

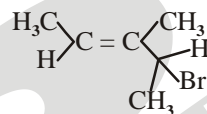
**SAMPLE PAPER - 38**

Time : 1 : 15 Hr.

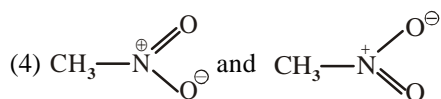
Question : 60

**PHYSICS**

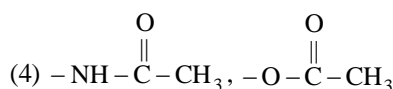
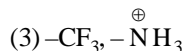
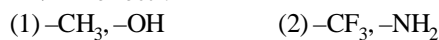
01. A particle moving in a straight line covers half the distance with speed of 3 m/s. The other half of the distance is covered in two equal time intervals with speed of 4.5 m/s and 7.5 m/s respectively. The average speed of the particle during this motion is :  
 (1) 4.0 m/s (2) 5.0 m/s (3) 5.5 m/s (4) 4.8 m/s
02. A particle has an initial velocity of  $5.5 \text{ ms}^{-1}$  due east and a constant acceleration of  $1 \text{ ms}^{-2}$  due west. The distance covered by the particle in sixth second of its motion is  
 (1) 0 (2) 0.25 m (3) 0.5 m (4) 0.75 m
03. At a metro station, a girl walks up a stationary escalator in time  $t_1$ . If she remains stationary on the escalator, then the escalator take her up in time  $t_2$ . The time taken by her to walk up on the moving escalator will be  
 (1)  $(t_1 + t_2)/2$  (2)  $t_1 t_2 / (t_2 - t_1)$   
 (3)  $t_1 t_2 / (t_2 + t_1)$  (4)  $t_1 - t_2$
04. A particle is thrown upwards from ground. It experiences a constant air resistance force which can produce a retardation of  $2 \text{ m/s}^2$ . The ratio of time of ascent to the time of descent is  
 (1) 1 : 1 (2)  $\sqrt{\frac{2}{3}}$   
 (3)  $\frac{2}{3}$  (4)  $\sqrt{\frac{3}{2}}$
05. Two balls are projected at an angle  $\theta$  and  $(90^\circ - \theta)$  to the horizontal with the same speed. The ratio of their maximum vertical heights is  
 (1) 1 : 1 (2)  $\tan \theta : 1$   
 (3)  $1 : \tan \theta$  (4)  $\tan^2 \theta : 1$
06. A man can swim in still water with a speed of 2 m/s. If he wants to cross a river of water current speed  $\sqrt{3} \text{ m/s}$  along shortest possible path, then in which direction should he swim ?  
 (1) at an angle  $120^\circ$  to the water current  
 (2) at an angle  $150^\circ$  to the water current  
 (3) at an angle  $90^\circ$  to the water current  
 (4) none of these
07. A particle has initial velocity  $(2\hat{i} + 3\hat{j})$  and acceleration  $(0.3\hat{i} + 0.2\hat{j})$ . The magnitude of velocity after 10 seconds will be  
 (1) 9 units (2)  $9\sqrt{2}$  units  
 (3)  $5\sqrt{2}$  units (4) 5 units
08. A constant force acting on a body of mass of 5 kg change its speed from  $5 \text{ m s}^{-1}$  to  $10 \text{ m s}^{-1}$  in 10 s without changing the direction of motion. The force acting on the body is  
 (1) 1.5 N (2) 2 N  
 (3) 2.5 N (4) 5 N
09. A stone of mass 1 kg tied to a light inextensible string of length  $L = 10 \text{ m}$  is whirling in a circular path of radius  $L$  in vertical plane. If the ratio of the maximum tension in the string to the minimum tension in the string is 4 and if  $g$  is taken to be  $10 \text{ ms}^{-2}$ , the speed of the stone at the highest point of the circle is  
 (1)  $10 \text{ ms}^{-1}$  (2)  $5\sqrt{2} \text{ ms}^{-1}$   
 (3)  $10\sqrt{3}$  (4) None of these
10. A body of mass  $m$  is placed on earth surface. It is then taken from earth's surface to a height  $h = 2R$ , then the change in gravitational potential energy is:  
 (1)  $\frac{mgh}{R}$  (2)  $\frac{2}{3} mgR$   
 (3)  $\frac{3}{4} mgR$  (4)  $\frac{mgR}{2}$
11. The density of a planet is twice that of earth and acceleration due to gravity at the surface of planet is equal to that at the surface of earth. If the radius of earth is  $R$ , then the radius of planet would be:  
 (1)  $2R$  (2)  $4R$   
 (3)  $\frac{1}{4} R$  (4)  $\frac{1}{2} R$

