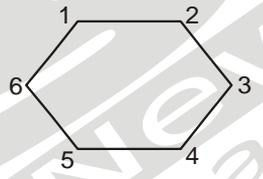
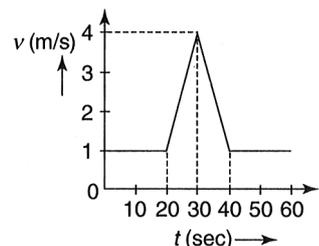



**SAMPLE PAPER - 69**

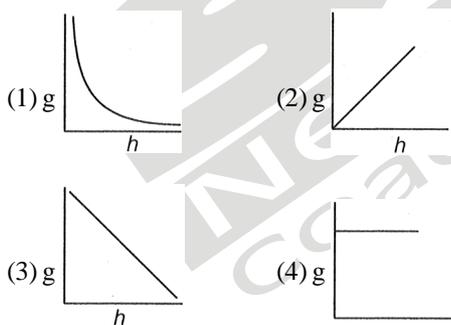
Time : 1 : 15 Hr.

Question : 60

**PHYSICS**

01. Two satellites of mass  $m$  and  $9m$  are orbiting a planet in orbits of radius  $R$ . Their periods of revolution will be in the ratio of  
 (1) 9 : 1    (2) 3 : 1    (3) 1 : 1    (4) 1 : 3
02. For a satellite moving in an orbit around the earth, the ratio of kinetic energy to potential energy is  
 (1) 2    (2)  $\frac{1}{2}$     (3)  $\frac{1}{\sqrt{2}}$     (4)  $\sqrt{2}$
03. A satellite of mass  $m$ , moving around the earth in a circular orbit of radius  $R$ , has angular momentum  $L$ . The areal velocity of satellite is: ( $M_e$  = mass of earth)  
 (1)  $\frac{L}{2m}$     (2)  $\frac{L}{2M_e}$     (3)  $\frac{2L}{m}$     (4)  $\frac{2L}{M_e}$
04. Four point masses each of mass  $m$  are placed at points 1, 3, 4 and 6 of a regular hexagon of side  $a$ . The gravitational field at the centre of hexagon is
- 
- (1)  $\frac{G.m}{a^2}$     (2)  $\frac{\sqrt{2}G.m}{a^2}$   
 (3)  $\frac{\sqrt{3}G.m}{a^2}$     (4) Zero
05. Four particles of masses  $m$ ,  $2m$ ,  $3m$  and  $4m$  are kept in sequence at the corners of a square of side  $a$ . The magnitude of gravitational force acting on a particle of mass  $m$  placed at the centre of the square will be  
 (1)  $\frac{24m^2G}{a^2}$     (2)  $\frac{6m^2G}{a^2}$   
 (3)  $\frac{4\sqrt{2}Gm^2}{a^2}$     (4) Zero
06. A lift is coming from 8th floor and is just about to stop at 4th floor. Taking ground floor as origin and take positive direction upwards for all quantities, which one of the following is correct?  
 (1)  $x < 0, v < 0, a > 0$     (2)  $x > 0, v < 0, a < 0$   
 (3)  $x > 0, v < 0, a > 0$     (4)  $x > 0, v > 0, a < 0$
07. A car accelerates from rest at a constant rate  $2m/s^2$  for some time. Then it retards at constant rate of  $4m/s^2$  and comes to rest. If the total time for which it remains in motion is 12 s, the total distance travelled is :  
 (1) 32 m    (2) 48 m  
 (3) 64 m    (4) 96 m
08. A ball is dropped from the top of a building 100 m high. At the same instant another ball is thrown upwards with a velocity of 40 m/s from the bottom of the building. The two balls will meet after  
 (1) 3 s    (2) 2 s    (3) 2.5 s    (4) 5 s
09. A particle moves in a straight line with an acceleration  $a$   $ms^{-2}$  at time 't' seconds where  $a = -\frac{1}{t^2}$ . When  $t = 1$  the particle has a velocity of  $3 ms^{-1}$ . Find the velocity of the particle at  $t = 4$  s.  
 (1) 5.25 m/s    (2) 1.25 m/s  
 (3) 2.25 m/s    (4) 8.25 m/s
10. Velocity-time (v-t) graph for a moving object is shown in the figure. Total displacement of the object during the time interval when there is non-zero acceleration and retardation is
- 
- (1) 60 m    (2) 50 m    (3) 30 m    (4) 40 m

