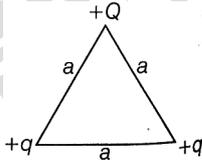


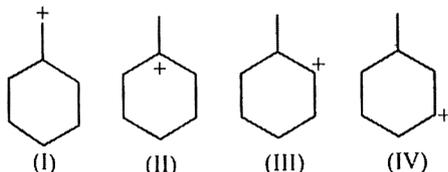
**SAMPLE PAPER - 14**
**PHYSICS**

01. Mark the wrong statement for a particle going on a straight line :
- If the velocity and acceleration have opposite sign, the object is slowing down.
  - If the position and velocity have opposite sign, the particle is moving towards the origin
  - If the velocity is zero at an instant, the acceleration should also be zero at that instant
  - If the velocity is zero for a time interval, the acceleration is zero at any instant within the time interval.
02. An aeroplane is flying horizontally with a velocity of 720 km/hr and at a height of 1960 m. When it is vertically above a point A on the ground, a bomb is released from it. The bomb strikes the ground at a point B. The distance AB is (ignoring air resistance)
- 2 km
  - 4 km
  - 1 km
  - None of these
03. A bucket tied at the end of a 1.6 m long string, is whirled in a vertical circle. What should be the minimum speed so that the water from the bucket does not split when the bucket is at highest position?
- 16 m/s
  - 4 m/s
  - 6.25 m/s
  - none of these
04. Two particles A and B are moving in uniform circular motion in concentric circles of radii  $r_A$  and  $r_B$  with speed  $V_A$  and  $V_B$  respectively. Their time period of rotation is the same. The ratio of angular speed of A to that of B will be :
- $r_A : r_B$
  - $V_A : V_B$
  - $r_B : r_A$
  - 1 : 1
05. Velocity vector and acceleration vector in a uniform circular motion are related as
- both in the same direction
  - perpendicular to each other
  - both in opposite direction
  - not related to each other
06. The capacitance of two concentric spherical shells of radii  $R_1$  and  $R_2$  ( $R_2 > R_1$ ) is
- $4\pi\epsilon_0 R_2$
  - $4\pi\epsilon_0 \frac{(R_2 - R_1)}{R_1 R_2}$
  - $4\pi\epsilon_0 \frac{R_1 R_2}{(R_2 - R_1)}$
  - $4\pi\epsilon_0 R_1$
07. Three charges are placed at the vertex of an equilateral triangle as shown in figure. For what value of Q, the electrostatic potential energy of the system is zero?
- 
- q
  - q/2
  - 2q
  - q/2
08. Two boys are standing at the ends A and B of a ground, where  $AB = a$ . The boy at B starts running in a direction perpendicular to AB with velocity  $v_1$ . The boy at A starts running simultaneously with constant velocity  $v$  and catches the other boy in a time  $t$ , where  $t$  is :
- $\frac{a}{\sqrt{v^2 + v_1^2}}$
  - $\frac{a^2}{\sqrt{v^2 - v_1^2}}$
  - $\frac{a}{(v - v_1)}$
  - $\frac{a}{(v + v_1)}$
09. An object moving with a speed of 6.25 m/s, is decelerated at a rate given by :
- $$\frac{dv}{dt} = -2.5\sqrt{v};$$
- where  $v$  is instantaneous speed. The time taken by the object, to come to rest, would be :
- 1 s
  - 2 s
  - 4 s
  - 8 s

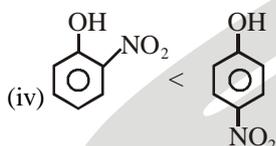
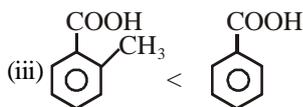
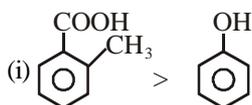
10. Two charged spheres of radii  $R_1$  and  $R_2$  have equal surface charge density. The ratio of their potential is  
 (1)  $R_1/R_2$  (2)  $R_2/R_1$  (3)  $(R_1/R_2)^2$  (4)  $(R_2/R_1)^2$

## CHEMISTRY

11. The stability order of the following carbocations is:

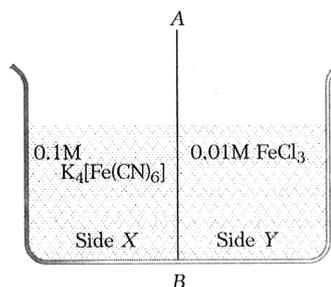


- (1) I > II > III > IV  
 (2) II > IV > III > I  
 (3) IV > III > II > I  
 (4) II > III > I > IV
12. Which of the following is correct order of acidic strength:-