12. A tunnel is dug across the diameter of earth. A ball is released from the surface of earth into the tunnel. The velocity of ball when it is at a distance  $\frac{R}{2}$  from the centre of earth is ( $R$  = radius of earth,  $M$  = mass of earth)
- (1)  $\sqrt{\frac{3GM}{4R}}$  (2)  $\sqrt{\frac{2GM}{3R}}$   
 (3)  $\sqrt{\frac{GM}{2R}}$  (4)  $\sqrt{\frac{2GM}{R}}$
13. A charged cloud system produces an electric field in the air near the earth's surface. A particle of charge  $-2 \times 10^{-9} \text{C}$  is acted on by a downward electrostatic force of  $3 \times 10^{-6} \text{N}$  when placed in this field. The gravitational and electrostatic force, respectively, exerted on a proton placed in this field are
- (1)  $1.64 \times 10^{-26} \text{N}$ ,  $2.4 \times 10^{-16} \text{N}$   
 (2)  $1.64 \times 10^{-26} \text{N}$ ,  $1.5 \times 10^3 \text{N}$   
 (3)  $1.56 \times 10^{-18} \text{N}$ ,  $2.4 \times 10^{-16} \text{N}$   
 (4)  $1.5 \times 10^3 \text{N}$ ,  $2.4 \times 10^{-16} \text{N}$
14. An infinite line charge is at the axis of a cylinder of length 1 m and radius 7 cm. If electric field at any point on the curved surface of cylinder is  $250 \text{NC}^{-1}$ , then net electric flux through the cylinder is
- (1)  $1.1 \times 10^2 \text{Nm}^2 \text{C}^{-1}$   
 (2)  $9.74 \times 10^{-6} \text{Nm}^2 \text{C}^{-1}$   
 (3)  $5.5 \times 10^6 \text{Nm}^2 \text{C}^{-1}$   
 (4)  $2.5 \times 10^2 \text{Nm}^2 \text{C}^{-1}$
15. A charge of  $+2 \mu\text{C}$  is situated off-centre of a hollow spherical metallic shell. Then
- (1)  $-2 \mu\text{C}$  charge gets uniformly distributed on inner surface of shell  
 (2)  $+2 \mu\text{C}$  charge gets non-uniformly distributed on outer surface of shell  
 (3)  $-2 \mu\text{C}$  charge gets non-uniformly distributed on inner surface of shell  
 (4) no change appears on outer surface of shell
16. Which of the following is not correct regarding 14 gram of carbon monoxide?
- (1) It corresponds to 0.5 mole of CO  
 (2) It occupies 2.24 litres at S.T.P.  
 (3) It corresponds to  $3.01 \times 10^{23}$  molecules of CO  
 (4) None
17. 60 g of a compound on analysis gave 24 g C, 4 g H and 32 g O. The empirical formula of the compound is
- (1)  $\text{C}_2\text{H}_4\text{O}_2$  (2)  $\text{C}_2\text{H}_2\text{O}_2$   
 (3)  $\text{CH}_2\text{O}_2$  (4)  $\text{CH}_2\text{O}$
18. If 0.5 mol of  $\text{BaCl}_2$  is mixed with 0.2 mol of  $\text{Na}_3\text{PO}_4$ , the maximum number of moles of  $\text{Ba}_3(\text{PO}_4)_2$  that can be formed is
- (1) 0.7 (2) 0.5  
 (3) 0.1 (4) 0.2
19. Two bottles A and B contain 1 M and 1 m aqueous solution of sulphuric acid respectively
- (1) A is more concentrated than B  
 (2) B is more concentrated than A  
 (3) Concentration of A = concentration of B  
 (4) It is not possible to compare the concentration
20. What is the total number of moles of  $\text{H}_2\text{SO}_4$  needed to prepare 5.0 L of a 2.0 M solution of  $\text{H}_2\text{SO}_4$ ?
- (1) 2.5 (2) 5.0 (3) 10 (4) 20.
21. What is the IUPAC name of the following compound?
- 
- (1) 2-Bromo-3-methylpent-3-ene  
 (2) 4-Bromo-3-methylpent-2-ene  
 (3) 3-Bromo-3-methyl-1, 2-dimethylprop-1-ene  
 (4) 3-Bromo-1, 2-dimethylbut-1-ene
22. Which of the following statement is not correct ?
- (1)  $\text{CH}_3\text{-CH}_2\text{CH}_2\text{CH}_2\text{-OH}$  and  $\text{CH}_3\text{-}\overset{\text{CH}_3}{\underset{|}{\text{C}}}\text{-CH}_2\text{-OH}$  are chain isomers  
 (2)  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH=CH}_2$  and  $\text{CH}_3\text{CH}_2\text{CH=CH-CH}_3$  are example of position isomerism  
 (3)  $\text{C}_2\text{H}_5\text{-O-CH}_3$  and  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  represent functional group isomerism  
 (4)  $\text{CH}_3\text{CH}_2\text{NH}_2$  and  $\text{CH}_3\text{NHCH}_3$  are example of chain isomers
23. The number of open chain isomers are possible having molecular formula  $\text{C}_5\text{H}_8$
- (1) 7 (2) 6  
 (3) 8 (4) 9
24. Which of the following pairs of structure do not constitute resonating structure
- (1)  $\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^-$  and  $\text{H}_3\text{C}-\overset{\ominus}{\text{O}}-\overset{\text{O}}{\parallel}{\text{C}}$   
 (2)  $\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$  and  $\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}=\text{CH}_2$   
 (3)  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2^\ominus$  and  $\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}=\text{CH}_2$

