

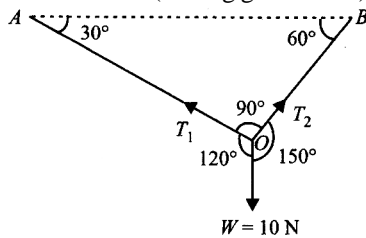
**SAMPLE PAPER - 45**

Time : 1 : 15 Hr.

Question : 60

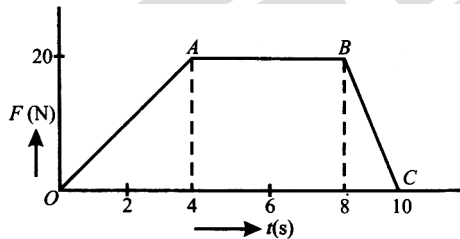
**PHYSICS**

01. A ball of mass 1 kg hangs in equilibrium from two strings OA and OB as shown in figure. What are the tensions in strings OA and OB ? (Taking  $g = 10 \text{ m/s}^2$ )



- (1) 5 N, zero                      (2) zero,  $5\sqrt{3}$  N  
(3) 5 N,  $5\sqrt{3}$  N                (4)  $5\sqrt{3}$  N, 5 N

02. A body of mass 5 kg is acted on by a force F which varies with time t as shown in the given figure. Then the momentum gained by the body at the end of 10 seconds is



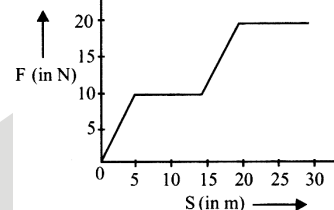
- (1)  $0 \text{ kg m s}^{-1}$                       (2)  $100 \text{ kg m s}^{-1}$   
(3)  $140 \text{ kg m s}^{-1}$                 (4)  $200 \text{ kg m s}^{-1}$

03. A block of mass 1 kg lies on a horizontal surface in a truck, the coefficient of static friction between the block and the surface is 0.6. What is the force of friction on the block if the acceleration of the truck is  $5 \text{ m/s}^2$ ? (Take  $g = 10 \text{ m/s}^2$ )

- (1) 5 N                                      (2) 6 N  
(3) 7 N                                      (4) 8 N

04. A particle moves with a velocity  $(5\hat{i} - 3\hat{j} + 6\hat{k}) \text{ m/s}$  under the influence of a constant force  $\vec{F} = (10\hat{i} + 10\hat{j} + 20\hat{k}) \text{ N}$ . The instantaneous power applied to the particle is  
(1) 200 W    (2) 40 W    (3) 140 W    (4) 170 W

05. The work done by a force acting on a body is as shown in the graph. The total work done in covering an initial distance of 20 m is



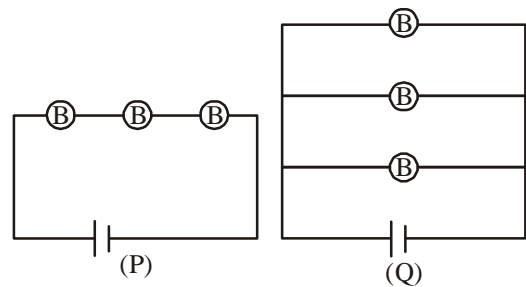
- (1) 225 J    (2) 200 J    (3) 400 J    (4) 175 J

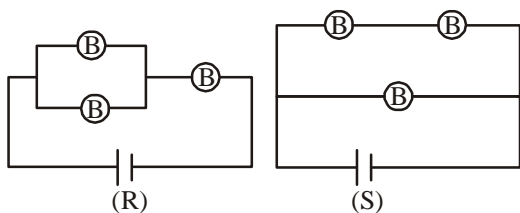
06. Two equal masses  $m_1$  and  $m_2$  moving along same straight line with velocities  $+3 \text{ m/s}$  and  $-5 \text{ m/s}$  respectively collide elastically. Their velocities after collision will respectively  
(1)  $+4 \text{ m/s}$  for both    (2)  $-3 \text{ m/s}$  and  $+5 \text{ m/s}$   
(3)  $-4 \text{ m/s}$  and  $+4 \text{ m/s}$     (4)  $-5 \text{ m/s}$  and  $+3 \text{ m/s}$