11. A particle is projected from a horizontal plane with a velocity of  $8\sqrt{2}$  m s<sup>-1</sup> at an angle  $\theta$ . At highest point its velocity is found to be 8 m s<sup>-1</sup>. Its range will be ( $g = 10$  m s<sup>-2</sup>)  
 (1) 3.2 m (2) 6.4 m (3) 4.6 m (4) 12.8 m
12. A body has an initial velocity of 3 m/s and has an acceleration of 1 m/sec<sup>2</sup> normal to the direction of the initial velocity. Then its velocity 4 seconds after the start is  
 (1) 7 m/sec along the direction of initial velocity  
 (2) 7 m/sec along the normal to the direction of initial velocity  
 (3) 7 m/sec mid-way between the two directions  
 (4) 5 m/sec at an angle off  $\tan^{-1}(4/3)$  with the direction of initial velocity
13. Find gravitational field at a distance of 2000 km from the centre of earth. (Given  $R_{\text{earth}} = 6400$  km,  $r = 2000$  km,  $M_{\text{earth}} = 6 \times 10^{24}$  kg)  
 (1) 1.53 ms<sup>-2</sup> (2) 7.12 ms<sup>-2</sup>  
 (3) 3.06 ms<sup>-2</sup> (4) 1.8 ms<sup>-2</sup>
14. At what distance (in metre) from the centre of the moon, the intensity of gravitational field will be zero? (Take, mass of earth and moon as  $5.98 \times 10^{24}$  kg and  $7.35 \times 10^{22}$  kg respectively and the distance between moon and earth is  $3.855 \times 10^8$  m.)  
 (1) zero (2)  $3.85 \times 10^7$   
 (3)  $8 \times 10^8$  (4)  $3.46 \times 10^8$
15. Which of the following graphs shows the variation of acceleration due to gravity  $g$  with depth  $h$  from the surface of the earth?



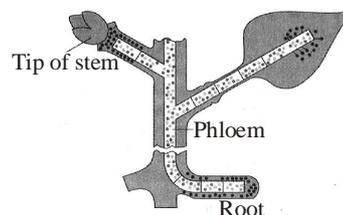
## CHEMISTRY

16. In the hydrocarbon  
 $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{C} \equiv \text{CH}$   
 6 5 4 3 2 1  
 The states of hybridization of carbons 1, 3 and 5 are in the following sequence:  
 (1)  $sp^3, sp^2, sp$  (2)  $sp^2, sp, sp^3$   
 (3)  $sp, sp^3, sp^2$  (4)  $sp, sp^2, sp^3$
17. Which of the following organic compounds has same hybridization as its combustion product ( $\text{CO}_2$ )?  
 (1) Ethane (2) Ethyne (3) Ethene (4) Ethanol
18. The pair of electron in the given carbanion,  $\text{CH}_3\text{C}\equiv\text{C}^-$  is present in which of the following orbitals?  
 (1)  $sp^2$  (2)  $sp$  (3)  $2p$  (4)  $sp^3$
19. What is the correct IUPAC name of the compound shown below ?  
  
 (1) 4-aminocarbonyl-3-bromophenol  
 (2) 5-bromo-4-hydroxy benzamide  
 (3) 3-bromo-4-hydroxy benzamide  
 (4) 4-amido-3-bromophenol
20. IUPAC name of the following molecule is  
  
 (1) 4-Hydroxy methyl-1-carboxy cyclohex-3-ene  
 (2) 4-(Hydroxy methyl) cyclohex-3-enecarboxylic acid  
 (3) 1-hydroxy methyl cyclohexene-4-carboxylic acid  
 (4) 4-(Hydroxy methyl cyclohex-3-enyl) methanoic acid
21. 25 mL solution of barium hydroxide on titration with 0.1 molar solution of hydrochloric acid gave a titre value of 35 mL. The molarity of barium hydroxide is:  
 (1) 0.28 (2) 0.35 (3) 0.07 (4) 0.14
22. The volume of water that must be added to a mixture of 250 ml of 0.6 M HCl and 750 ml of 0.2 M HCl to obtain 0.25 solution of HCl is:  
 (1) 750 ml (2) 100 ml (3) 200 ml (4) 300 ml
23. 20 mL of 0.1 M solution of compound  $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$  is titrated against 0.05 M HCl,  $x$  mL of HCl is used when phenolphthalein is used as an indicator and  $y$  mL of HCl is used when methyl orange is the indicator in two separate titrations. Hence  $(y - x)$  is:  
 (1) 40 mL (2) 80 mL  
 (3) 120 mL (4) None of these
24. An aqueous solution of 6.3 g of oxalic acid dihydrate is made up to 250 mL. The volume of 0.1 NaOH required to completely neutralise 20 mL of this solution is  
 (1) 40 mL (2) 20 mL  
 (3) 10 mL (4) 4 mL
25. 10 g HCl and 10g NaOH are dissolved in water and diluted upto 7.5 litre. Resulting solution will be  
 (1) Acidic (2) alkline  
 (3) Neutral (4) Unpredictable