## CHEMISTRY



25. Which of the following set of functional groups shows +R/+M effect ?



26. The correct Lewis dot structure of CO is.



27. Match proper adjustment from Column-I and Column-II.

	Column-I		Column-II
A.	Electron deficient	(i)	$\text{PCl}_5$
B.	Molecule with expanded octet	(ii)	$\text{IF}_7$
C.	Odd electron molecule	(iii)	$\text{CuCl}$
D.	Molecule with pseudo inert gas electronic configuration	(iv)	$\text{NO}$
		(v)	$\text{BCl}_3$
		(vi)	$\text{AgCl}$

(1) A-(v); B-(i), (ii); C-(iv); D-(iii), (vi)

(2) A-(vi); B-(i), (iii); C-(ii); D-(v), (iv)

(3) A-(iii); B-(i), (iv); C-(ii); D-(iv), (v)

(4) A-(ii); B-(ii), (vi); C-(iii); D-(v), (iv)

28. Compound with maximum Lattice energy



29. Elements given in column-I and their electron gain enthalpy in column-II. Match the elements with electron gain enthalpy.

	Column-I		Column-II
(i)	Noble gas	(p)	- 53 KJ/mole
(ii)	Alkali metal	(q)	- 328 KJ/mole
(iii)	Halogen	(r)	- 141 KJ/mole
(iv)	Chalcogen	(s)	+ 48 KJ/mole

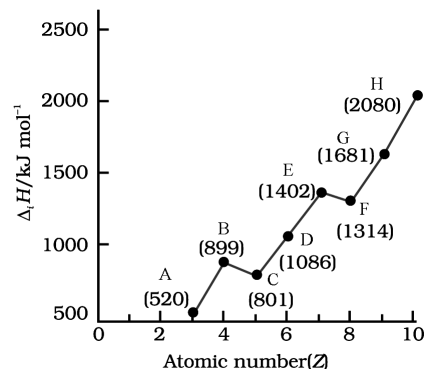
(1) (i)-(s); (ii)-(q); (iii)-(p); (iv)-(r)

(2) (i)-(s); (ii)-(p); (iii)-(r); (iv)-(q)

(3) (i)-(s); (ii)-(p); (iii)-(q); (iv)-(r)

(4) (i)-(s); (ii)-(r); (iii)-(q); (iv)-(p)

30. Graph given below.



Match Column-I and Column-II. On the basis of graph.

	Column-I		Column-II
(i)	Most reactive N.M.	(p)	C
(ii)	Least reactive N.M.	(q)	G
(iii)	More reactive metal	(r)	H
(iv)	non metal with least I.P.	(s)	A

(1) (i)-(s); (ii)-(r); (iii)-(q); (iv)-(p)

(2) (i)-(q); (ii)-(s); (iii)-(p); (iv)-(r)

(3) (i)-(q); (ii)-(r); (iii)-(s); (iv)-(p)

(4) (i)-(r); (ii)-(q); (iii)-(p); (iv)-(s)

## BOTANY

31. Soil less cultivation of plant in a defined nutrient solution is called

(1) Pisciculture

(2) Bonsai

(3) Hydroponics

(4) Aquaculture

32. The two sub-units of ribosome remain united at a critical-ion level of or ribosomes structure is maintained by

(1) Magnesium

(2) Calcium

(3) Copper

(4) Manganese

33. Component of nitrogenase and nitrate reductase is

(1) N

(2) Mo

(3) Co

(4) No specific component

34. Any mineral ion concentration in tissues that .....a..... the dry weight of tissues by about ....b.... is considered to toxic

