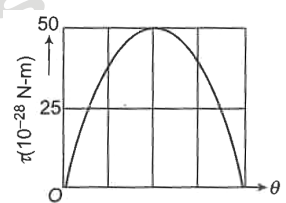


**SAMPLE PAPER - 52**

Time : 1 : 15 Hr.

Question : 60

**PHYSICS**

01. Each of the two point charges are doubled and their distance is halved. Force of interaction becomes  $n$  times, where  $n$  is  
 (1) 4 (2) 1 (3) 1/16 (4) 16
02. Two charged spheres separated at a distance  $d$  exert a force  $F$  on each other. If they are immersed in a liquid of dielectric constant  $K = 2$ , then the force is (if all in conditions are same)  
 (1)  $F/2$  (2)  $F$  (3)  $2F$  (4)  $4F$
03. When  $10^{19}$  electrons are removed from a neutral metal plate, the electric charge on it is  
 (1)  $-1.6\text{ C}$  (2)  $+1.6\text{ C}$  (3)  $10^{19}\text{ C}$  (4)  $10^{-19}\text{ C}$
04. Two point charges A and B, having charges  $+Q$  and  $-Q$  respectively, are placed at certain distance apart and force acting between them is  $F$ . If 75% charge of A is transferred to B, then force between the charges becomes  
 (1)  $\frac{F}{16}$  (2)  $\frac{9F}{16}$  (3)  $\frac{4F}{3}$  (4)  $F$
05. The force exerted by two charged bodies on one another obey Coulomb's law provided that  
 (1) The charges are not too small  
 (2) The charges are not too large  
 (3) The charges are in vacuum  
 (4) Linear dimensions of the bodies are much smaller than the distance between the bodies
06. Determine the electric field strength vector if the potential of this field depends on  $x, y$  coordinates as  $V = 10\text{ axy}$   
 (1)  $10\text{ a}(\hat{y}\hat{i} + \hat{x}\hat{j})$  (2)  $-10\text{ a}(\hat{y}\hat{i} + \hat{x}\hat{j})$   
 (3)  $-a(\hat{y}\hat{i} + \hat{x}\hat{j})$  (4)  $-10\text{ a}(\hat{x}\hat{i} + \hat{y}\hat{k})$
07. Select the correct statement about electric charge  
 (1) Charge can be converted into energy and energy can be converted into charge  
 (2) Charge of a particle increases with increase in its velocity
- (3) Charge on a body is always integral multiple of a certain charge called charge of electron  
 (4) Charge on a body is always positive or zero
08. An electric dipole consisting of two opposite charges of  $2 \times 10^{-6}\text{ C}$  each separated by a distance of 3 cm is placed in an electric field of  $2 \times 10^5\text{ N/C}$ . The maximum torque on the dipole will be  
 (1)  $12 \times 10^{-1}\text{ Nm}$  (2)  $12 \times 10^{-3}\text{ Nm}$   
 (3)  $24 \times 10^{-1}\text{ Nm}$  (4)  $24 \times 10^{-3}\text{ Nm}$
09. An electric dipole is placed in a uniform electric field  $\vec{E}$  of magnitude  $40\text{ N/C}$ . Graph shows the magnitude of the torque on the dipole versus the angle  $\theta$  between the field  $\vec{E}$  and the dipole moment  $\vec{p}$ . The magnitude of dipole moment  $\vec{p}$  is equal to:
- 
- (1)  $1.25 \times 10^{-28}\text{ C-m}$  (2)  $2.0 \times 10^{-25}\text{ C-m}$   
 (3)  $2.5 \times 10^{-28}\text{ C-m}$  (4)  $5.0 \times 10^{-28}\text{ C-m}$
10. Two equal and opposite charges of masses  $M_1$  and  $M_2$  are accelerated in a uniform electric field through the same distance. What is the ratio of their accelerations, if their ratio of masses is  $M_1/M_2 = 0.5$ ?  
 (1)  $\frac{a_1}{a_2} = 0.5$  (2)  $\frac{a_1}{a_2} = 1$   
 (3)  $\frac{a_1}{a_2} = 2$  (4)  $\frac{a_1}{a_2} = 3$
11. The distance between two charges  $6\mu\text{C}$  and  $15\mu\text{C}$  is 2 m. At what point on the line joining the two, the intensity will be zero?  
 (1) At a distance 1 m from  $6\mu\text{C}$   
 (2) At a distance 1 m from  $15\mu\text{C}$   
 (3) At a distance 0.77 m from  $6\mu\text{C}$   
 (4) At a distance 0.77 m from  $15\mu\text{C}$

