Regn. No. 0920
ESTD. 1985
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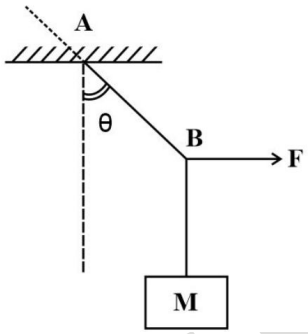
SAMPLE PAPER - 64

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

PHYSICS

01. A mass M is suspended by a rope from rigid support at A as shown in the figure. Another rope is tied at the end B and it is pulled horizontally with a force F. If the rope AB makes an anlge θ with the vertical, then the tension in the string AB is



(1) $F\sin\theta$ (2) $\frac{F}{\sin\theta}$ (3) $F\cos\theta$ (4) $\frac{F}{\cos\theta}$

02. A balloon with mass 'm' is descending down with an acceleration 'a' (where a < g). How much mass should be removed from it so that it starts moving up with an acceleration 'a'?

(1) $\frac{ma}{g+a}$ (2) $\frac{ma}{g-a}$

(3) $\frac{2ma}{g+a}$ (4) $\frac{2ma}{g-a}$

03. A person of mass 60 kg is inside a lift of mass 940 kg and presses the button on control panel. The lift starts moving upwards with an acceleration 1.0 m/s^2. If g = 10 m/s^2, the tension in the supporting cable is
(1) 9680 N (2) 11000
(3) 1200 N (4) 8600 N

04 Two astronauts are floating in gravitation free space after having lost contact with their spaceship. The two will
(1) keep floating at the same distance between them
(2) move towards each other
(3) move away from each other
(4) will become stationary

05. A body projected vertically from the earth reaches a height equal to earth's radius before returning to the earth. The power exerted by the gravitational force is greatest
(1) at the instant just before the body hits the earth
(2) it remains constant all through
(3) at the instant just after the body is projected
(4) at the highest position of the body

06. One can easily weigh the earth by calculating the mass of the earth by 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) $\frac{G}{g}R_e^3$

07. Three equal masses of 1 kg each are placed at the vertices of an equilateral ΔPQR and a mass of 2 kg is placed at the centroid O of the triangle which is at a distance of $\sqrt{2}$ m from each of the vertices of the triangle. The force, (in newton) acting on the mass of 2 kg is
(1) 2 (2) $\sqrt{2}$
(3) 1 (4) zero

08. Which of the following statements about the gravitational constant is true?
(1) It is a force
(2) It has no unit
(3) It has same value in all systems of unit
(4) It does not depend on the nature of the medium in which the bodies are kept

09. The weight of a body on the surface of the earth is 90 N. What is the gravitational force on it due to the earth at a height equal to half the radius of the earth?
(1) 35 N (2) 28 N
(3) 18 N (4) 40 N

10. What will happen to the weight of the body at the south-pole, if the earth stops rotating about its polar axis?
(1) No change
(2) Increases
(3) Decreases but not become zero
(4) Reduces to zero

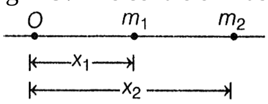
11. Three bodies having masses 5 kg, 4 kg and 2 kg is moving at the speed of 5 ms^{-1}, 4 ms^{-1} and 1.5 ms^{-1} respectively along X-axis. The magnitude of velocity of centre of mass is

(1) 1.0 ms^{-1} (2) 4 ms^{-1} (3) 0.9 ms^{-1} (4) 1.3 ms^{-1}

12. Two masses of 6 and 2 unit are at positions $(6\hat{i}-7\hat{j})$ and $(2\hat{i}+5\hat{j}-8\hat{k})$, respectively. The coordinates of the centre of mass are

(1) (2, –5, 3) (2) (5, –5, –3)
(3) (5, –4, –2) (4) (5, –4, –4)

13. In the diagram shown below, m_1 and m_2 are the masses of two particles and x_1 and x_2 are their respective distances from the origin O. The centre of mass of the system is



(1) $\frac{m_1x_2+m_2x_2}{m_1+m_2}$ (2) $\frac{m_1+m_2}{2}$

(3) $\frac{m_1x_1+m_2x_2}{m_1+m_2}$ (4) $\frac{m_1m_2+x_1x_2}{m_1+m_2}$

14. A wheel having moment of inertia 3 kg-m^2 about its vertical axis, rotates at the rate of 60 rpm about this axis. The torque which can stop the wheel's rotation in 90 s would be

(1) $\frac{2\pi}{15}$ Nm^{-1} (2) $\frac{\pi}{12}$ Nm^{-1}

(3) $\frac{\pi}{15}$ Nm^{-1} (4) $\frac{\pi}{18}$ Nm^{-1}

15. Moment of inertia of ring about its diameter is I. The moment of inertia of the same ring about that axis perpendicular to its plane and passing through centre is

