Regn. No. 0920
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ESTD. 1985
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SAMPLE PAPER - 37

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

PHYSICS

01. A train 200 m long crosses a bridge 300 m long. It enters the bridge with velocity 30 ms^{-1} and leaves it with velocity 50 ms^{-1}. What is the time taken to cross the bridge ?
(1) 2.5 s (2) 7.5 s (3) 12.5 s (4) 15.0 s

02. A lift is coming from 8th floor and is just about to reach 4th floor. Taking ground floor as origin and take positive direction upwards for all quantities, which one of the following is correct?
(1) $x < 0, v < 0, a > 0$
(2) $x > 0, v < 0, a < 0$
(3) $x > 0, v < 0, a > 0$
(4) $x > 0, v > 0, a < 0$

03. The area under velocity-time graph for a particle in a given interval of time represents
(1) velocity (2) acceleration
(3) work done (4) displacement

04. A stone is dropped into well in which the level of water is h below the top of the well. If v is velocity of sound, the time T after which the splash is heard is given by :
(1) $T = 2hv$ (2) $T = \sqrt{\frac{2h}{g}} + \frac{h}{v}$
(3) $T = \sqrt{\frac{2h}{g}} + \frac{h}{g}$ (4) $T = \sqrt{\frac{h}{2g}} + \frac{2h}{v}$

05. A ball is dropped from the top of a building 100 m high. At the same instant another ball is thrown upwards with a velocity of 40 m/s from the bottom of the building. The two balls will meet after
(1) 3 s (2) 2 s
(3) 2.5 s (4) 5 s

06. A ball released from the top of a tower travels $\frac{11}{36}$ of the height of the tower in the last second of its journey. The height of the tower is
(Take $g = 10\ m\ s^{-2}$)
(1) 11 m (2) 36 m (3) 47 m (4) 180 m

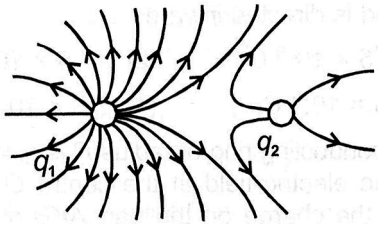
07. A particle is projected from a horizontal plane with a velocity of $8\sqrt{2}$ m s^{-1} at an angle θ. At highest point its velocity is found to be 8 m s^{-1}. Its range will be
($g = 10\ m\ s^{-2}$)
(1) 3.2 m (2) 4.6 m (3) 6.4 m (4) 12.8 m

08. A car travels due east on a level road for 30 km. It then turns due north at an intersection and travels 40 km before stopping. The resultant displacement of the car is
(1) 50 km, 53° north of east
(2) 50 km, 53° east of north
(3) 100 km, 37° north of east
(4) 100 km, 37° east of north

09. Rain is falling verticaly 4 ms^{-1}. A man is moving due east with 3 ms^{-1}. The direction in which he shall hold the umbrella with the vertical is
(1) 53^0 east of vertical
(2) 53^0 west of vertical
(3) 37^0 east of vertical
(4) 37^0 west of vertical

10. Two very small spheres A and B are charged with +10 and +20 coulomb respectively and separated by a distance of 80 cm. The electric field at point on the line joining the centres of the two spheres will be zero at almost how much distance from A ?
(1) 20 cm (2) 33 cm
(3) 45 cm (4) 60 cm

11. Figure shows electric field lines due to a charge configuration, from this we conclude that



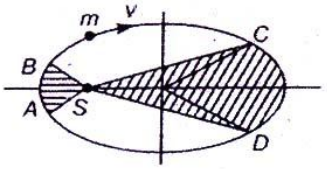
(1) q_1 and q_2 are positive and $q_2 > q_1$
(2) q_1 and q_2 are positive and $q_1 > q_2$
(3) q_1 and q_2 are negative and $|q_1| > |q_2|$
(4) q_1 and q_2 are negative and $|q_2| > |q_1|$