12. The point charges  $Q$  and  $-2Q$  are placed some distance apart. If the electric field at the location of  $Q$  is  $\vec{E}$ , then the electric field at the location of  $-2Q$  will be  
 (1)  $-\frac{\vec{E}}{2}$  (2)  $+\frac{\vec{E}}{2}$  (3)  $-\vec{E}$  (4)  $+\vec{E}$
13. In a region, the intensity of an electric field is given by  $E = 2\hat{i} + 3\hat{j} + \hat{k}$  in  $\text{NC}^{-1}$ . The electric flux through surface  $S = 10\hat{i}$   $\text{m}^2$  in the region is  
 (1)  $5 \text{ Nm}^2 \text{ C}^{-1}$  (2)  $10 \text{ Nm}^2 \text{ C}^{-1}$   
 (3)  $15 \text{ Nm}^2 \text{ C}^{-1}$  (4)  $20 \text{ Nm}^2 \text{ C}^{-1}$
14. A charge  $Q$  is enclosed by a Gaussian spherical surface of radius  $R$ . If the radius is doubled, then the outward electric flux will  
 (1) be reduced to half (2) remain the same  
 (3) be doubled (4) increase four times
15. Charge  $Q$  is given a displacement  $\vec{r} = (a\hat{i} - b\hat{j})$  in an electric field  $\vec{E} = (E_1\hat{i} - E_2\hat{j})$ . The work done is:  
 (1)  $Q(E_1a + E_2b)$   
 (2)  $Q\sqrt{(E_1a)^2 + (E_2b)^2}$   
 (3)  $Q(E_1 + E_2)\sqrt{a^2 + b^2}$   
 (4)  $Q\left(\sqrt{E_1^2 + E_2^2}\right)\sqrt{a^2 + b^2}$
20. Number of mole in  $1 \text{ m}^3$  gas at NTP are:  
 (1) 44.6 (2) 40.6 (3) 42.6 (4) 48.6
21. One litre  $\text{N}_2$ ,  $\frac{7}{8}$  litre  $\text{O}_2$  and 1 litre  $\text{CO}$  are taken in a mixture under identical conditions of  $P$  and  $T$ . The amount of gases present in mixture is given by:  
 (1)  $w_{\text{N}_2} = w_{\text{O}_2} > w_{\text{CO}}$  (2)  $w_{\text{N}_2} = w_{\text{CO}} > w_{\text{O}_2}$   
 (3)  $w_{\text{N}_2} = w_{\text{O}_2} = w_{\text{CO}}$  (4)  $w_{\text{CO}} > w_{\text{N}_2} > w_{\text{O}_2}$
22. 1 mol of  $\text{CH}_4$  contains  
 (1)  $6.02 \times 10^{23}$  atoms of H  
 (2) 4 g atom of Hydrogen  
 (3)  $1.81 \times 10^{23}$  molecules of  $\text{CH}_4$   
 (4) 3.0 g of carbon
23. The atomic weights of two elements A and B are 40 and 80 respectively. If  $x$  g of A contains  $y$  atoms, how many atoms are present in  $2x$  g of B?  
 (1)  $\frac{y}{2}$  (2)  $\frac{y}{4}$  (3)  $y$  (4)  $2y$
24. Haemoglobin contains 0.33% of iron by weight. The molecular weight of haemoglobin is approximately 67200. The number of iron atoms (At. wt. of Fe = 56) present in one molecule of haemoglobin is  
 (1) 6 (2) 1 (3) 4 (4) 2
25. In a compound C, H, N atoms are present in 9 : 1 : 3.5 by weight. Molecular weight of compound is 108. Its molecular formula is:  
 (1)  $\text{C}_2\text{H}_6\text{N}_2$  (2)  $\text{C}_3\text{H}_4\text{N}$  (3)  $\text{C}_6\text{H}_8\text{N}_2$  (4)  $\text{C}_9\text{H}_{12}\text{N}_3$
26. The simplest formula of a compound containing 50% of element X (atomic mass 10) and 50% of element Y (atomic mass 20) is  
 (1) XY (2)  $\text{X}_2\text{Y}$   
 (3)  $\text{XY}_3$  (4)  $\text{X}_2\text{Y}_3$
27. The empirical formula of an acid is  $\text{CH}_2\text{O}_2$ , the probable molecular formula of acid may be  
 (1)  $\text{CH}_2\text{O}$  (2)  $\text{CH}_2\text{O}_2$  (3)  $\text{C}_2\text{H}_4\text{O}_2$  (4)  $\text{C}_3\text{H}_6\text{O}_4$
28. The mass of a molecule of water is  
 (1)  $3 \times 10^{-26}$  kg (2)  $3 \times 10^{-25}$  kg  
 (3)  $1.5 \times 10^{-26}$  kg (4)  $2.5 \times 10^{-26}$  kg
29. A compound (80 g) on analysis gave C = 24 g, H = 4 g, O = 32 g. Its empirical formula is  
 (1)  $\text{C}_2\text{H}_2\text{O}_2$  (2)  $\text{C}_2\text{H}_2\text{O}$  (3)  $\text{CH}_2\text{O}_2$  (4)  $\text{CH}_2\text{O}$
30. 3.0 molal NaOH solution has a density of 1.110 g/mL. The molarity of the solution is:  
 (1) 2.9732 M (2) 3.05 M  
 (3) 3.64 M (4) 3.0504 M

