Regn. No. 0920
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ESTD. 1985
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SAMPLE PAPER - 35

Time : 1 : 15 Hr. **Question : 60**

PHYSICS

01. A boy walks to his school at a distance of 6 km with constant speed of 2.5 km/h and walks back with a constant speed of 4 km/h. His average speed for round trip expressed in km /h, is

(1) $\frac{24}{13}$ (2) $\frac{40}{13}$ (3) 3 (4) $\frac{1}{2}$

02. A particle has an initial velocity of 9 m/s due east and a constant acceleration of $2m/s^2$ due west. The distance covered by the particle in the fifth second of its motion is:

(1) 0 (2) 0.5 m
(3) 2 m (4) none of these.

03. Drops of water fall from the roof of a building 9 m high at regular intervals of time, the first drop reaching the ground at the same instant fourth drop starts its fall. What are the distances of the second and third drops from the roof ?

(1) 6 m and 2 m (2) 6 m and 3 m
(3) 4 m and 1 m (4) 4 m and 2 m

04. The displacement - time graph of a particle at time t makes angle 45° with the time axis. After two seconds, it makes an angle 60° with the time axis. What is the average acceleration of the particle?

(1) $\frac{1}{2}$ (2) $\frac{\sqrt{3}}{2}$

(3) $\frac{(\sqrt{3}-1)}{2}$ (4) $\frac{(\sqrt{3}+1)}{2}$

05. A car accelerates from rest at a constant rate $2m/s^2$ for some time. Then it retards at constant rate of $4 m/s^2$ 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

06. A particle located at x = 0 at time t = 0, starts moving along the positive x-direction with a velocity v that varies as $v = \alpha\sqrt{x}$. The displacement of the particle varies with time as

(1) t^3 (2) t^2 (3) t (4) $t^{1/2}$

07. 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)

(1) 2 km (2) 4 km
(3) 1 km (4) None of these

08. Two forces P and Q have a resultant perpendicular to P. The angle between the forces is

(1) $\tan^{-1}\left(\frac{-P}{Q}\right)$ (2) $\tan^{-1}\left(\frac{P}{Q}\right)$

(3) $\sin^{-1}\left(\frac{P}{Q}\right)$ (4) $\cos^{-1}\left(-\frac{P}{Q}\right)$

09. Two particles A and B get 4 m closer each second while travelling in opposite direction. They get 0.4 m closer every second while travelling in same direction. The speeds of A and B are respectively

(1) 2.2 m s^{-1} and 0.4 m s^{-1}
(2) 2.2 m s^{-1} and 1.8 m s^{-1}
(3) 4 m s^{-1} and 0.4 m s^{-1}
(4) 2.2 m s^{-1} and 4 m s^{-1}

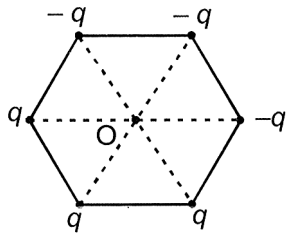
10. When two particles having charges q_1 and q_2 are kept at a certain distance, they exert a force F on each other. If the distance between the two particles is reduced to half and the charge on each particle is doubled then the force between the particles would be

(1) 2F (2) 4F (3) 8F (4) 16F

11. An electric dipole having charges +q and –q at a separation r. At distance d > > r along the axis of the dipole, the field is proportional to

(1) $\frac{q}{d^2}$ (2) $\frac{qr}{d^2}$ (3) $\frac{q}{d^3}$ (4) $\frac{qr}{d^3}$

12. Six point charges are placed at the vertices of a hexagon of side 1 m as shown in figure. Net electric field at the centre of the hexagon is



(1) Zero (2) $\frac{6q}{4\pi\varepsilon_0}$

(3) $\frac{q}{\pi\varepsilon_0}$ (4) $\frac{q}{4\pi\varepsilon_0}$

13. The planet has a mass of eight times the mass of earth and density is also equal to eight times the average density of the earth. If g be the acceleration due to earth's gravity on its surface, then acceleration due to gravity on planet's surface will be.
(1) 2g (2) 4g (3) 8g (4) 16g

14. A satellite is moving around the earth in a circular orbit. The force acting on the satellite is:
(1) centripetal only, provided by gravitational pull
(2) centrifugal only, due to the orbital motion
(3) zero because centripetal and centrifugal forces balance out
(4) tangential to orbit, provided by a machine fitted to the satellite

15. The height at which the weight of a body becomes 1/4th, of its weight on the surface of earth (radius R), is
(1) R (2) 2 R
(3) 3 R (4) 4 R