07. A body with mass 5 kg is acted upon by a force  $\vec{F} = (-3\hat{i} + 4\hat{j}) \text{ N}$ . If its initial velocity at  $t = 0$  is  $\vec{v} = (6\hat{i} - 12\hat{j}) \text{ ms}^{-1}$ , the time at which it will just have a velocity along the y-axis is  
(1) never    (2) 10 s    (3) 2 s    (4) 15 s

08. If momentum of a certain body is increased by 50% then increase in the K.E. of the body will be:  
(1) 25%                                      (2) 50%  
(3) 100%                                      (4) 125%.

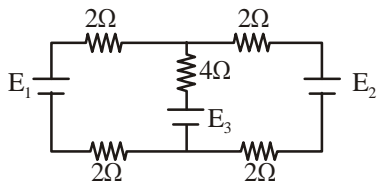
09. Following figures show different combination of identical bulbs connected to identical battery. Which option is correct regarding the total power dissipated in the circuit?



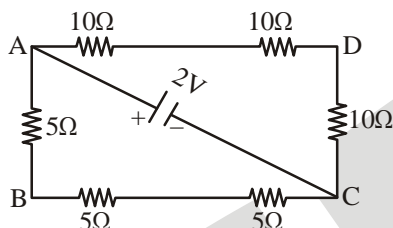


- (1)  $P < Q < R < S$       (2)  $P < R < S < Q$   
 (3)  $P < R < S = Q$       (4)  $P < R = S < Q$

10. Consider the following circuit-  
 $E_1 = 3\text{V}, E_2 = E_3 = 6\text{V}$   
 The current flowing through the  $4\Omega$  resistance is



- (1)  $1\text{ A}$       (2)  $\frac{1}{2}\text{ A}$       (3)  $\frac{1}{4}\text{ A}$       (4)  $\frac{1}{8}\text{ A}$
11. In the given circuit, the potential difference between the points A and B is

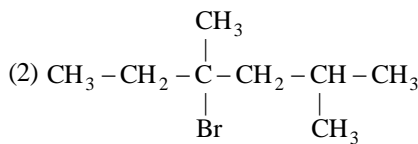


- (1)  $\frac{2}{3}\text{ V}$       (2)  $\frac{8}{9}\text{ V}$       (3)  $1\text{V}$       (4)  $\frac{4}{3}\text{ V}$
12. A rod works as a heater that consumes 1 KW of power. If it is cut along the length at two mutually perpendicular diameters to form 4 rods, then power consumed by each new rod will be
- (1)  $1\text{ KW}$       (2)  $0.25\text{ KW}$   
 (3)  $4\text{ KW}$       (4)  $16\text{ KW}$
13. The circular motion of a particle with constant speed is
- (1) Periodic but not simple harmonic  
 (2) Simple harmonic but not periodic  
 (3) Period and simple harmonic  
 (4) Neither periodic nor simple harmonic
14. The time period of a particle executing SHM is 8 s. At  $t = 0$  it is at the mean position. The ratio of distance covered by the particle in 1<sup>st</sup> second to the 2<sup>nd</sup> second is
- (1)  $(\sqrt{2} - 1)\text{s}$       (2)  $\sqrt{2}\text{ s}$   
 (3)  $(\sqrt{2} + 1)\text{s}$       (4)  $\frac{1}{\sqrt{2}}\text{ s}$

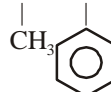
15. A body of mass  $m$  is placed on earth surface which is taken from earth surface to a height of  $h = 3R$ , then change in gravitational potential energy is
- (1)  $\frac{mgR}{4}$       (2)  $\frac{2}{3}mgR$       (3)  $\frac{3}{4}mgR$       (4)  $\frac{mgR}{2}$

