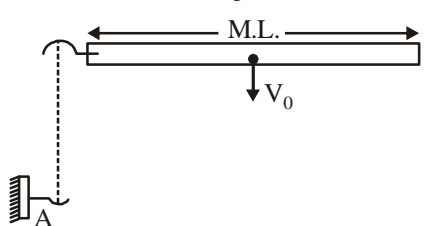
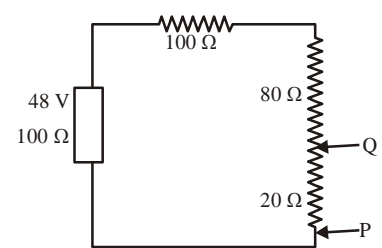


SAMPLE PAPER - 49

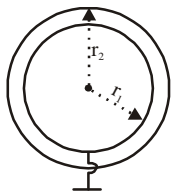
Time : 1 : 15 Hr.

Question : 60

PHYSICS

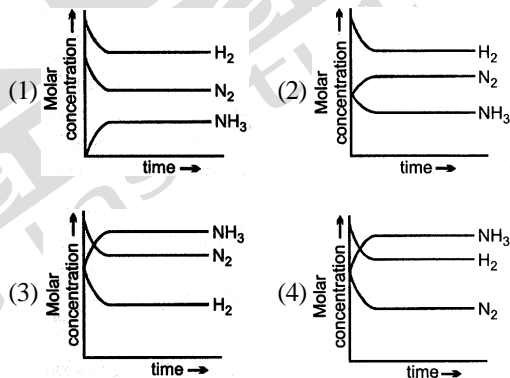
01. A nucleus of mass number A , originally at rest, emits an α -particle with speed v . The daughter nucleus recoils with a speed :
- (1) $\frac{2v}{A+4}$ (2) $\frac{4v}{A+4}$ (3) $\frac{4v}{A-4}$ (4) $\frac{2v}{A-4}$
02. Moment of inertia of a rigid body is expressed in units of kg-m^2 . There are two rods A and B made of same metal. Both of them have equal cross-sectional area but rod A is double in length as compared to rod B. What is the ratio of moment of inertia of rod A to that of rod B ?
- (1) 1 (2) 2 (3) 4 (4) 8
03. Two particles of masses m_1, m_2 move with initial velocities u_1 and u_2 . On collision, one of the particles get excited to higher level, after absorbing energy ϵ . If final velocities of particles be v_1 and v_2 then we must have :
- (1) $\frac{1}{2} m_1 u_1^2 + \frac{1}{2} m_2 u_2^2 = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 - \epsilon$
- (2) $\frac{1}{2} m_1 u_1^2 + \frac{1}{2} m_2 u_2^2 - \epsilon = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2$
- (3) $\frac{1}{2} m_1 u_1^2 + \frac{1}{2} m_2 u_2^2 + \epsilon = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2$
- (4) $m_1^2 u_1 + m_2^2 u_2 - \epsilon = m_1^2 v_1 + m_2^2 v_2$
04. A rod is falling down with constant velocity V_0 , as shown. It comes in contact with hinge A and rotates about A. Angular velocity of rod just after the moment when it comes in contact with hinge A.
- 
- (1) $\frac{2 V_0}{3 L}$ (2) $\frac{3 V_0}{2 L}$ (3) $\frac{V_0}{L}$ (4) $\frac{2 V_0}{5 L}$
05. 2 litre water at 27°C is heated by a 1 kW heater in an open container. On an average heat is lost to surroundings at the rate 160 J/s. The time required for the temperature to reach 77°C is :
- (1) 8 min 20 sec (2) 10 min
 (3) 7 min (4) 14 min
06. The total radiant energy per unit area, normal to the direction of incidence, received at a distance R from the centre of a star of radius r , whose outer surface radiates as a black body at a temperature T K is given by :
- (1) $\frac{4\pi\sigma r^2 T^4}{R^2}$ (2) $\frac{\sigma r^2 T^4}{R^2}$
 (3) $\frac{\sigma r^2 T^4}{4\pi R^2}$ (4) $\frac{\sigma r^4 T^4}{R^4}$
07. In the circuit of figure the potential difference across PQ will be nearest to
- 
- (1) 9.6 V (2) 6.6 V (3) 4.8 V (4) 3.2 V
08. A Cylinder of radius R made of material of thermal conductivity K_1 is surrounded by a cylindrical shell of inner radius R and outer radius $2R$ made of a material of thermal conductivity K_2 . The two ends of combined system are maintained at two different temp there is no loss of heat across cylindrical surface and system is in steady state calculate effective thermal conductivity of system.
- (1) $\frac{K_1 + 3K_2}{4}$ (2) $K_1 + K_2$
 (3) $\frac{K_1 + 8K_2}{9}$ (4) $\frac{8K_1 + K_2}{9}$