12. One can easily "weigh the earth" by calculating the mass of earth using the formula (in usual notation):

(1) $\frac{G}{g}R_E^2$ (2) $\frac{g}{G}R_E^2$ (3) $\frac{g}{G}R_E$ (4) $\frac{G}{g}R_E^3$

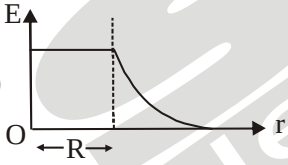
13. Which of the following options are correct?
(1) Acceleration due to gravity decreases with increasing altitude
(2) Acceleration due to gravity increases with increasing depth (assume the earth to be a sphere of uniform density).
(3) Acceleration due to gravity increases with increasing latitude
(4) Acceleration due to gravity is independent of the mass of the earth.
(1) 1, 3 (2) 2, 3 (3) 1 only (4) all

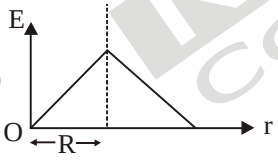
14. The figure shows elliptical orbit of a planet m about the sun S. The shaded area SCD is twice the shaded area SAB. If t_1 is the time for the planet to move from C to D and t_2 is the time to move from A to B, then.

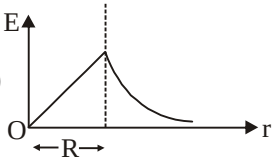


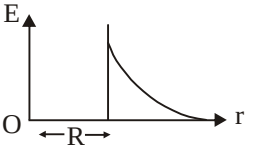
(1) $t_1 < t_2$ (2) $t_1 = 4t_2$
(3) $t_1 = 2t_2$ (4) $t_1 = t_2$

15. Which one of the following plots represents the variation of gravitational field on a particle with distance r due to a solid sphere of radius R ? (r is measured from the centre of the sphere.

(1)


(2)


(3)


(4)


CHEMISTRY

16. A given sample of pure compound contains 9.81 gm of Zn, 1.8×10^{23} atoms of chromium and 0.60 mole of oxygen atoms. What is the simplest formula? (Moler mass of Zn = 65)
(1) $ZnCr_2O_7$ (2) $ZnCr_2O_4$
(3) $ZnCrO_4$ (4) $ZnCrO_6$

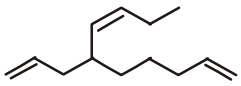
17. The mass of N_2F_4 produced by the reaction of 2.0 g of NH_3 and 8.0 g of F_2 is 3.56 g. What is the per cent yield?
$2NH_3 + 5F_2 \longrightarrow N_2F_4 + 6HF$
(1) 79.0 (2) 71.2
(3) 84.6 (4) None of these

18. Number of atoms in 558.5 g Fe (atomic weight = 55.85) is
(1) twice that in 60 g carbon
(2) 6.023×10^{22}
(3) Half in 8 g He
(4) $558.5 \times 6.023 \times 10^{23}$

19. The hydrated salt $Na_2XO_3.xH_2O$ undergoes 63% loss in mass on heating and becomes anhydrous. The value of x is
(1) 10 (2) 12
(3) 8 (4) 18

20. The correct IUPAC name of $(C_2H_5)_4C$ is
(1) Tetraethyl methane (2) 2-Ethylpentane
(3) 3, 3-Diethylpentane (4) None of these

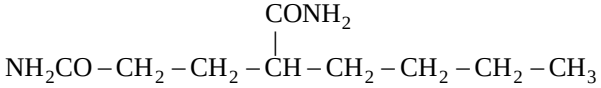
21. What is the correct IUPAC name of the following compound?