## CHEMISTRY

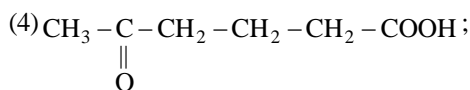
16. For the reaction equilibrium:  $\text{N}_2\text{O}_{4(g)} \rightleftharpoons 2\text{NO}_{2(g)}$  the concentration of  $\text{N}_2\text{O}_4$  and  $\text{NO}_2$  at equilibrium are  $4.8 \times 10^{-2}$  and  $1.2 \times 10^{-2}$  mol/L, respectively. The value of  $K_c$  for the reaction is
- (1)  $3 \times 10^{-3}\text{ M}$       (2)  $3 \times 10^3\text{ M}$   
 (3)  $3.3 \times 10^2\text{ M}$       (4)  $3 \times 10^{-1}\text{ M}$
17. The equilibrium constant for the reaction:  $\text{N}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{NO}_{(g)}$  at temperature T is  $4 \times 10^{-4}$ . The value of  $K_c$  for the reaction  $\text{NO}_{(g)} \rightleftharpoons \frac{1}{2}\text{N}_{2(g)} + \frac{1}{2}\text{O}_{2(g)}$  at the same temperature is
- (1)  $0.02$       (2)  $50$   
 (3)  $4 \times 10^{-4}$       (4)  $2.5 \times 10^{-2}$
18. To a  $10\text{ mL}$  of  $10^{-3}\text{ N H}_2\text{SO}_4$  solution, water has been added to make the total volume of  $1\text{ L}$ . Its pOH would be
- (1)  $3$       (2)  $12$   
 (3)  $9$       (4)  $5$
19. In which case change in pH is maximum?
- (1)  $1\text{ mL}$  of  $\text{pH} = 2$  is diluted to  $100\text{ mL}$   
 (2)  $0.01\text{ mol}$  of  $\text{NaOH}$  is added into  $100\text{ mL}$  of  $0.01\text{ M NaOH}$  solution  
 (3)  $100\text{ mL}$  of  $\text{H}_2\text{O}$  is added into  $900\text{ mL}$  of  $10^{-6}\text{ M HCl}$   
 (4)  $100\text{ mL}$  of  $\text{pH} = 2$  solution is mixed with  $100\text{ mL}$  of  $\text{pH} = 12$
20. Calculate the pH of a solution prepared by mixing  $2.0\text{ ml}$  of a strong acid ( $\text{HCl}$ ) solution of  $\text{pH} 3.0$  and  $3.0\text{ mL}$  of a strong base ( $\text{NaOH}$ ) of  $10.0$ .
- (1)  $2.5$       (2)  $3.5$   
 (3)  $4.5$       (4)  $6.5$
21. Which nomenclature is not according to IUPAC system?
- (1)  $\text{Br}-\text{CH}_2-\text{CH}=\text{CH}_2$ ; 1-Bromoprop-2-ene



; 4-Bromo-2,4-dimethylhexane



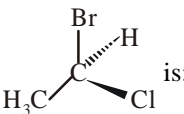
; 2-Methyl-3-phenylpentane



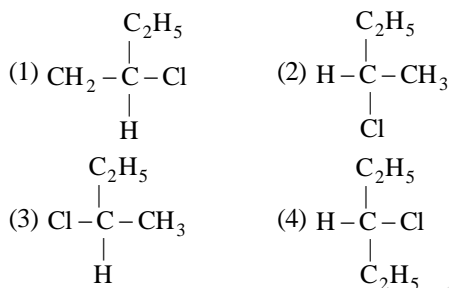
5-Oxohexanoic acid

22. How many structural isomers are possible for a compound with molecular formula  $\text{C}_3\text{H}_7\text{Cl}$ ?

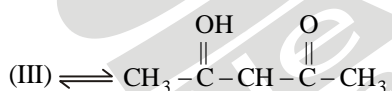
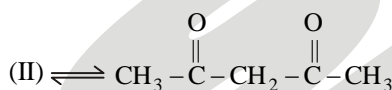
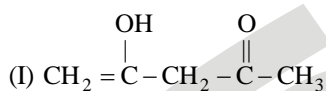
(1) 2 (2) 5  
(3) 7 (4) 9

23. The chirality of compound  is:
- (1) R (2) S (3) 6 (4) E

24.  $\text{CH}_3 - \text{CHCl} - \text{CH}_2 - \text{CH}_3$  has a chiral centre. Which of the following represents its R configuration?