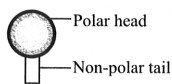
(1) a-enhances, b-10 mmole/kg

(2) a-reduces, b-10 mmole/kg

(3) a-enhances, b-10percent

(4) a-reduces, b-10 percent

35. Recognise the following equation :
- $$\alpha\text{-ketoglutaric acid} + \text{NH}_4^+ + \text{NADPH} \xrightarrow{\text{Glutamate dehydrogenase}} \text{Glutamate} + \text{H}_2\text{O} + \text{NADP}$$
- (1) Reductive deamination  
 (2) Transamination  
 (3) Nitrogen fixation  
 (4) Reductive amination
36. Once water is absorbed by the root hairs, it can move deeper into root layers by two distinct pathways  
 (1) One in xylem and second in phloem  
 (2) One is active and second is passive  
 (3) One is apoplast and second is symplast  
 (4) One is tracheid and second is vessel
37. Which of the following scientist showed that it is only the green part of the plants that would release oxygen?  
 (1) Joseph Priestley (2) Jan Ingenhousz  
 (3) T.W. Engelmann (4) C. van Niel
38. Leaf pigments of any green plants can be separated by  
 (1) X-ray diffraction  
 (2) Sedimentation  
 (3) Paper chromatography  
 (4) Centrifugation
39. Plant cells differ from animal cells in having  
 (1) cell wall  
 (2) plastids  
 (3) a large central vacuole  
 (4) all of these
40. Read the given statements and select the correct option.  
 Statement 1: Chloroplasts and mitochondria are semi-autonomous bodies.  
 Statement 2: Chloroplast and mitochondria have their own DNA and protein synthesizing machinery.  
 (1) Both statements 1 and 2 are correct.  
 (2) Both statements 1 and 2 are incorrect  
 (3) Statement 1 is correct and statement 2 is incorrect.  
 (4) Statements 1 is incorrect and statement 2 is correct.
41. The lipid molecule present in plasma membrane have polar heads and non-polar tails (as shown in figure). Which option represents the correct arrangement of lipids in lipid bilayer?

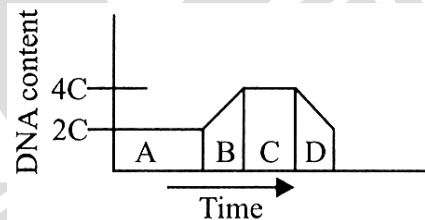


- (1)
- (2)
- (3)
- (4)

42. Which typical stage is known for DNA replication?  
 (1) Metaphase (2) G<sub>1</sub>-phase  
 (3) S stage (4) G<sub>2</sub>-phase
43. Match Column-I with Column-II and select the correct option from the codes given below.

	Column-I		Column-II
A.	Division of nucleus	(i)	Interphase
B.	Division of cytoplasm	(ii)	Cytokinesis
C.	DNA replication	(iii)	Syncytium
D.	Karyokinesis not followed by cytokinesis	(iv)	Karyokinesis

- (1) A-(ii); B-(iv); C-(i); D-(iii)  
 (2) A-(iv); B-(ii); C-(i); D-(iii)  
 (3) A-(iv); B-(ii); C-(iii); D-(i)  
 (4) A-(iii); B-(ii); C-(iv); D-(i)
44. The graph given shows the change in DNA content during various phases (A to D) in a typical mitotic cell cycle. Identify the phases and select the correct option.



- (1) A-G<sub>2</sub>; B-G<sub>1</sub>; C-S; D-M  
 (2) A-G; B-S; C-G<sub>2</sub>; D-M  
 (3) A-G<sub>1</sub>; B-S; C-G<sub>2</sub>; D-M  
 (4) A-M; B-G<sub>1</sub>; C-S; D-G<sub>2</sub>
45. The number of chromosomes is reduced to half during  
 (1) mitosis (2) meiosis-II  
 (3) meiosis-I (4) fertilization

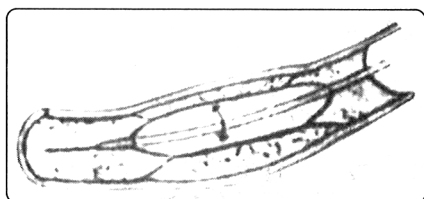
## ZOOLOGY

46. In which one of the following options the two examples are correctly matched with their particular type of immunity?

	Examples	Type of immunity
(a)	Polymorphonuclear leucocytes and monocytes	Cellular barriers
(b)	Anti-tetanus and anti-snake bite injections	Active immunity
(c)	Saliva in mouth and tears in eyes	Physical barriers
(d)	Mucus coating of epithelium lining the urinogenital tract	Physiological barriers