09. Charge on the outer sphere is q , and the Inner sphere is grounded. Then the charge on the inner sphere is q' . For ($r_2 > r_1$)

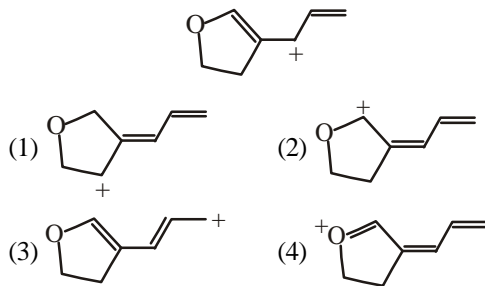


- (1) $q' = \text{zero}$ (2) $q' = q$
 (3) $q' = -\frac{r_1}{r_2}q$ (4) $q' = \frac{r_1}{r_2}q$
10. For a S. H. Oscillator, the states possible are
 (1) $x = 0; v = \text{min}; a = 0$
 (2) $x = A; v = 0; a = \text{min}$
 (3) $x = A; v = \text{max.}; a = 0$
 (4) $x = A; v = 0; a = \text{max}$
11. Two S.H.Ms are represented by the equations $y_1 = 10 \sin(4\pi t + \frac{\pi}{4})$ and $y_2 = 5 [\sin(3\pi t) + \sqrt{3} \cos(3\pi t)]$. Their amplitudes are in the ratio
 (1) 1 : 1 (2) 2 : 1
 (3) 2 : $\sqrt{3}$ (4) $\sqrt{3} : 2$
12. A copper rod of 88 cm and an aluminum rod of unknown length have their increase in length independent of increase in temperature. The length of aluminum rod is: ($\alpha_{\text{Cu}} = 1.7 \times 10^{-5} \text{ K}^{-1}$ and $\alpha_{\text{Al}} = 2.2 \times 10^{-5} \text{ K}^{-1}$)
 (1) 6.8 cm (2) 113.9 cm
 (3) 88 cm (4) 68 cm
13. A piece of ice falls from a height h so that it melts completely. Only one-quarter of the heat produced is absorbed by the ice and all energy of ice gets converted into heat during its fall. The value of h is; [Latent heat of ice is $3.4 \times 10^5 \text{ J/kg}$ and $g = 10 \text{ N/kg}$]
 (1) 34 km (2) 544 km
 (3) 136 km (4) 68 km
14. A heat source at $T = 10^3 \text{ K}$ is connected to another heat reservoir at $T = 10^2 \text{ K}$ by a copper slab which is 1 m thick. Given that the thermal conductivity of copper is $0.1 \text{ W K}^{-1} \text{ m}^{-1}$, the energy flux through it in the steady state is:
 (1) 90 Wm^{-2} (2) 200 Wm^{-2}
 (3) 65 Wm^{-2} (4) 120 Wm^{-2}
15. A particle execute SHM along a straight line. The amplitude of oscillation is 2 cm. When displacement of particle from the mean position is 1 cm, the magnitude of its acceleration is equal to magnitude of its velocity. The time period of oscillation is
 (1) $\frac{2\pi}{\sqrt{2}}$ (2) $\frac{\sqrt{2}}{2\pi}$ (3) $\frac{2\pi}{\sqrt{3}}$ (4) $\frac{\sqrt{3}}{2\pi}$