25. The order of stability of the following tautomeric compounds is:



(1) II > I > III (2) II > III > I  
(3) I > II > III (4) III > II > I

26. Which of the following species contains three bond pairs and one lone pair around the central atom ?

(1)  $\text{H}_2\text{O}$  (2)  $\text{BF}_3$   
(3)  $\text{NH}_2$  (4)  $\text{PCl}_3$

27. Four diatomic species are listed below in different sequences. Which of these presents the correct order of their increasing bond order ?

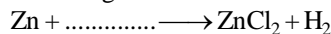
(1)  $\text{O}_2^- < \text{NO} < \text{C}_2^{2-} < \text{He}_2^+$   
(2)  $\text{NO} < \text{C}_2^{2-} < \text{O}_2^- < \text{He}_2^+$   
(3)  $\text{C}_2^{2-} < \text{He}_2^+ < \text{NO} < \text{O}_2^-$   
(4)  $\text{He}_2^+ < \text{O}_2^- < \text{NO} < \text{C}_2^{2-}$

28. Match the facts of Column-I with that of Column-II and select the correct choice.

Column-I (Nature of hydride)	Column-II (Groups of Periodic table)
(p) Electron precise	(i) Be, Mg and group 13
(q) Electron rich	(ii) groups 15, 16, 17
(r) Electron deficient	(iii) Group 14

(1) p-(iii), q-(ii), r-(i) (2) p-(i), q-(ii), r-(iii)  
(3) p-(iii), q-(i), r-(ii) (4) p-(ii), q-(iii), r-(i)

29. Supply the missing term in the reaction



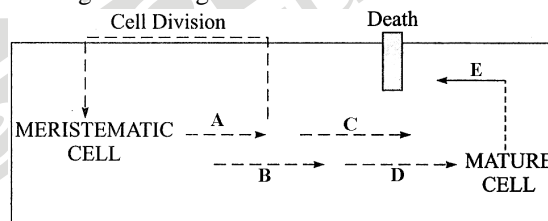
(1)  $\text{Na}_2\text{CO}_3$  (2)  $\text{NaOH}$  (3)  $\text{NaHCO}_3$  (4)  $\text{Na}_2\text{O}$

30. Which of the following is/are correct use(s) of hydrogen?

(1) Oxy-hydrogen and atomic hydrogen torches are used for cutting and welding of metals  
(2) As a rocket fuel  
(3) As fuel in fuel cell for generating electricity  
(4) All of the above

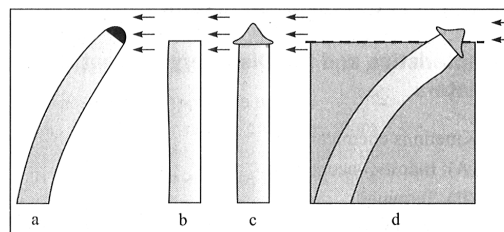
## BOTANY

31. Recognise the figure and find out the correct labelling:



(1) A—elongation, C—differentiation, B—plasmatic growth, D—senescence, E—maturation  
(2) B—elongation, E—differentiation, A—plasmatic growth, C—senescence, D—maturation  
(3) A—elongation, D—differentiation, B—plasmatic growth, E—senescence, C—maturation  
(4) B—elongation, C—differentiation, A—plasmatic growth, E—senescence, D—maturation

