
  - B. II and V
  - C. III and IV
  - D. II, III and IV
4. Disjunction refers to
  - A. The separation of homologous chromosomes at anaphase-I
  - B. The type of chromosomal aberration in which there is loss of a part of a chromosome
  - C. Incompatibility in fungi and other thallophytes
  - D. Modification of gene action by a non-allelic gene

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.



5. You are given two plants(A & B)of liliaceae. In plant A the leaf tip is modified for performing vegetative reproduction while in B the leaf apex is modified for performing mechanical support. A & B are respectively
- A. Smilax and Allium
  - B. Scilla and Gloriosa
  - C. Gloriosa and Yucca
  - D. Ruscus and Scilla
6. In which one pair, both the plants can be vegetatively propagated by leaf pieces?
- A. Bryophyllum and leaf kalanchoe
  - B. Chrysanthemum and Agave
  - C. Agave and kalanchoe
  - D. Asparagus and Bryophyllum
7. A bacterium divides once in every 25 minutes, if a culture containing  $10^5$  cells per ml is grown for 3hrs short of 5 minutes, what will be the cell concentration per ml?
- A.  $10 \times 10^{30}$  cells
  - B.  $32 \times 10^5$  cells
  - C.  $128 \times 10^5$  cells
  - D.  $175 \times 10^5$  cells
8. In tissue culture medium, the embryoids formed from pollen grains is due to
- A. Cellular totipotency
  - B. Organogenesis
  - C. Double fertilization
  - D. Test tube culture
9. Assertion: Biopiracy is being resorted to by the countries of north.  
Reason: Countries of south are incapable of biopiracy
- A. Both Assertion and reason are true and reason is the correct explanation of assertion
  - B. Both Assertion and reason are true and reason is not the correct explanation of assertion
  - C. Assertion is true but reason is false
  - D. Assertion is false but reason is true

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.

10. To form one molecule of glyceraldehyde phosphate in Calvin cycle
- A. 9ATP and 36 NADPH are required
  - B. 6ATP and 6NADPH are required
  - C. 3ATP and 3NADPH are required
  - D. 9ATP and 6NADPH are required

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.

## ZOOLOGY

1. Choanocyte is the characteristic of
  - A. Annelida
  - B. Porifera
  - C. Arthropoda
  - D. None of the above
2. Fore wings in cockroach arise from
  - A. Mesothorax and are dark and leathery
  - B. Prothorax and are called tegmine
  - C. Mesothorax and are transparent and membranous
  - D. Prothorax and are transparent and membranous
3. How many leucocytes are present in humans in 1  $\mu$ L of blood?
  - A. 100 million
  - B. 10000 million
  - C. 3.5 million
  - D. 5000 million
4. The vitamin-C or ascorbic acid prevents
  - A. Rickets
  - B. Pellagra
  - C. Scurvy
  - D. Antibody synthesis
5. Blood protein which initiates blood coagulation, is
  - A. Prothrombin
  - B. Thrombin
  - C. Fibrinogen
  - D. Fibrin

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.

6. If due to some injury, the chordae tendinae of the tricuspid valve of the human heart is partially non - functional. What will be the immediate effect?
  - A. The flow of blood into the aorta will be slowed down
  - B. The pacemaker will stop working
  - C. The blood will tend to flow back into the left atrium
  - D. The flow of blood into the pulmonary artery will be reduced
7. Route of the reflex arc is
  - A. Receptors, effectors, grey mater and motor fibres
  - B. Receptors, sensory fibres, grey mater, motor fibres and effectors
  - C. sensory fibres, grey mater, motor fibres, receptors and effectors
  - D. Effectors, grey mater, motor, sensory fibres and receptors
8. When pregnancy occurs in the ovary itself, it is called
  - A. Tubual pregnancy
  - B. Ectopic pregnancy
  - C. Abdominal pregnancy
  - D. None of these
9. Similarities between organisms of different genotypes are due to
  - A. Convergent evolution
  - B. Divergent evolution
  - C. Microevolution
  - D. Macroevolution
10. The toxic substance, 'Haemozoin', related to high fever and chill, is released during the following disease
  - A. Dengue
  - B. Malaria
  - C. Diptheria
  - D. Pneumonia

**Note:** All questions are of objective type (multiple choice questions). Each question has four options of which one is correct. Each correct answer will be awarded 2 marks. The wrong answer and unanswered questions will receive nil marks.