(1) 6-(2-propenyl)-1, 7-decadiene
(2) 5-(2-propenyl)-3, 9-decadiene
(3) 4-(1-propenyl)-1, 8-nonadiene
(4) 4-(1-butenyl)-1, 8-nonadiene

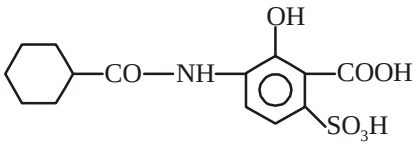
22. The correct IUPAC name of 2-ethyl-3-pentyne is
(1) 3-methyl hexyne-4
(2) 4-ethyl pentyne-2
(3) 4-methyl hex-2-yne
(4) None of these

23. The IUPAC name of compound



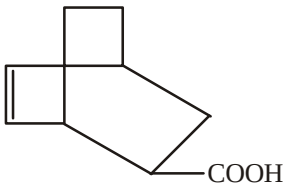
(1) 1, 3-Dicarbamoylheptane
(2) 4-Carbamoyloctane
(3) 2-Butyl pentanediamide
(4) 2-Butyl pentane diamino ketone

24. What is the name of the following compound?



(1) 3-(cyclohexanecarboxamido)-2 hydroxy-6 sulphobenzoic acid
(2) 2-Carboxy-4 (cyclohexanecarboxamido)-3-hydroxybenzene sulphonic acid
(3) 5-(cyclohexanecarboxamido)-6-hydroxy-2-sulphobenzoic acid
(4) None of the above

25. The diels-Alder reaction between 1,3-cyclohexadiene and propenoic acid gives the product.
Its IUPAC name is



(1) 2-carboxy bicyclo [2.2.2] oct-5-ene
(2) Bicyclo [2.2.2] oct-2-en-5-oicacid
(3) Bicyclo [2.2.2] oct-5-en-2-carboxylic acid
(4) 3-carboxy bicyclo [2.2.2] oct-5-ene

26. Which of the following is correct matching :
(1) O > S > Se > Te - Electron gain enthalpy
(2) B < C < O < N - Ionisation energy
(3) Ce < Gd < Nd < Eu - Atomic radius
(4) B < Ga < Al < Tl < In - Atomic radius

27. Consider the element F, Cl, O, N. The correct order of their electronegativity :
(1) F > O > N > Cl (2) F > Cl > O > N
(3) F > O > Cl > N (4) O > N > F > Cl

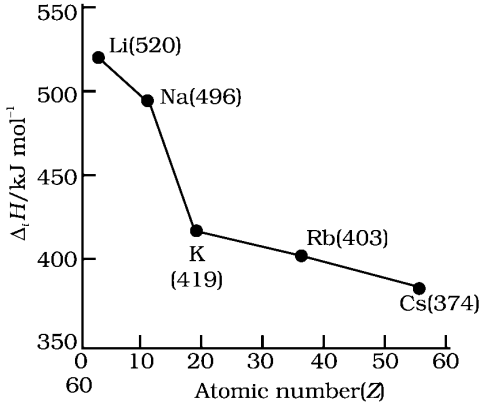
28. Determine correct matching between column-I & Column-II

Column-I	**Column-II**
A. Element Z = 71	p - group 16, period-7
B. Element Z = 116	q - p-block, group-13
C. Element - He	r - s- block
D. Element Z = 49	s - f-block

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

29. Among the following not a Dobereiner's Triads
(1) Li, Na, K
(2) F, Cl, Br
(3) Ca, Sr, Ba
(4) None of the these

30. The below graph represent



(1) IP_2 (2) ΔHeg_1
(3) IP_1 (4) Electronegativity

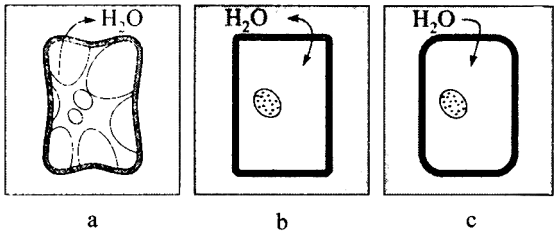
BOTANY

31. Fill in the blanks :

Property	**Simple diffusion**	**Facilitated diffusion**	**Active transport**
Uphill transport	No	...a...	...b...
highly selective	...c...	Yes	...d...
Transport saturates	...e...	...f...	Yes
Requires ATP energy	No	...g...	Yes
Requires special membrane proteins	No	Yes	...h...