32. The following experiment demonstrate that the



(1) Tip of coleoptile is the source of auxin  
(2) Tip of coleoptile is the site of transmittable influence that caused the bending of entire coleoptile  
(3) Both (1) and (2)  
(4) Tip of coleoptile is the source of cytokinin

33. Plant growth hormones extracted from a fungus and a fish are respectively  
 (1) Gibberellin and zeatin  
 (2) Ethylene and cytokinin  
 (3) Auxin and 2, 4-D  
 (4) Gibberellin and kinetin

34. Which one of the PGRs would be used by farmers if they are asked to  
 (A) Induce parthenocarpy in tomatoes  
 (B) Hastens fruit ripening in tomatoes and apples  
 (C) Induces flowering in mango  
 (D) Elongation and improvement in shape of apple  
 (E) Promote nutrient mobilisation  
 (1) A-auxins, B-ethephon, C-ethylene, D-GA, E-cytokinin  
 (2) A-ethylene, B-GA, C-auxin, D-ethephon, E-cytokinin  
 (3) A-auxin, B-ethephon, C-cytokinin, D-ethylene, E-GA  
 (4) A-cytokinin, B-auxin, C-GA, D-ethephon, E-ethylene

35. Match the columns.

	Column-I		Column-II
1.	Human urine	A.	Cytokinin
2.	Gibberella fujikuroi	B.	Auxin
3.	Herring fish DNA	C.	Ethylene
4.	Ripening fruits	D.	Abscisic acid
5.	Aged leaves of plants	E.	Gibberellins

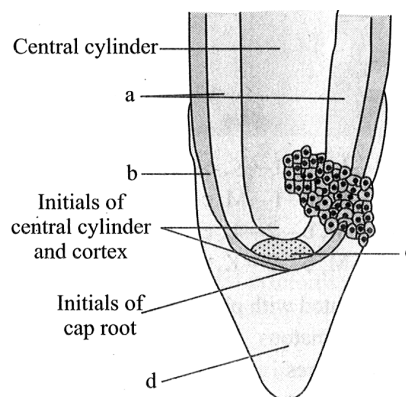
- (1) 1-B; 2-E; 3-A; 4-C; 5-D  
 (2) 1-B; 2-C; 3-D; 4-E; 5-A  
 (3) 1-A; 2-E; 3-B; 4-D; 5-C  
 (4) 1-E; 2-D; 3-C; 4-B; 5-A

36. Fill in the blanks:

1. Wheat, barely and rye have two kinds of varieties: winter and spring varieties. The 'spring' variety are normally planted in ...a... and come to flower and produce grain before the end of growing season.  
 2. 'Winter' varieties, however, if planted in ...b... would normally fail to flower or produce mature grain within a span of flowering season.  
 3. Hence 'winter' varieties are planted in ...c... They germinate, and over ...d... come out as small seedlings resume growth in the ...e... and are harvested usually around mid-summer.  
 (1) a-spring, b-winter, c-spring, d-winter, e-spring  
 (2) a-winter, b-spring, c-winter, d-spring, e-winter  
 (3) a-spring, b-spring, c-autumn, d-winter, e-spring  
 (4) a-spring, b-winter, c-autumn, d-spring, e-winter

37. Growth in plants is largely restricted to specialised regions of active cell division called  
 (1) Meristems (2) Cambium  
 (3) Primordium (4) Permanent tissue

38. Recognise the figure and find out the correct matching.



- (1) a-cortex, b-protoderm, c-root apical meristem, d-root cap  
 (2) b-cortex, a-protoderm, d-root apical meristem, c-root cap  
 (3) a-cortex, c-protoderm, b-root apical meristem, d-root cap  
 (4) b-cortex, a-protoderm, c-root apical meristem, d-root cap

39. What is the mode of nutrition in monera?

- (1) Chemosynthetic and photosynthetic  
 (2) Saprophytic  
 (3) Parasitic  
 (4) All of these

40. Cyanobacteria:

- (1) Have chlorophyll a similar to green plants  
 (2) Are heterotrophic  
 (3) Are unicellular, colonial or filamentous, marine or terrestrial algae  
 (4) More than one is correct