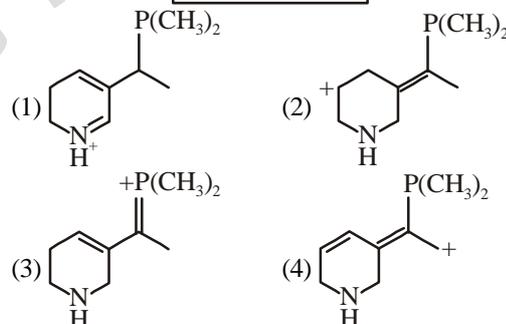
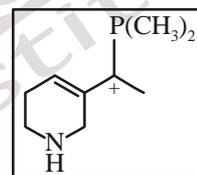
- (1) (i) & (iv)                      (2) (i), (iii) & (iv)  
 (3) (i) & (iii)                      (4) (i), (ii), (iii) & (iv)
13. van't Hoff factors are x, y, z in the case of association, dissociation and no change respectively. Increasing order is  
 (1)  $x < y < z$                       (2)  $x = y = z$   
 (3)  $y < x < z$                       (4)  $x < z < y$
14. The relationship between osmotic pressure at 273 K when 10 g glucose ( $p_1$ ), 10 g urea ( $p_2$ ) and 10 g sucrose ( $p_3$ ) are dissolved in 240 mL of water is  
 (1)  $p_1 > p_2 > p_3$                       (2)  $p_3 > p_1 > p_2$   
 (3)  $p_2 > p_1 > p_3$                       (4)  $p_2 > p_3 > p_1$

15.  $\text{FeCl}_3$  on reaction with  $\text{K}_4[\text{Fe}(\text{CN})_6]$  in aqueous solution gives blue colour. These are separated by a semi permeable membrane AB as shown.

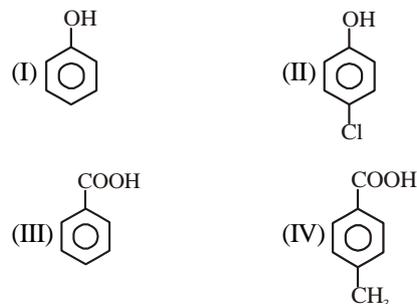


Due to osmosis there is

- (1) blue colour formation in side X  
 (2) blue colour formation in side Y  
 (3) blue colour formation in both of the sides X and Y  
 (4) no blue colour formation
16. Consider the isoelectronic species,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{F}^-$  and  $\text{O}^{2-}$ . The correct order of increasing length of their radii is \_\_\_\_\_  
 (1)  $\text{F}^- < \text{O}^{2-} < \text{Mg}^{2+} < \text{Na}^+$   
 (2)  $\text{Mg}^{2+} < \text{Na}^+ < \text{F}^- < \text{O}^{2-}$   
 (3)  $\text{O}^{2-} < \text{F}^- < \text{Na}^+ < \text{Mg}^{2+}$   
 (4)  $\text{O}^{2-} < \text{F}^- < \text{Mg}^{2+} < \text{Na}^+$
17. Which of the following species is a resonance form of the species in the box?



18. The correct acidity order of the following is:



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

19. Correct order of basic strength of given amine in aqueous medium  
 $C_2H_5NH_2$ ,  $(C_2H_5)_2NH$ ,  $(C_2H_5)_3N$ ,  $C_6H_5NH_2$   
 (1)  $(C_2H_5)_2NH > C_2H_5NH_2 > (C_2H_5)_3N > C_6H_5NH_2$   
 (2)  $(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2 > C_6H_5NH_2$   
 (3)  $(C_2H_5)_2NH > (C_2H_5)_3N > C_6H_5NH_2 > C_2H_5NH_2$   
 (4)  $(C_2H_5)_3N > (C_2H_5)_2NH > C_2H_5NH_2 > C_6H_5NH_2$
20. For the following, the increasing order of nucleophilicity is  $I^-$ ,  $Cl^-$ ,  $Br^-$   
 (1)  $I^- < Cl^- < Br^-$  (2)  $Br^- < Cl^- < I^-$   
 (3)  $I^- < Br^- < Cl^-$  (4)  $Cl^- < Br^- < I^-$

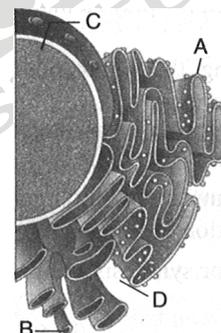
## BOTANY

21. .... is the best stage to count the number and study the morphology of chromosomes  
 (1) Prophase  
 (2) Metaphase  
 (3) Anaphase  
 (4) Telophase
22. Fill in the blanks:  
 1. ATP synthase consists of two major components,  $F_0$  and  $F_1$ . The ....a.... headpiece is peripheral membrane protein complex and contains the site for synthesis of ATP from ADP and inorganic phosphate.  
 2. ....b.... is an integral membrane protein complex that forms the channel through which proton crosses the membrane.  
 3. For each ATP produced, .....c..... passes through ....b.... from the ....d.... to the ....e.... down the electrochemical proton gradient.  
 (1) a- $F_0$ , b- $F_1$ , c- $2H^+$ , d-matrix, e-inner membrane  
 (2) a- $F_1$ , b- $F_0$ , c- $2H^+$ , d-intermembrane space, e-matrix  
 (3) a- $F_0$ , b- $F_1$ , c- $2H^+$ , d-intermembrane space, e-matrix  
 (4) a- $F_1$ , d- $F_0$ , c- $2H^+$ , d-matrix e-intermembrane space
23. Match the columns and identify the correct option.