(1) a-Yes, b-Yes, c-No, d-Yes, e-No, f-No, g-Yes, h-No
(2) a-No, b-Yes, c-Yes, d-No, e-Yes, f-Yes, g-No, h-Yes
(3) a-No, b-Yes, c-No, d-Yes, e-No, f-Yes, g-No, h-Yes
(4) a-No, b-Yes, c-No, d-Yes, e-No, f-No, g-No, h-Yes

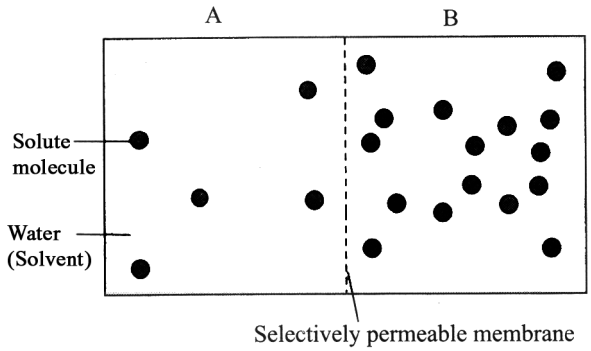
32. Recognise the figure and find out the correct matching.



(1) a- flaccid, b-turgid, c-plasmolysed
(2) b-flaccid, c-turgid, a-plasmolysed
(3) c-flaccid, a-turgid, b-plasmolysed
(4) c-flaccid, b-turgid, a-plasmolysed

33. Water will be absorbed by root hairs when the external medium is
(1) Hypotonic
(2) Hypertonic
(3) Isotonic
(4) Viscous

34. Recognise the figure and find out the correct statement.



(i) Solution of which chamber has a lower water potential?
(ii) Solution of which chamber has a lower solute potential?
(iii) In which direction osmosis occurs ?
(iv) At equilibrium which chamber will have lower water potential ?
(1) i-A, ii-B, (iii) A to B, (iv)-A
(2) i-B, ii-A, (iii) B to A, (iv)-B
(3) i-B, ii-B, (iii) A to B, (iv)-same
(4) i-A, ii-A, (iii) A to B, (iv)-same

35. Which of the following pressure is ultimately responsible for enlargement and extension growth of cells?
(1) Solute potential
(2) Pressure potential
(3) Osmotic Pressure
(4) Turgor Pressure

36. Read the following statements and find out the incorrect statement.
(1) The apoplast does not provide any barrier to water movement and water movement is through mass flow.
(2) Symplastic movement is relatively slower
(3) Cytoplasmic streaming is observed in cells of the Hydrilla Leaf; the movement of chloroplast due to streaming is easily visible.
(4) The movement of water through the root layers is ultimately apoplastic in the endodermis.

37. In plants capillarity is aided by the
(1) Small diameter of tracheids
(2) large diameter of tracheids
(3) Small diameter of vessel elements
(4) Both (1) and (3)

38. What are plasmids?
(1) Naked genomic DNA
(2) Smaller DNA than genomic DNA
(3) Enveloped DNA
(4) None of these

39. The main arena of various types of activities of a cell is
(1) nucleus (2) plasma membrane
(3) mitochondrian (4) cytoplasm

40. Middle lamellae
(1) mainly consists of Ca-pectate
(2) hold different neighbouring cells together
(3) is formed as cell plate during cytokinesis
(4) All of these

41. Agranular ER of muscle cells is also called
(1) sarcoplasmic reticulum
(2) Nissl's granules
(3) desmotubules
(4) dictyosome

42. Functions like mechanical support, motility, maintenance of shape of cell are performed by
(1) cilia and flagella
(2) cytoskeleton
(3) centriole
(4) ribosomes

43. Section of cilia/flagella show

	Peripheral microtubules (doublet)	Central microtubules (singlet)	Radial Spoke	Central sheath
(1)	9 + 0	2	18	1
(2)	9 + 2	9 + 0	9	1
(3)	9	2	9	1
(4)	18	2	9	1

44. Kinetochore is associated with
(1) primary constriction
(2) secondary constriction
(3) satellite
(4) More than one option is correct

45. Match Column-I with Column-II and select the correct option.

	Column-I		Column-II
(A)	Metacentric chromosome	(i)	Middle centromere
(B)	Sub-metacentric	(ii)	Centromere slightly a way from middle
(C)	Acrocentric	(iii)	Centromere close to its end
(D)	Telocentric	(iv)	Terminal centromere