CHEMISTRY

16. Which has minimum number of atoms of oxygen?
(1) 10 mL H_2O (*l*)
(2) 0.1 mole of V_2O_5 (s)
(3) 12 gm O_3(g)
(4) 12.044×10^{22} molecules of CO_2

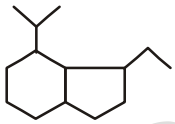
17. In an organic compound of molar mass 108 gm mol^{-1} C, H and N atoms are present in 9:1:3.5 by weight. Molecular formula can be:
(1) $C_6H_8N_2$ (2) $C_7H_{10}N$
(3) $C_5H_6N_3$ (4) $C_4H_{18}N_3$

18. In which of the following pairs do 1 g of each have an equal number of molecules?
(1) N_2O and CO (2) N_2 and C_3O_2
(3) N_2 and CO (4) None

19. How many moles of magnesium phosphate $Mg_3(PO_4)_2$ will contain 0.25 mol of oxygen atoms?
(1) 0.02 (2) 3.125×10^{-2}
(3) 1.25×10^{-2} (4) 2.5×10^{-2}

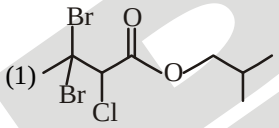
20. 1 M HCl and 2 M HCl are mixed in volume ratio of 4:1. What is the final molarity of HCl solution?
(1) 1.5 (2) 1 (3) 1.2 (4) 1.8

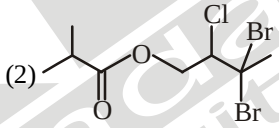
21. The number of 3° and 2° carbon atoms in the following compound is

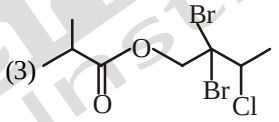


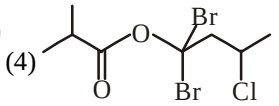
(1) 5, 6 (2) 5, 7
(3) 4, 6 (4) 6, 6

22. Which of the following is correct structure of 3, 3-dibromo-2-chlorobutyl 2-methyl propanoate?

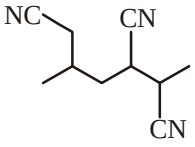
(1) 

(2) 

(3) 

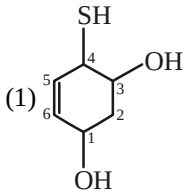
(4) 

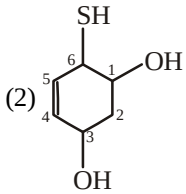
23. What is the correct IUPAC name of the compound?

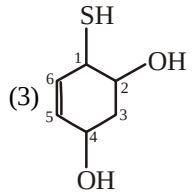


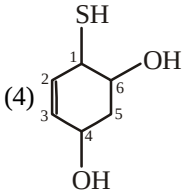
(1) 3-cyano-2, 5-dimethyl heptanedinitrile
(2) 2-methyl hexane-1, 4, 5-tricarbonitrile
(3) 2, 5-dimethyl-1, 3, 7-heptanedinitrile
(4) 5-cyano-3, 6-dimethyl heptanedinitrile

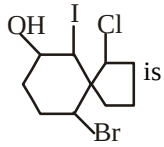
24. Select the structure with correct numbering for IUPAC name of the compound

(1) 

(2) 

(3) 

(4) 

25. IUPAC name of the compound  is

(1) 2-chloro-2′-bromo-6-iodospiro [4.5]-5-decanol
(2) 2′-Bromo-2-Chloro-6 iodospiro [4.5]-5 decanol
(3) 10-Bromo-2-Chloro-6-iodospiro [4.5]-7-decanol
(4) None of these

26. I.U.P.A.C name of element having atomic number 109 :
(1) Unnilnonium (2) Ununennium
(3) Ununnonium (4) Unnilennium

27. Which of the following species will have largest and smallest species :
Mg, Al, Mg^{++}, Al^{+3}
(1) Mg, Al^{+3} (2) Al, Al^{+3}
(3) Mg^{++}, Al^{3+} (4) Mg^{++}, Al

28. Decreasing order of first ionisation enthalpy of group-13 elements are :
(1) B > Ga > Al > In > Tl (2) B > Ga > Al > Tl > In
(3) B > Tl > Ga > Al > In (4) Tl > In > Ga > Al > B

29. The correct decreasing order of IP in following elements
(1) B > Ga > Al > In > Tl (2) B < Be < C < N < O
(3) Al < Mg < Si < S < P (4) P > S > Si > Mg > Al

30.