(1) $\frac{I}{2}$ (2) 2I (3) $\frac{I}{4}$ (4) 4I

CHEMISTRY

16. What does ΔH represent in
$X(g) + e^- \longrightarrow X^-(g)$; $\Delta H = -x$?
(1) Ionization energy
(2) Electron gain enthalpy
(3) Electronegativity
(4) None of these

17. Select the correct statement(s) out of the following:
(1) Radius of Mg^{2+} is smaller than that of Mg
(2) Radius of Al^{3+} is smaller than that of Al
(3) Mg being larger in size than Al, it has largest size among Mg, Al, Mg^{2+} and Al^{3+}
(4) All are correct

18. Which of the following is correct w.r.t. $\Delta_{eg}H$?
(1) Cl > F > Br > I (2) S > Se > Te > O
(3) Both (1) and (2) (4) None is correct

19. Which of the following is the correct matching related to groups of p-block?

	Column–I		Column–II
A.	Group 16	P.	Halogens
B.	Group 17	Q.	Noble gases
C.	Group 18	R.	Chalcogens

(1) A–P; B–Q; C–R (2) A–R; B–P; C–Q
(3) A–Q; B–R; C–P (4) A–R; B–Q; C–P

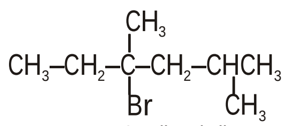
20. Select the incorrect statement
(1) d-block is in the extreme right of periodic table
(2) elements of d-block are commonly referred to as transition metals
(3) Zn, Cd and Hg have electronic configuration $(n-1)\ d^{10}\ ns^2$
(4) Zn, Cd and Hg belong to 12th group of periodic table.

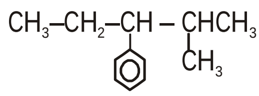
21. Select the correct statement out of the following w.r.t. elements of d-block.
(1) These are the elements of groups 3 to 12.
(2) These are characterised by the filling of inner d-orbitals by electrons.
(3) Their general electronic configuration is $(n-1)d^{1-10}\ ns^{0-2}$
(4) All are correct

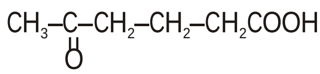
22. The IUPAC name of the compound having the formula $CH_2 = CH - C \equiv CH$ is
(1) 1-butyne-3-ene (2) but-1-yne-3-ene
(3) 1-buten-3-yne (4) 3-butene-1-yne

23. Which nomenclature is not according to IUPAC system?

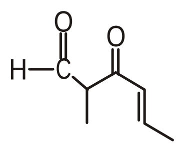
(1) $Br-CH_2-CH=CH_2$
1-Bromoprop-2-ene

(2) 
4-Bromo-2,4-dimethylhexane

(3) 
2-Methyl-3phenylpentane

(4) 
5-oxohexanoic acid

24. The IUPAC name of the compound



is ....

(1) 3-keto-2-methylhex-4-enal
(2) 5-formylhex-2-en-3-one
(3) 5-methyl-4-oxohex-2-en-5-al
(4) 3-keto-2-methylhex-5-enal

25. An optically active compound is
(1) 1–bromobutane
(2) β–bromobutyric acid
(3) 2–bromo–2–methylpropane
(4) 1–bromo–2–methylpropane

26. Which of the following statements is incorrect for a homologous series?
(1) All members have a general formula
(2) All members have the same functional group
(3) All members have the similiar chemical properties
(4) All members have the same physical properties

27. Buna-N synthetic rubber is a copolymer of-

(1) $H_2C=\overset{Cl}{\overset{|}{C}}-CH=CH_2$ and $H_2C=CH-CH=CH_2$

(2) $H_2C=CH-CH=CH_2$ and $H_5C_6-CH=CH_2$

(3) $H_2C=CH-CN$ and $H_2C=CH-CH=CH_2$

(4) $H_2C=CH-CN$ and $H_2C=CH-\overset{CH_3}{\overset{|}{C}}=CH_2$

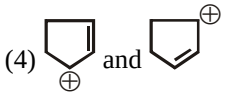
28. Point out the incorrect statement about resonance.
(1) Resonance structure should have equal energy
(2) In resonance structures, the constituent atom should be in the same position
(3) In resonance structure there should be the same number of electron pairs
(4) Resonance structures should differ only in the location of electrons arounds the constituent atoms.