## CHEMISTRY

16. The largest number of molecules is in  
 (1) 36 g of water  
 (2) 28 g of carbon monoxide  
 (3) 46 g of ethyl alcohol  
 (4) 54 g of nitrogen pentoxide
17. The total number of electrons in one molecule of carbon dioxide is  
 (1) 22 (2) 44 (3) 66 (4) 88
18. Four one litre flasks are separately filled with the gases  $\text{H}_2$ , He,  $\text{O}_2$  and  $\text{O}_3$  at the same temperature and pressure. The ratio of total number of atoms of these gases present in different flask would be:  
 (1) 1 : 1 : 1 : 1 (2) 1 : 2 : 2 : 3  
 (3) 2 : 1 : 2 : 3 (4) 3 : 2 : 2 : 1
19. 4.4 g of  $\text{CO}_2$  and 2.24 litre of  $\text{H}_2$  at STP are mixed in a container. The total number of molecules present in the container will be:  
 (1)  $6.022 \times 10^{23}$  (2)  $1.2044 \times 10^{23}$   
 (3) 2 mole (4)  $6.023 \times 10^{24}$

31. Compounds found in acid soluble pool have molecular weight ranging from  
 (1) 18-800 daltons  
 (2) 100-800 daltons  
 (3) more than 800 daltons  
 (4) None of the above
32. Lipids are found in acid insoluble fraction during the analysis of chemical composition of tissues. Give the reason.  
 (1) It has very high molecular weight  
 (2) It is polymer  
 (3) It has low molecular weight  
 (4) On grinding, the biomembranes are broken into pieces and from insoluble vesicles.
33. Identify the correct statement from those given below.  
 (1) Lipids with molecular weight not exceeding 800 Da. comes under acid soluble fraction  
 (2) The acid soluble fraction have four types of organic compounds, i.e. proteins, nucleic acid.  
 (3) The macromolecules from cytoplasm and organelles become the acid insoluble fraction  
 (4) The acid insoluble pool represents roughly the cytoplasmic composition of cells
34. Which of the following is an essential amino acids?  
 (1) Valine (2) Leucine  
 (3) Tryptophan (4) All of these
35. Inulin is polymer of  
 (1) Fructose (2) glucose  
 (3) sucrose (4) xylose
36. Pick the odd statement out  
 (1) Removal of  $\text{CO}_2$  from amino acids converts an amino acid into an amine  
 (2) All the biomolecules have a turnover  
 (3) Metabolic pathways are termed as transformation reactions  
 (4) Metabolic pathways always follow a linear route
37. Which of the following describes the given graph correctly?
- 
- (1) Endothermic reaction with energy - A in the presence of enzyme and B in the absence of enzyme
- (2) Exothermic reaction with energy - A in the presence of enzyme and B in the absence of enzyme  
 (3) Endothermic reaction with energy - A in the absence of enzyme and B in the presence of enzyme  
 (4) Exothermic reaction with energy - A in the absence of enzyme and B in the presence of enzyme
38. Those nucleic acids, which behave like enzymes are known as  
 (1) ribozymes (2) pepzymes  
 (3) ribose (4) Both (1) and (2)
39. Choose the correct option.  
 (1)  $\text{E} + \text{S} \longrightarrow \text{ES} \longrightarrow \text{E} + \text{P} \longrightarrow \text{EP}$   
 (2)  $\text{E} + \text{S} \rightleftharpoons \text{ES} \longrightarrow \text{E} - \text{P} \longrightarrow \text{E} + \text{P}$   
 (3)  $\text{E} + \text{S} \longrightarrow \text{ES} \rightleftharpoons \text{E} - \text{P} \longrightarrow \text{E} + \text{P}$   
 (4)  $\text{E} + \text{S} \rightleftharpoons \text{ES} \rightleftharpoons \text{E} - \text{P} \rightleftharpoons \text{E} + \text{P}$
40. Choose the correct graph, showing the effect of pH on the velocity (V) of a typical enzymatic reaction?
- (1)

(2)
- (3)