Element	Group No.	Period
A	14	III
B	2	II
C	2	III
D	1	III
E	15	III

The decreasing order of metallic character of elements
(1) D > C > B > A > E (2) B > C > D > E > A
(3) B > C > D > A > E (4) D > C > B > E > A

BOTANY

31. Read the following statements and find out the incorrect statement.
(1) Different proteins in the membrane play a major role in both active as well as passive transport.
(2) Pumps are the proteins that use energy to transport substances across the cell membrane from a low concentration to high concentration (downhill transport)
(3) Like enzymes the carrier protein is very specific in what it carries across the membrane.
(4) Diffusion whether facilitated or not-takes place only along a gradient and do not use energy.

32. Uniport, symport and antiport are the types of
(1) Simple diffusion
(2) Facilitated diffusion
(3) Active transport
(4) Osmosis

33. Fill in the blanks
1. Despite the absence of a heart or a circulatory system in plants, the flow of water upward through the xylm in plants can achieve fairly high rates up to ...a... metres per hour.
2. Less than ...b... percent of the water reaching the leaves is used in photosynthesis and plant growth.
3. Water loss from a leaf can be studied by using ...e...
4. Most researchers agree that water is mainly ...d... through the plant.
(1) a–10, b–5, c-potato osmometer, d–pushed
(2) a–5, b–10, c–cobalt chloride paper, d–pulled
(3) a–15, b–1, c–cobalt chloride paper, d–pulled
(4) a–10, b–1, c–cobalt chloride paper, d–pushed

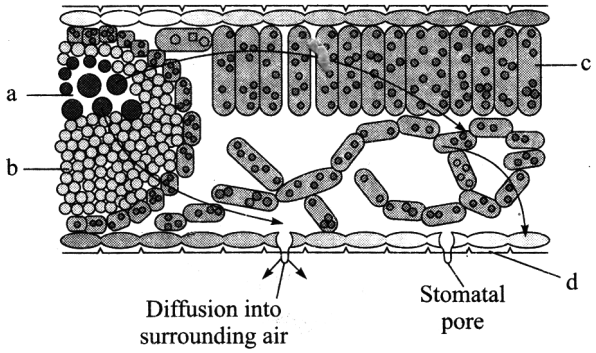
34. If a pressure greater than atmospheric pressure is applied to pure water or a solution, its water potential
(1) Increases
(2) Decreases
(3) Remains same
(4) Becomes zero

35. The net direction and rate of osmosis depends on
(1) Pressure gradient
(2) Concentration gradient
(3) Both A and B
(4) None of the above

36. In thistle funnel experiment, if sugar is added to beaker after the stoppage of osmosis, then
(1) Level of solution in beaker lowers
(2) Level of solution in thistle funnel rises up
(3) Level of solution in beaker/remains same
(4) Level of solution in thistle funnel lowers

37. 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 polyethene respectively
(4) Blotting paper and cobalt chloride paper respectively.

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



(1) c–palisade, d–guard cell, a–xylem, b–phloem
(2) c–palisade, d–guard cell, b–xylem, a–phloem
(3) d–palisade, c–guard cell, a–xylem, b–phloem
(4) d–palisade, c–guard cell, b–xylem, a–phloem

39. Which of the following are not inclusion bodies?
(1) Phosphate granules
(2) Cyanophycean granules
(3) Glycogen granules
(4) Glucose granules

40. Match column I with column II, and choose the correct combination from the options given below.

Column I		Column II	
A.	Kinetochores	i.	Non-staining
B.	Satellite	ii.	Proteinaceous structure
C.	Cytoskeleton	iii.	Disc shaped
D.	Axoneme	iv.	Cilia

(1) A-iii, B-i, C-iv, D-ii
(2) A-iii, B-ii, C-i, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iii, B-i, C-ii, D-iv

41. Proteins synthesised by ribosomes on the ER are modified in the cisternae of Golgi body before they are released from its _____.
(1) trans face (2) formative face
(3) cis face (4) both (2) and (3)

42. Select the correct matching.

	Column-(I) (Type of leucoplast)		Column-II (Stored food)
(a)	Amyloplast	(i)	Oil and fat
(b)	Elaioplast	(ii)	Protein
(c)	Aleuroplasts	(iii)	Carbohydrate

(1) (1)–(iii); (2)–(i); (3)–(ii)
(2) (1)–(i); (2)–(ii); (3)–(iii)
(3) (1)–(iii); (2)–(ii); (3)–(i)
(4) (1)–(ii); (2)–(iii); (3)–(i)

43. The core of cilia and flagella is called
(1) axoneme (2) protoplasmic sheath
(3) granum (4) spoke

44. m–RNA is actively synthesised in
(1) nucleoplasm (2) ribosomes
(3) lysosomes (4) nucleolus