29. Which of the following pairs of structures is not a pair of resonating structures ?

(1) $H-C\equiv \overset{\oplus}{N}H$ and $H-\overset{\oplus}{C}=\overset{\bullet\bullet}{N}-H$

(2) $CH_3-CH=CH-CH_3$ and $CH_3CH_2CH=CH_2$

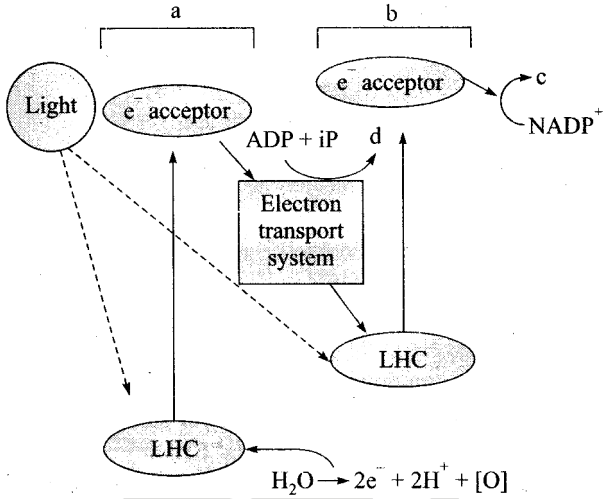
(3) $CH_3-\overset{O_\ominus}{\overset{|}{C}}=CH-\overset{O}{\overset{\|}{C}}-CH_3$ & $CH_3-\overset{O}{\overset{\|}{C}}-\overset{-}{C}H-\overset{O}{\overset{\|}{C}}-CH_3$

(4)  and

30. Which of the following is/are correct with respect to ionization enthalpy?
(1) Li > Na > K > Rb > Cs
It is because of dominance of size over nuclear charge.
(2) Li < B < Be
It is because Be has $1s^2$ pair of electrons in valence shell.
(3) C < O < N
It is because of 3-unpaired electrons in 2p, that give extra stability to N-atom.
(4) All are correct

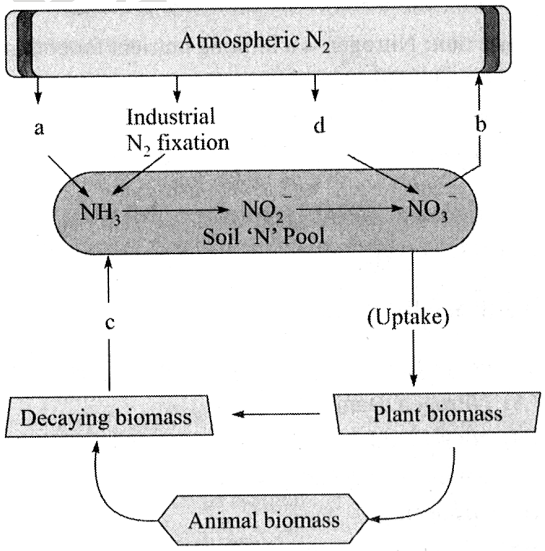
BOTANY

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



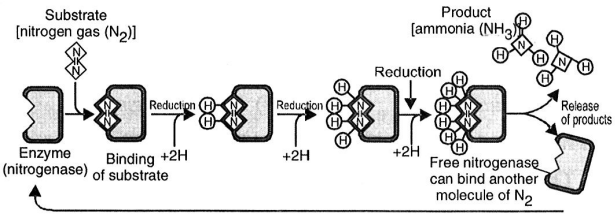
(1) a-PS I, b-PS II, c-ATP, d-NADH
(2) a-PS II, b-PS I, c-NADPH, d-ATP
(3) a-PS I, b-PS II, c-NADPH, d-ATP
(4) a-PS II, b-PS I, c-NADP, d-ATP

32. Study the figure shown below and select the option which gives correct words for all the blanks



(1) a-Biological N_2 - fixation, b- Denitrification, c-Ammonification, d-Electrical N_2- fixation
(2) a-Ammonification, b- Biological -N_2- fixation, c-Electrical N_2- fixation, d- Denitrification
(3) a-Biological N_2 - fixation, b-Electrical N_2- fixation, c-Denitrification, d-Ammonification
(4) a-Biological N_2 - fixation, b- Ammonification, c-Denitrification, d-Electrical N_2- fixation

33. Following figure shows the mechanism of



(1) N_2- fixation (2) Nitrification
(3) Ammonification (4) Denitrification

34. Systema Naturae was written by:
(1) Lamarck (2) Cuvier
(3) Aristotle (4) Linnaeus

35. Match column I with column II for housefly classification and select the correct option using the codes given below:

	Column–I		Column–II
(a)	Family	1.	Diptera
(b)	Order	2.	Arthropoda
(c)	Class	3.	Muscidae
(d)	Phylum	4.	Insecta