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

ZOOLOGY

46. Shape of oxy-haemoglobin dissociation curve is :
(1) Sigmoid (2) Linear
(3) Parabola (4) Hyperbola

47. Match the columns I and II, and choose the correct combination from the options given

Column I		Column II	
A.	Plasma	I.	RBC
B.	Most abundant cells of blood	II.	Thrombocytes
C.	Average life span of RBC	III.	55% of blood
D.	Megakaryocyte produce	IV.	120 days

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

48. Pulmonary artery differs from pulmonary vein in having
(1) Thick wall
(2) Thin wall
(3) Valves
(4) Both (2) and (3)

49. In circulatory system, Valves occur in
(1) heart and blood vessels of both vertebrates and invertebrates as well as vertebrate lymphatics
(2) both vertebrate and invertibrate hearts
(3) Vertebrate heart only
(4) Both vertebrate and invertebrate hearts and their blood vessels

50. Choose the correct option
(i) Human heart is ectodermal in origin
(ii) Mitral valve guards the opening between right atrium and left ventricle
(iii) SAN is located on the left upper corner of right atrium
(iv) Stroke volume × Heart rate= Cardiac output
(1) i alone is correct
(2) i and ii alone are correct
(3) ii and iii alone are correct
(4) iv alone is correct

51. In mammals, which blood vessel would normally carry largest amount of urea
(1) Hepatic Vein
(2) Hepatic Portal Vein
(3) Renal Vein
(4) Dorsal Aorta

52. Which among the following is correct during each cardiac cycle ?
(1) The volume of blood pumped out by the Rt and Lt vetricles is same
(2) The volume of blood pumped out by the Rt and Lt vetricles is different
(3) The volume of blood received by each atrium is different
(4) The volume of blood received by the aorta and pulmonary artery is different

53. Which one of the following mammalian cells is not capable of metabolising glucose to carbon-dioxide aerobically ?
(1) Red blood cells
(2) White blood cells
(3) Unstriated muscle cells
(4) Liver cells

54. If A = Primary bronchi, B = Alveolar duct, C = Alveoli, D = Secondary bronchi, E = Terminal bronchiole, then starting from trachea (T), which sequence of branching is correct?
(1) $T \rightarrow A \rightarrow E \rightarrow D \rightarrow C \rightarrow B$
(2) $T \rightarrow A \rightarrow D \rightarrow E \rightarrow B \rightarrow C$
(3) $T \rightarrow A \rightarrow D \rightarrow E \rightarrow C \rightarrow B$
(4) $T \rightarrow E \rightarrow A \rightarrow D \rightarrow B \rightarrow C$

55. If A, B, C and D are partial pressure of CO_2 in atmosphere, alveoli, oxygenated blood and deoxygenated blood, then which relation is correct:
(1) $A < B = C < D$
(2) $A > B = C > D$
(3) $A < B < C = D$
(4) $A = B < C < D$

56. What will be the effect on oxygen dissociation curve, if temperatue is decreased ?
(1) Graph will be shifted to right
(2) Graph will be shifted to left
(3) Graph will became straight line
(4) Unpredictable

57. A worker has been working in a coal mine for many years without wearing a mask. Most probable
(1) Fibrosis in lung tissues
(2) Inflammation of bronchi
(3) Wheezing while breathing
(4) Allergy

58. Exchange of gases at the level of alveoli and tissues occur respectively in the processes :
(1) Diffusion and diffusion
(2) Facilitated diffusion and diffusion
(3) Diffusion and facilitated diffusion
(4) Active diffusion and simple

59. **Statement A :** Solubility of CO_2 is more than that of O_2.
Statement B : Alveoli is having simple squamous epithelium.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both Statements A and B are correct
(4) Both Statements A and B are incorrect

60. Which of the following conditions is not favourable for the formation of oxy-haemoglobin ?
(1) High pO_2 (2) Lower temperature
(3) Low pH (4) Low pCO_2