45. Select the correct match
(1) Nucleus – Flemming
(2) Golgi Complex – Christian de Duve
(3) Chromatin – Robert Brown
(4) Ribosomes – George Palade

ZOOLOGY

46. Match the columns I and II and choose the correct combination form the options given

Column-I		Column-II	
A.	Fibrinogen	I.	Biconcave
B.	Granulocyte	II.	Clotting of blood
C.	Largest sized WBC	III.	Basophils
D.	RBCs	IV.	Monocyte

(1) A-IV, B-III, C-II, D-I
(2) A-II, B-III, C-IV, D-I
(3) A-III, B-II, C-IV, D-I
(4) A-I, B-II, C-III, D-IV

47. Cardiac output is blood
(1) Receives by heart per minute
(2) Pumped by ventricles per sec
(3) Pumped by each ventricle per minute
(4) Pumped by left ventricle per hour

48. Match the column

Column I		Column II	
A.	Superior Vena Cava	p.	Carries deoxygenated blood to lungs
B.	Inferior Vena Cava	q.	Carries Oxygenated blood from lungs
C.	Pulmonary Aterty	r.	Brings deoxygenated blood from lower parts of body to right atrium
D.	Pulmonary Vein	s.	Brings deoxygenated blood from upper parts of body into right atrium

(1) A-q, B-s, C-r, D-p
(2) A-s, B-p, C-q, D-r
(3) A-s, B-r, C-p, D-q
(4) A-s, B-p, C-r, D-q

49. Find the correct descending order of percentage proportion of leucocytes in human blood
(1) Neutrophils → Basophils → Lymphocytes → acidophils → monocytes
(2) Neutrophils → Monocytes → Lymphocytes → Acidophils → Basophils
(3) Neutrophils → Lymphocytes → Monocytes → Acidophils → Basophils
(4) Neutrophils → Acidophils → Basophils → Lymphocytes → Monicytes.

50. Select the correct option

	Structure	%	Function
(1)		0.3-0.5	Phagocytic
(2)		0.5-1	Secret histamine and serotonin
(3)		30-40	Defence against microbes
(4)		30-40	Allergic reactions

51. Hardening of arteries due to precipitationof Ca salts and cholesterol causes
(1) Heart attack (2) Arteriosclerosis
(3) Atherosclerosis (4) Hypertension

52. The walls of capillaries are composed of endothelium which is
(1) Cuboidal epithelium
(2) Squamous epithelium
(3) Columnar epithelium
(4) Stratified epithelium

53. At the end of joint diastole ventricle is
(1) Completely filled by blood
(2) Two third filled by blood
(3) One third filled by blood
(4) Completely empty

54. Identify the correct sequence of following events :
1. Air is inspired
2. Increase in thoracic cavity
3. Increase in pulmonary cavity
4. Contraction of intercostal and phrenic muscles (Diaphragm)
(1) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$ (2) $4 \rightarrow 1 \rightarrow 2 \rightarrow 3$
(3) $4 \rightarrow 3 \rightarrow 2 \rightarrow 1$ (4) $4 \rightarrow 2 \rightarrow 3 \rightarrow 1$

55. CO_2 is mainly carried as :
(1) carbamino-haemoglobin
(2) Carboxy-haemoglobin
(3) HCO_3^-
(4) Dissolved in plasma

56. Out of the following how many centres in brain are located in medulla ?
1. Respiratory rhythm centre
2. Chemosensitive area
3. Pheumotaxic centre
(1) None (2) 1 (3) 2 (4) 3

57. Which of the following is not the function of conducting part of lungs ?
(1) Humidification of air
(2) Transport of the atmospheric air to the alveoli
(3) Diffusion of O_2 and CO_2
(4) Removal of foreign particles

58. Match the columns :

Column-A		Column-B	
A.	Tidal Volume	1.	5800 ml
B.	Expiratory reserve volume	2.	3000 ml
C.	Total lung capacity	3.	500 ml
D.	Inspiratory capacity	4.	1100 ml

(1) A-3, B-4, C-2, D-1 (2) A-3, B-4, C-1, D-2
(3) A-4, B-2, C-1, D-3 (4) A-4, B-3, C-2, D-1

59. O_2 is mainly transported by blood from alveoli upto tissues as :
(1) HCO_3^-
(2) Oxy-haemoglobin
(3) Dissolved in plasma
(4) Carbamino-haemoglobin

60. Carbonic anhydrase enzyme is found in
(1) Very low concentration in RBCs and absent in plasma
(2) Very high concentration in RBCs and absent in plasma
(3) Very high concentration in RBCs and very low in plasma
(4) Very low concentration in RBCs and very high concentration in plasma