(1) (a)–3; (b)–1; (c)–4; (d)–2
(2) (a)–3; (b)–2; (c)–4; (d)–1
(3) (a)–4; (b)–3; (c)–2; (d)–1
(4) (a)–4; (b)–2; (c)–1; (d)–3

36. A taxon is:
(1) A group of related families
(2) A group of related species
(3) A type of living organisms
(4) A taxonomic group of any ranking

37. Family is placed between:
(1) Genus and species (2) Order and class
(3) Class and genus (4) Order and genus

38. National Botanical Research Institute located in:
(1) Chennai (2) Lucknow
(3) Kolkata (4) Darjeeling

39. Prokaryotes are placed in group:
(1) Monera (2) Pteridophytes
(3) Bryophyta (4) Angiosperms

40. Prokaryotic cells are characterized by:
(1) Absence of nuclear envelope
(2) Presence of nuclear envelope
(3) Presence of distinct chromosome
(4) Absence of chromatin material

41. Golgi apparatus does not occur in:
(1) Yeast
(2) Liver cells
(3) Higher plants
(4) Bacteria and blue green algae

42. Membrane bound organelles are absent in:
(1) Streptococcus (2) Chlamydomonas
(3) Plasmodium (4) Saccharomyces

43. Organisms called methanogens are most abundant in:
(1) Polluted stream (2) Cattle yard
(3) Sulphur rock (4) Hot spring

44. In five kingdom classification, single celled eukaryotes are included in:
(1) Fungi (2) Protista
(3) Monera (4) Archaea

45. Which is characteristic feature of chrysophytes?
(1) Parasitic forms causing diseases in animals
(2) Have protein rich layer called pellicle
(3) Commonly called dinoflagellates
(4) Have indestructible wall layer deposited with silica

ZOOLOGY

46. Which of the following layers are present in adrenal cortex from inner to outer?
(1) Zona reticularis, zonal fasciculata and zona glomerulosa.
(2) zona fasciculata, zona glomerulosa and zona reticularis.
(3) Zona glomerulosa, zona reticularis and zona fasciculata.
(4) Zona glomerulosa, zona fasciculata and zona retcularis.

47. Which of the following are effects of cortisol?
(1) Anti-inflammatory
(2) Immunosuppressant
(3) Increases RBC production
(4) All of these

48. Select the correct order of toxicity of the following chemicals.
A. Ammonia
B. Urea
C. Uric acid
(1) A > B > C (2) B > A > C
(3) C > A > B (4) C > B > A

49. Which of the following organisms are uricotelic?
(A) Reptiles (B) Birds
(C) Insects (D) Land snails
(1) A, B and C only (2) B and C only
(3) A and D only (4) All of these

50. What gets increased in blood if liver becomes functionless?
(1) Urea (2) Ammonia
(3) Uric acid (4) Proteins

51. Select the total number of excretory organs present in various animals from the following.
Protonephridia, SA node, Nephridia, Hepatic caeca, Atrium, Malpighian tubules, Green glands, Kidney, Pons, Ommatidia, Parapodia.
(1) 4 (2) 5 (3) 6 (4) 7

52. Kidneys in human are situated between _____.
(1) $T_{12} - L_3$ (2) $T_{11} - L_2$
(3) $T_{12} - L_1$ (4) $T_{12} - L_5$

53. Glomerulus along with Bowman's capsule is called
(1) Renal corpuscle (2) Malpighian tubule
(3) Malpighian body (4) Both (1) and (3)

54. The part through which arteries and veins enter or leave the kidney is called
(1) Major calyces (2) Minor calyces
(3) Hilus (4) Renal pore

55. Blood vessel draining the glomerulus in a mammalian nephron is called
(1) Afferent arteriole and is narrower than the vessel entering it.
(2) Efferent venule and is narrower than the vessel entering it.
(3) Efferent arteriole and is narrower than the vessel entering it.
(4) Renal artery and is wider than the vessel entering it.

56. Filtration of blood occurs in
(1) Loop of Henle (2) Bowman's capsule
(3) Lungs (4) Renal papillae

57. The values of GFR in a healthy individual is
(1) 125 ml/min (2) 150 ml/min
(3) 100 ml/min (4) 200 ml/min

58. Tubular secretion helps in
(1) Ionic balance of body fluid.
(2) Acid base balance of body fluid.
(3) Both (1) and (2)
(4) None of these

59. Which of the following segment allows the passage of small amount of urea into modularly interstitium to keep up the osmolarity?
(1) PCT (2) DCT
(3) HL (4) Collecting duct

60. Counter–current mechanism is present in which of the following?
(1) HL (2) Vasa recta
(3) Both (1) and (2) (4) DCT