(4)
41. Enzymes that catalyse the removal of groups from substrates by mechanism other than hydrolysis.  
 (1) lyases  
 (2) ligases  
 (3) hydrolases  
 (4) dehydrogenases
42. Transition state structure of the substrate formed during an enzymatic reaction is  
 (1) transient, but stable  
 (2) permanent, but unstable  
 (3) transient and unstable  
 (4) permanent and stable
43. Michaelis Menten constant ( $K_m$ ) is equal to  
 (1) the rate of enzymatic activity  
 (2) the rate of reaction  
 (3) substrate concentration at which the reaction attains half of its maximum velocity  
 (4) substrate concentration at which the rate of reaction is maximum

44. Non-protein constituents bound to enzyme, which make enzymes catalytically more active  
 (1) cofactors (2) co-ions  
 (3) inhibitor (4) both (1) and (2)
45. The cofactors that associate with the apoenzyme only during course of catalysis are called as  
 (1) Cofactors (2) coenzymes  
 (3) metal ions (4) prosthetic group

## ZOOLOGY

46. Hypothalamus contains several groups of neurosecretory cells called \_\_\_\_\_ which produce hormones.  
 (1) Ganglion (2) Plexus  
 (3) Nuclei (4) Astrocytes
47. Which of the following statement is incorrect about pituitary?  
 (1) Located in bony cavity called sella turcica  
 (2) Attached to hypothalamus by stalk  
 (3) Divided anatomically into adenohypophysis and neurohypophysis  
 (4) Secrete released and inhibitory hormones
48. Select the incorrect statement from the following.  
 (1) Hypersecretion of GH leads to gigantism  
 (2) ACTH stimulates synthesis and secretion of glucocorticoids from adrenal cortex  
 (3) Oxytocin acts on skeletal muscles of our body and stimulates their contraction  
 (4) ADH reduces loss of water through urine
49. 24 hour diurnal rhythms of our body is maintained by  
 (1) Melatonin (2) Glucagon  
 (3) Thymosin (4) Oxytocin
50. The features of cretinism include  
 (1) Stunted growth  
 (2) Mental retardation and low IQ  
 (3) Abnormal skin and deaf mutism  
 (4) All of these
51. A. Increase alertness  
 B. Pupillary constriction  
 C. Piloerection  
 D. Increases heart rate  
 E. Increases respiratory rate  
 F. Sweating  
 Which of the above are effects of adrenaline/noradrenaline?  
 (1) All except C (2) All except B and F  
 (3) All except B (4) All except B, E and F
52. Which of the following layers are present in adrenal cortex from inner to outer?  
 (1) Zona reticularis, zona fasciculata and zona

- glomerulosa  
 (2) Zona fasciculata, zona glomerulosa and zona reticularis  
 (3) Zona glomerulosa, zona reticularis and zona fasciculata  
 (4) Zona glomerulosa, zona fasciculata and zona reticularis.

53. A. Anabolic effect on protein and carbohydrate metabolism.  
 B. Influences male sexual behaviour (libido).  
 C. Stimulate spermatogenesis.  
 D. Muscular growth, aggressiveness and low pitch voice.  
 Above are the functions of which of the hormone?  
 (1) Estrogens (2) Progesterone  
 (3) Testosterone (4) Relaxin
54. Select the incorrect statement from the following.  
 (1) GIT secretes four major peptide hormones.  
 (2) Several other non-endocrine tissues secrete hormones called growth factors.  
 (3) Hormone receptors are located in target tissues only.  
 (4) Hormone receptors are non-specific in nature.
55. A steroid hormone typically alters the activity of its target cells by  
 (1) Changing the membrane permeability of cell.  
 (2) Entering the cell and altering gene expression.  
 (3) Activation of  $IP_3$ .  
 (4) Conversion of ATP to cAMP.
56. Which of the following hormones are iodothyronines?  
 (1)  $T_3$  (2)  $T_4$   
 (3) TCT (4) Both (1) and (2)
57. Arrange the correct working sequence of 'FSH'.  
 (1) Binding to membrane receptor.  
 (2) Biochemical response.  
 (3) Generation of second messenger.  
 (4) Physiological response (Ovarian growth).  
 (1) 1 → 2 → 3 → 4 (2) 1 → 3 → 2 → 4  
 (3) 4 → 3 → 2 → 1 (4) 3 → 1 → 4 → 2
58. Which one of the following pair of organs includes only the endocrine glands?  
 (1) Thymus and testes  
 (2) Adrenal and ovary  
 (3) Parathyroid and adrenal  
 (4) Pancreas and parathyroid
59. Feeling the tremors of an earthquake, a scared resident from the seventh floor of a multi-storeyed building starts climbing down the stairs rapidly. Which hormone initiated this action?  
 (1) Adrenaline (2) Glucagon  
 (3) Gastrin (4) Thyroxine
60. Acromegaly is caused by  
 (1) Excess of G.H.  
 (2) Excess of thyroxin  
 (3) Deficiency of thyroxin  
 (4) Excess of adrenalin