41. Aspergillus belongs to:

- (1) Phycomycetes  
 (2) Ascomycetes  
 (3) Deuteromycetes  
 (4) Basidiomycetes

42. In majority of the dicotyledonous plants primary root arises from:

- (1) Plumule  
 (2) Radicle  
 (3) Part of plant other than radical  
 (4) All are correct

43. Pulvinus leaf base found in:

- (1) Oil plant (2) Resinous plant  
 (3) Leguminous plant (4) Cereals plants

44. In canna flower which types of symmetry present:

- (1) Actinomorphic (2) Zygomorphic  
 (3) Asymmetrical (4) None of these

45. Diadelphous condition found in:  
(1) China rose (2) Pea  
(3) Citrus (4) Salvia and mustard

## ZOOLOGY

46. Part of brain involved in interpretation, storage of information of response on the basis of past experience is:  
(1) Association area (2) Cerebellum  
(3) Sensory area (4) Motor area
47. Muller's fibres occur in :  
(1) Heart (2) Kidney  
(3) Retina (4) Pancreas
48. Choose incorrect statement.  
(1) Posterior lobe of cerebrum is called occipital lobe  
(2) Prominent folds are present on outer part of cerebral hemisphere. Ridges are known as sulci while grooves are called gyri  
(3) Maximum part of diencephalon is formed by thalamus  
(4) Both the cerebral hemisphere connected by white thick fibre called corpus callosum
49. Myelin sheath is produced by  
(1) Schwann cells and oligodendrocytes  
(2) astrocytes and Schwann cells  
(3) oligodendrocytes and osteoclasts  
(4) osteoclasts and astrocytes
50. Which one of the following statements is true?  
(1) Saltatory conduction is seen in non-myelinated nerve fibres  
(2) Nissl's granules are found in muscle fibres  
(3) Non-myelinated nerve fibres do not possess nodes of Ranvier  
(4) Non-myelinated nerve fibres are completely enclosed by myelin sheath
51. Which of the following receptors are specifically responsible for maintenance of the balance of body and posture ?  
(1) Basilar membrane and otoliths  
(2) Hair cells and organ of Corti  
(3) Tectorial membrane and macula  
(4) Crista ampullaris and macula
52. The order of the three layers of cells in the retina of human eye from inside to outside is  
(1) bipolar cells, photoreceptor cells, ganglion cells  
(2) ganglion cells, rods, cones  
(3) ganglion cells, bipolar cells, photoreceptor cells  
(4) photoreceptor cells, ganglion cells, bipolar cells
53. Dilation of pupil takes place by  
(1) sympathetic nervous system  
(2) parasympathetic nervous system  
(3) central nervous system  
(4) Both (1) and (2)
54. Restriction enzyme breaks  
(1) Glycosidic linkage  
(2) H-bond  
(3) Sugar-Phosphate linkage  
(4) All of these
55. The first restriction enzyme type II was isolated from  
(1) E.coli  
(2) Haemophilus influenzae  
(3) Pseudomonas  
(4) Xanthomonas
56. Which of the following antibiotic resistance genes are used as selectable marker for E.coli?  
(1) Chloramphenicol (2) Tetracycline  
(3) Kanamycin (4) All of these
57. Which of the following is used to check the progression of restriction enzyme digestion ?  
(1) PCR (2) ROP  
(3) AGE (4) All
58. PCR is related to  
(1) DNA cloning  
(2) DNA amplification  
(3) DNA selective replication  
(4) All of these
59. Golden rice is  
(1) A Variety of rice grown along the yellow river in China  
(2) Long stored rice having yellow colour tint  
(3) A Transgenic rice having gene for  $\beta$ -carotene  
(4) Wild variety of rice with yellow coloured grains.
60. A functional ADA cDNA can be introduced into cells of the patients receiving gene therapy by using vector constituted by  
(1) E. coli (2) Reovirus  
(3) Retrovirus (4) Agrobacterium