Ans. (1)

47. Each antibody has ...A... polypeptide chains, ...B... small chains called ...C... chains and ...D... longer chains called ...E... chains.  
The antibody, therefore, is represented as ...F... Here A to F refers to  
(1) A-four, B-two, C-light, D-two, E-heavy, F-H<sub>2</sub>L<sub>2</sub>  
(2) A-six, B-three, C-light, D-three, E-heavy, F-H<sub>3</sub>L<sub>2</sub>  
(3) A-two, B-one, C-light, D-one, E-heavy, F-H<sub>1</sub>L<sub>1</sub>  
(4) A-five, B-two, C-light, D-three, E-heavy, F-H<sub>2</sub>L<sub>2</sub>
48. A new born baby who receives IgA from its mother's milk develops  
(1) naturally acquired active immunity  
(2) artificially acquired active immunity  
(3) naturally acquired passive immunity  
(4) artificially acquired passive immunity
49. In higher vertebrates, the immune system can distinguish self-cells and non-self. If this property is lost due to genetic abnormality and it attacks self-cells then it leads to  
(1) graft rejection (2) auto-immune disease  
(3) active immunity (4) allergic response
50. The correct route through which impulse travel in the heart is:  
(1) S.A. node → Purkinje fibres → Bundle of His → A.V. node → Heart muscles  
(2) A.V. node → S.A. node → Purkinje fibres → Bundle of His → Heart muscles  
(3) S.A. node → A.V. node → Bundle of His → Purkinje fibres → Heart muscles  
(4) A.V. node → Bundle of His → S.A. Node → Purkinje fibre → Heart muscles
51. Heart beat becomes faster on stimulation by:  
(1) Sympathetic nerves and acetylcholine  
(2) Sympathetic nerves and adrenaline  
(3) Parasympathetic nerves and acetylcholine  
(4) Parasympathetic nerves and thyroxine
52. Which one of the following statements is correct regarding blood pressure?  
(1) 130/90 mm Hg is considered high and required treatment  
(2) 100/55 mm Hg is considered an ideal blood pressure  
(3) 105/50 mm Hg makes one very active  
(4) 190/110 mm Hg may harm vital organs like brain and kidney
53. The figure below shows an angiogram of the coronary blood vessel. Which one of the following statements correctly describes, what is being done?



- (1) It is coronary artery which has a cancerous growth that is being removed  
(2) It is coronary artery which is blocked by a plaque and the same is being cracked  
(3) It is coronary vein in which the defective valves are being opened  
(4) It is coronary vein blocked by a parasite (blood fluke) that is being removed.

54. Which one of the following statements is incorrect?  
(1) The medullary zone of kidney is divided into a few conical masses called medullary pyramids projecting into the calyces  
(2) Inside the kidney the cortical region extends in between the medullary pyramids as renal pelvis  
(3) Glomerulus alongwith Bowman's capsule is called the renal corpuscle  
(4) Renal corpuscle, proximal convoluted tubule (PCT) and distal convoluted tubule (DCT) of the nephron are situated in the cortical region of kidney
55. Dialysing unit (artificial kidney) contains a fluid which is almost same as plasma except that it has :  
(1) High glucose (2) High urea  
(3) No urea (4) High uric acid
56. Which substances are actively reabsorbed by nephron ?  
(1) Glucose, Na<sup>+</sup>, H<sup>+</sup>  
(2) Nitrogenous wastes, water, K<sup>+</sup>  
(3) Nitrogenous wastes, Amino acid, glucose  
(4) Glucose, amino acid, Na<sup>+</sup>
57. A chordate animal having flame cells as excretory structures:  
(1) *Planaria* (2) *Prawn*  
(3) *Amphioxus* (4) *Earthworm*
58. Of the following animals, how many are ureotelic ?  
[Most of bony fishes, Aquatic insects, Birds, Land snails, Mammals]  
(1) None (2) One  
(3) Two (4) Three
59. Proximal convoluted tubule (PCT) is lined by :  
(1) Simple cuboidal epithelium with brush border  
(2) Simple cuboidal epithelium without brush border  
(3) Simple columnar epithelium with brush border  
(4) Simple columnar epithelium without brush border
60. A → ADH → B → diuresis, A is a gland in which ADH is synthesized while B is the part of nephron on which ADH acts. A and B are :  
(1) Neurohypophysis, Loop of Henle  
(2) Neurohypophysis, Collecting ducts  
(3) Hypothalamus, Loop of henle  
(4) Hypothalamus, Collecting ducts