16. The position of some metals in the electrochemical series in decreasing electropositive character is $\text{Mg} > \text{Al} > \text{Zn} > \text{Cu} > \text{Ag}$. What will happened if copper spoon is used to stirred a solution of aluminium nitrate?
 (1) The spoon gets coated with aluminium
 (2) An alloy of aluminium and copper is formed
 (3) No reaction occurs
 (4) The solution starts turning blue
17. Which of the following is interstitial hydride?
 (1) CaH_2 (2) CuH
 (3) PH_3 (4) NaH
18. Hard water is not fit for washing clothes because
 (1) it contains impurities
 (2) it is acidic in nature
 (3) it gives precipitate with soap
 (4) it contains Na_2SO_4 and KCl
19. For the synthesis of ammonia by the reaction $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ in the Haber's process, the attainment of equilibrium is correctly predicted by the curve.



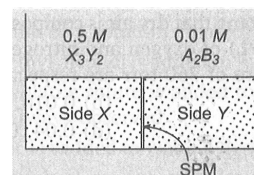
20. One mole of pure ethyl alcohol was treated with one mole of pure acetic acid at 25°C . One-third of the acid changes into ester at equilibrium. The equilibrium constant for the reaction will be:
 (1) $\frac{1}{4}$ (2) 2 (3) 3 (4) 4
21. Which of the following species is not a resonance form of the following species?



22. If $E_{\text{Au}^+/\text{Au}}^\circ$ is 1.69 V and $E_{\text{Au}^{3+}/\text{Au}}^\circ$ is 1.40 V, then $E_{\text{Au}^+/\text{Au}^{3+}}^\circ$ will be:
 (1) 0.19 V (2) 2.945 V
 (3) 1.255 V (4) None of these
23. For pure water:
 (1) pH increases while pOH decreases with rise in temperature
 (2) pH decreases while pOH increases with rise in temperature
 (3) both pH and pOH decreases with rise in temperature
 (4) both pH and pOH increases with rise in temperature
24. Select the correct statement(s).
 (1) Both lattice energy and hydration energy decrease with the increase in ionic size
 (2) Lattice energy can be calculated using Born-Haber cycle
 (3) If the anion is larger than the cation, the lattice energy will remain almost constant within a particular group
 (4) All of the above statements are correct
25. The pH of a solution of 0.10 M CH_3COOH increases when which of the following substances is added?
 (1) NaHSO_4 (2) HClO_4
 (3) KNO_3 (4) K_2CO_3
26. At 25°C , K_{sp} for PbBr_2 is equal to 8×10^{-5} . If the salt is 80% dissociated, what is the solubility of PbBr_2 in mol/litre?
 (1) $\left[\frac{10^{-4}}{1.6 \times 1.6} \right]^{1/3}$ (2) $\left[\frac{10^{-5}}{1.6 \times 1.6} \right]^{1/3}$
 (3) $\left[\frac{10^{-4}}{0.8 \times 0.8} \right]^{1/3}$ (4) $\left[\frac{10^{-5}}{1.6 \times 1.6} \right]^{1/2}$
27. Tendency of I^- , Br^- , Cl^- and F^- to be oxidised is in order
 (1) $\text{I}^- > \text{Br}^- > \text{Cl}^- > \text{F}^-$ (2) $\text{I}^- < \text{Br}^- < \text{Cl}^- < \text{F}^-$
 (3) $\text{I}^- < \text{Cl}^- < \text{F}^- < \text{Br}^-$ (4) $\text{I}^- = \text{Br}^- < \text{Cl}^- = \text{F}^-$
28. AlCl_3 , KCl , CH_3COONa , $\text{CH}_3\text{COONH}_4$ treated separated with
 (i) normal water
 (ii) acidified water
 (iii) alkaline water
 The incorrect statement among the following-
 (1) K^+ , Cl^- remain as it is in solution either acidic basic or normal
 (2) AlCl_3 in acidic solution as in the form of $\text{Al}(\text{OH})_3$, Cl^- , H^+
 (3) AlCl_3 in alkaline solution give $(\text{Al}(\text{OH})_4)^-$, Cl^-
 (4) CH_3COONa in normal water give basic solution.
29. The structure of XeF_6 is experimentally determined to be distorted octahedron. Its structure according to VSEPR theory is

- (1) octahedron
 (2) trigonal bipyramidal
 (3) pentagonal bipyramidal
 (4) tetragonal bipyramidal