	Column I		Column II
(a)	Thylakoids	(1)	Disc-shaped sacs in Golgi apparatus
(b)	Cristae	(2)	Condensed structure of DNA
(c)	Cisternae	(3)	Flat membranous sacs in stroma
(d)	Chromatid	(4)	Infoldings in mitochondria

- (1) a-3, b-4, c-1, d-2  
 (2) a-3, b-1, c-4, d-2  
 (3) a-3, b-4, c-2, d-1  
 (4) a-4, b-3, c-1, d-2

24. Read the following statement carefully and mark them as true (T) or false (F).  
 A. The content of nucleolus is continuous with the rest of the nucleoplasm.  
 B. In the chromoplast, water soluble carotenoid pigments like carotene and xanthophyll are present.  
 C. Basal body of bacterial flagellum has 9 + 2 arrangement of microtubules.  
 (1) T, F, F (2) F, T, T (3) T, F, T (4) T, T, F
25. Which of the events listed below is not observed during mitosis?  
 (1) Chromatin condensation  
 (2) Movement of centrioles to opposite poles  
 (3) Appearance of chromosomes with two chromatids joined together at the centromere  
 (4) Crossing over
26. Action spectrum of photosynthesis resembles roughly the  
 (1) Absorption spectrum of chlorophyll *a*  
 (2) Absorption spectrum of chlorophyll *b*  
 (3) Absorption spectrum of chlorophyll *c*  
 (4) Absorption spectrum of chlorophyll *a* and *b*
27. Identify the components labelled A, B, C and D in the diagram below from the list (i) to (vii) given along with:



### Components:

- (1) Cristae of mitochondria  
 (2) Inner membrane of mitochondria  
 (3) Cytoplasm  
 (4) Smooth endoplasmic reticulum  
 (5) Rough endoplasmic reticulum  
 (6) Mitochondrial matrix  
 (7) Cell vacuole  
 (8) Nucleus

The correct components are:

- (1) A-5, B-4, C-8, D-3 (2) A-1, B-4, C-8, D-4  
 (3) A-6, B-5, C-4, D-7 (4) A-5, B-1, C-3, D-2

28. Arrangement of microtubules in a flagellum and a centriole is respectively  
 (1) 9 + 2 and 9 + 1  
 (2) 9 + 1 and 9 + 0  
 (3) 9 + 0 and 9 + 2  
 (4) 9 + 2 and 9 + 0

29. Which of the following options is true for a secretory cell?  
 (1) Golgi apparatus is absent  
 (2) RER is easily observed in the cell  
 (3) Only SER is present  
 (4) Secretory granules are formed in nucleus
30. The best material for the study of structure of cell membrane is  
 (1) RBC of human  
 (2) Liver cell  
 (3) kidney cell  
 (4) muscle cell

## ZOOLOGY

31. Releasing hormones and inhibiting hormones are produced by  
 (1) Pituitary (2) Thyroid  
 (3) Thymus (4) Hypothalamus
32. The adrenal medulla secretes two hormones called adrenaline or epinephrine and nor-adrenaline or nor-epinephrine. These are commonly known as  
 (1) Steroids  
 (2) Terpenes  
 (3) Catecholamines  
 (4) Cytokinin
33. A child suffers from erythroblastosis foetalis if  
 (1) mother is Rh<sup>+</sup>, father is Rh<sup>-</sup>  
 (2) mother is Rh<sup>-</sup>, father is Rh<sup>+</sup>  
 (3) both are Rh<sup>-</sup>  
 (4) both are Rh<sup>+</sup>

34. The function of thyrocalcitonin is  
 (1) Lowers Ca<sup>2+</sup> level in blood  
 (2) Elevates K<sup>+</sup> level in blood  
 (3) Elevates Ca<sup>2+</sup> level in blood  
 (4) None of the above
35. The organs of different species that are related to each other through common descent through becomes functionally different are called  
 (1) Vestigial (2) Analogous  
 (3) Homologous (4) None of these
36. Immune response of any old person is weak because  
 (1) Thymus is degenerated in an old individual  
 (2) Thymosin production decreases  
 (3) Both (1) and (2)  
 (4) None of these
37. Select the total number of hormones from the following which has extra cellular receptor Erythropoietin, Gastrin, Secretin, GIP, CCK, Insulin, Glucagon, Thymosin, PTH, ANF  
 (1) 8 (2) 7 (3) 9 (4) 10
38. Arachidonic acid has how many carbon atoms?  
 (1) 16 (2) 15 (3) 20 (4) 21
39. The aves have additional chamber in digestive tract, where.....is for food storage and ..... is for food grinding  
 (1) Crop, gizzard (2) Gizzard, crop  
 (3) Crop, pharynx (4) Pharynx, gizzard
40. Select the incorrect matching  
 (1) Kangaroo - *Macropus*  
 (2) Blue whale - *Balaenoptera*  
 (3) Monkey - *Macaca*  
 (4) *Elephas* - *Camel*