26. Equal mass of  $\text{Fe}_2\text{O}_3$  and  $\text{FeO}$  has mass of oxygen in the ratio:  
 (1) 1.35 (2) 0.74  
 (3) 0.37 (4) 2.7
27. Which of the following is/are correct with respect to ionization enthalpy?  
 (1)  $\text{Li} > \text{Na} > \text{K} > \text{Rb} > \text{Cs}$   
 It is because of dominance of size over nuclear charge.  
 (2)  $\text{Li} < \text{B} < \text{Be}$   
 It is because Be has  $1s^2$  pair of electrons in valence shell.  
 (3)  $\text{C} < \text{O} < \text{N}$   
 It is because of 3-unpaired electrons in 2p, that give extra stability to N-atom.  
 (4) All are correct
28. Which of the following is not correct for noble gases?  
 (1) These are mono-atomic  
 (2) Their radii are very large because of non-bonding nature  
 (3) We study van der Waals' radii for them  
 (4) Their valency is always zero.
29. Select the correct statement out of the following w.r.t. elements of d-block.  
 (1) These are the elements of groups 3 to 12.  
 (2) These are characterised by the filling of inner d-orbitals by electrons.  
 (3) Their general electronic configuration is  $(n-1)d^{1-10}ns^{0-2}$   
 (4) All are correct
30. Select the incorrect statement:  
 (1) Elements of d-block are characterised by filling of inner d-orbitals by electrons.  
 (2)  $\text{Zn}^{2+}$ ,  $\text{Cd}^{2+}$  and  $\text{Hg}^{2+}$  are coloured and paramagnetic.  
 (3) Most of these metals and their compounds are used as catalyst.  
 (4) Elements of d-block form a bridge between chemically active metals of s-block and less active elements of 13 group.

## BOTANY

31. 'S' in 70S is:  
 (1) Svedberg's unit (2) Solubility  
 (3) Surface area (4) Size
32. Cytoskeleton is made of:  
 (1) Microtubules and E.R.  
 (2) Microtubules and microfilaments  
 (3) Cytoplasm  
 (4) Cytoplasm with network of microtubules and microfilaments
33. The discoverer of lysosome is:  
 (1) Palade (2) de Duve  
 (3) Porter (4) Golgi
34. Axoneme with 9+2 microtubular arrangement occurs in:  
 (1) Cilia (2) Flagella  
 (3) Both (1) and (2) (4) Centriole
35. Organelle important in spindle formation during nuclear division in animal cell.  
 (1) Centriole (2) Golgi body  
 (3) Chloroplast (4) Mitochondrion
36. Most water flow in root occurs via apoplast as  
 (1) Cortical cells are living cells  
 (2) Cortical cells are loosely arranged  
 (3) Cortical cells are thin walled  
 (4) All of the above
37. 0.1 M solution of solute (non-electrolyte) will have a water potential of  
 (1) -2.3 bars (2) Zero  
 (3) 2.3 bars (4) 22.4 bars
38. Which one give the most valid and recent explanation for stomatal movements ?  
 (1) Starch hydrolysis  
 (2) Guard cell photosynthesis  
 (3) Transpiration  
 (4) Potassium influx and efflux
39. Root pressure contributes to the  
 (1) Ascent of sap in small herbaceous plants  
 (2) Re-establishment of continuous chains of water molecules in the xylem which often breaks under the enormous tension created by transpiration  
 (3) Guttation (4) All the above
40. Bulk flow can be achieved through a hydrostatic pressure gradient. Negative hydrostatic pressure gradient and positive hydrostatic pressure gradient are seen in  
 (1) Suction through a straw and a garden hose respectively  
 (2) A garden hose and suction through a straw respectively  
 (3) Cobalt chloride paper and polythene respectively  
 (4) Blotting paper and cobalt chloride paper respectively
41. Recognise the figure and find out the correct statement



- The following figure shows  
 (1) The mechanism of the absorption and translocation of water and minerals  
 (2) The demonstration of osmosis  
 (3) The translocation of food through phloem  
 (4) Transpiration pull for ascent of sap

42. Guttation occurs in well watered herbaceous plants of well drained soils during  
 (1) Evening (2) Morning  
 (3) Day (4) Viscous.
43. Movement of minerals in plant roots through diffusion is  
 (1) Endosmosis (2) Osmosis  
 (3) Active absorption (4) Passive absorption
44. Omnis-cellula-e-cellula is gene alisation given by:  
 (1) Lamarck (2) Dutrochet  
 (3) Leeuwenhoek (4) Virchow
45. Slime layer and capsule are types of which of the following?  
 (1) Glycocalyx (2) Plasmalemma  
 (3) Cell wall (4) Cell envelope