30. X_3Y_2 ($i=5$) when reacted with A_2B_3 ($i=5$) in aqueous solution gives brown colour. These are separated by a semipermeable membrane AB as shown. Due to osmosis there is:



- (1) brown colour formation in side X
 (2) brown colour formation in side Y
 (3) formation in both of the sides X and Y
 (4) no brown colour formation

BOTANY

31. Which set of diseases are caused by bacteria :-
 (1) Rabies, Tetanus, Mumps, Kuru
 (2) Tetanus, Typhoid, AIDS, Rabies
 (3) Tetanus, Cholera, Typhoid, Citrus Canker
 (4) AIDS, Mumps, Cholera, Kuru
32. The structure in the internal ear which resembles a "snail shell" is called
 (1) Organ of corti
 (2) Membranous labirynth
 (3) Cochlea (4) Ear ossicles
33. Match the Column-I with Column-II and choose the correct option.
- | | Column I | | Column II |
|----|-----------------|------|-------------------------|
| A. | Exine | i. | Large irregular nucleus |
| B. | Intine | ii. | Sporopollenin absent |
| C. | Germ pore | iii. | Sporopollenin |
| D. | Vegetative cell | iv. | Pecto-Cellulose |
- (1) A-ii; B-iv; C-iii; D-i
 (2) A-iv; B-iii; C-ii; D-i
 (3) A-iii; B-iv; C-ii; D-i
 (4) A-i; B-ii; C-iv; D-iii
34. List of some of the plants is given below :-
 Brinjal, Pea, Aloe, Mustard, Onion, Cucumber, Garlic
 How many above plants have trimerous flower ?
 (1) 5 (2) 3 (3) 4 (4) 6
35. Which plant does not pose sucker stem ?
 (1) jasmine (2) Pineapple
 (3) Banana (4) Chrysanthemum

36. During prolonged fasting
 (1) First fats are used up, followed by carbohydrate from liver and muscles, and protein in the end
 (2) First carbohydrate are used up, followed by fat and proteins towards end
 (3) First lipids, followed by proteins and carbohydrates towards end
 (4) None of the above

37. How many following plants have hypogynous flower
 China rose, Cucumber, Cotton, Mustard, Tomato, Colchicum, onion
 (1) 6 (2) 8 (3) 9 (4) 7

38. Symmetry of flower in pea is :-
 (1) Actinomorphic (2) Irregular
 (3) Epigynous (4) Zygomorphic

39. In of angiosperms pollen grain are shed at stage.
 (1) 60 percent, 2-celled (2) 60 percent, 3-celled
 (3) 40 percent, 2-celled (4) 40 percent, 4-celled

40. Five events in the transmission of nerve impulse across the synapse are given below.

A. Opening of specific ion channels allows the entry of ions, a new action potential is generated in the post-synaptic neuron.

B. Neurotransmitter binds to the receptor on post synaptic membrane.

C. Synaptic vesicle fuses with pre-synaptic membrane, neurotransmitter releases into synaptic cleft.

D. Depolarization of pre-synaptic membrane

E. Arrival of action potential at axon terminal. In which sequence of the events occur?

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

41. What is the end product of sexual reproduction ?

- (1) Ovule and ovary
 (2) Androecium and gynoecium
 (3) Fruit and seed
 (4) Gamete and primary endosperm cell

42. Match Column-I with Column-II are select the correct option from the codes given below.

Column-I		Column-II	
A.	Monera	(i)	Solanum, Mangifera
B.	Protista	(ii)	Bacillus, Oscillatoria
C.	Fungi	(iii)	Euglena, Trypanosoma
D.	Plantae	(iv)	Mucor, Penicillium
E.	Animalia	(v)	Felis, Panthera

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

43. Receptors associated with aortic and carotid artery can recognize changes in and concentration and send necessary signals to for remedial action.

- (1) O₂, CO₂ pneumotaxic
 (2) CO₂, H⁺, rhythm centre
 (3) CO₂, H⁺, appneustic centre
 (4) O₂, H⁺, pneumotaxic

44. Study the following table which shows different organisms with their taxonomic categories.

Common name	Family	Order	Class	Phylum/ Division
Man	Hominidae	Primata	Mammalia	A
Housefly	Muscidae	Diptera	B	Arthropoda
Mango	C	Sapindales	Dicotyledonae	Angiospermae
Wheat	Poaceae	Poales	D	Angiospermae

Select the correct option for A, B, C and D.