## ZOOLOGY

46. Expiratory muscles contract at the time of  
 (1) Deep inspiration  
 (2) Normal inspiration and expiration  
 (3) Forceful expiration  
 (4) Muscular expansion of lungs
47. The vital capacity is equal to  
 (1) ERV + TV (2) IRV + TV  
 (3) VC + RV (4) ERV + TV + IRV
48. Arrange the following in the order of increasing volume.  
 1. Tidal volume  
 2. Residual volume  
 3. Expiratory reserve volume  
 4. Inspiratory reserve volume  
 (1)  $1 < 2 < 3 < 4$  (2)  $1 < 4 < 3 < 2$   
 (3)  $1 < 3 < 2 < 4$  (4)  $1 < 4 < 2 < 3$
49. Which of the following is not true?  
 (1)  $pCO_2$  of deoxygenated blood is 95 mmHg.  
 (2)  $pCO_2$  of alveolar air is 40 mmHg.  
 (3)  $pO_2$  alveolar air is 104 mmHg.  
 (4)  $pO_2$  of oxygenated blood is 95 mmHg.
50. The solubility of  $CO_2$  is \_\_\_\_\_ times higher than that of  $O_2$   
 (1) 10-15 (2) 20-25  
 (3) 30-35 (4) 210
51. What would be the heart rate of a person if cardiac output is 5L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL?  
 (1) 75 beats per minute  
 (2) 100 beats per minutes  
 (3) 125 beats per minute  
 (4) 50 beats per minute

52. ECG depicts the depolarization and repolarization processes during the cardiac cycle. In the ECG of a normal healthy individual one of the following waves is not represented.  
 (1) Depolarization of atria  
 (2) Repolarization of atria  
 (3) Depolarization of ventricles  
 (4) Repolarization of ventricles

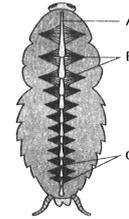
53. Match the columns.

Column-I		Column-II	
A. Heart Failure	(I)	Heart muscle is suddenly damaged by a inadequate blood supply.	
B. Cardiac arrest	(II)	Chest pain due to inadequate $O_2$ reaching the heart muscles.	
C. Heart attack	(III)	Atherosclerosis	
D. Coronary artery disease	(IV)	Heart not pumping blood effectively enough to meet the needs of body (CAD)	
E. Angina pectoris	(V)	Heart stops beating	

- (1) A-IV, B-V, C-I, D-III, E-II  
 (2) A-IV, B-V, C-III, D-I, E-II  
 (3) A-IV, B-III, C-V, D-II, E-I  
 (4) A-V, B-IV, C-II, D-III, E-I
54. Select the incorrect statement from the following.  
 (1) Invertebrates possess very simple endocrine system.  
 (2) Anterior Pituitary is under control of hypothalamus by portal system  
 (3) Posterior pituitary is under direct neural regulation of hypothalamus.  
 (4) Hypothalamus secretes trophic hormones.
55. Select the correct statement from the following.  
 (A) Hypothalamus contains many nuclei which produces hormones.  
 (B) Posterior pituitary is under direct neural regulation of hypothalamus.  
 (C) Oxytocin and vasopressin are actually synthesized in hypothalamus and transported axonally to adenohypophysis.  
 (D) LH induces ovulation and destroys corpus luteum.  
 (1) A and B only (2) A and D Only  
 (3) B and D Only (4) C and D Only
56. Hormones are called chemical signals that stimulate specific target tissues. Their specificity is due to the presence of signal receiving 'receptors' only in the respective target tissue. Where are these receptors present in case of hormones of protein nature.  
 (1) Extracellular matrix (2) Blood  
 (3) Plasma membrane (4) Nucleus

57. Thymosin is responsible for  
 (1) Raising the blood sugar level  
 (2) Raising blood calcium level  
 (3) Differentiation of T-lymphocyte  
 (4) Decrease in blood RBC
58. How many filamentous Malpighian tubules are found in cockroach?  
 (1) 100-150 (2) 50-100  
 (3) 150-200 (4) 200-250
59. Mosaic vision means  
 (1) More sensitivity and less resolution  
 (2) More sensitivity and more resolution  
 (3) Less sensitivity and less resolution  
 (4) Less sensitivity and more resolution

60. Identify A, B and C in the given figure.



- (1) A–Chambers of heart, B–Anterior aorta, C–Alary muscles  
 (2) A–Alary muscles, B–Chambers of heart, C–Anterior aorta  
 (3) A–Anterior aorta, B–Chambers of heart, C–Alary muscles  
 (4) A–Anterior aorta, B–Alary muscles, C–Chambers of heart

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