	A	B	C	D
(1)	Chordata	Insecta	Anacardiaceae	Monocotyledonae
(2)	Animalia	Arachnida	Anacardiaceae	Monocotyledonae
(3)	Chordata	Arachnida	Polygonaceae	Monocotyledonae
(4)	Non-chordata	Insecta	Anacardiaceae	Dicotyledonae

45. The most abundant lipid in the cell membrane is

- (1) cutin (2) glycolipid
 (3) steroid (4) phospholipid

ZOOLOGY

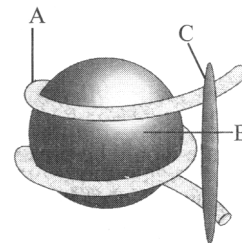
46. Purines possess nitrogen at :

- (1) 1, 3, 7 and 9 positions
 (2) 1, 3, 5 and 7 positions
 (3) 1, 2, 4 and 6 positions
 (4) 1, 2, 6 and 8 positions

47. Total amount of A and T in DNA is 45%. Amount of guanine will be:

- (1) 22.5% (2) 55% (3) 45% (4) 27.5%

48. A nucleosome is given in the diagram. Select the option with correct identification



	A	B	C
(1)	RNA	Non-histone	DNA
(2)	DNA	Histone octamer	H ₁ histone
(3)	RNA	H ₁ histone	Non-histone protein
(4)	DNA	H ₁ histone	Histone octamer

49. If the DNA of a virus is labelled with ^{32}P and the protein of the virus is labelled ^{35}S , after transduction which molecule (s) would be present inside the bacterial cells ?
 (1) ^{32}P only
 (2) ^{35}S only
 (3) Both ^{35}S and ^{32}P
 (4) Neither molecule would be present inside the cell

50. Match the columns -

Column-A		Column-B	
A.	Taylor and colleagues	1.	Biochemical characterization of transforming principle
B.	Meischer	2.	Nuclein
C.	Crick	3.	Central dogma
D.	Avery, Macleod and McCarthy	4.	Semi-conservative replication of DNA

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

51. Two strands of DNA are held together by :
 (1) Peptide bonds
 (2) Phosphodiester bonds
 (3) S - S bonds
 (4) Hydrogen bonds
52. How much amount of blood is filtered out by kidney's per minute ?
 (1) 500 ml (2) 1100-1200 ml
 (3) 1500 ml (4) 125 ml
53. Select the correct option-

In eukaryotes		
	Site of origin of replication	Number of replication forks
(1)	One	One
(2)	One	Many
(3)	Many	One
(4)	Many	Many

54. DNA unwinding is done by
 (1) Ligase (2) Helicase
 (3) Topoisomerase (4) Hexonuclease
55. The part of chromosome beyond secondary constriction is known as :-
 (1) Chromomere (2) Satellite
 (3) Kinetochore (4) Centromere
56. Which of the nervous system transmit impulse from CNS to involuntary organs & smooth muscle?
 (1) Sympathetic nervous system
 (2) Parasympathetic nervous system
 (3) Autonomic nervous system
 (4) Somatic nervous system
57. Find out the incorrect match :-
 (1) Lysosome - Intracellular scavenging
 (2) Golgi complex - Metabolism of xenobiotics
 (3) Elaioplast - Oil and fat storage
 (4) glyoxysomes - Gluconeogenesis
58. The same hormone can be known by various names given in which set
 (1) Secretin, enterokinin, gastrin
 (2) Gametokinetic factor, testosterone, LTH
 (3) ADH, pitressin, and vasopressin
 (4) Oxytocin, tri-iodo-thyronine, thyroxine
59. A Malpighian corpuscle is
 (1) Another name for nephron.
 (2) An excretory structure of insects.
 (3) Combined name for glomerulus and Bowman's Capsule
 (4) None of the above
60. Oxytocin is used in-
 (1) Milk ejection
 (2) Parturition
 (3) Milk let down process
 (4) All of the above