

**SAMPLE PAPER - 109**

Time : 1 : 15 Hr.

Question : 60

**PHYSICS**

01. The earth is assumed to be a sphere of R. A platform is arranged at a height h above surface of earth. The escape

velocity of a body from this platform is  $\frac{v_e}{\sqrt{3}}$ , where  $v_e$  is

its escape velocity from the surface of the earth. The value of h is

- (1) R (2) 2R  
 (3) 3R (4) 4R

02. In a travelling wave

$$y = 0.1 \sin \pi \left( x - 330t + \frac{2}{3} \right)$$

the phase difference between  $x_1 = 3\text{m}$  and  $x_2 = 3.5\text{m}$  is :

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

03. The work done in increasing the size of a rectangular soap film with dimensions  $8\text{cm} \times 3.75\text{cm}$  to  $10\text{cm} \times 6\text{cm}$  is  $2.3 \times 10^{-4}\text{J}$ . The surface tension of the film (in N/m) is :

- (1)  $1.65 \times 10^{-2}$  (2)  $3.3 \times 10^{-2}$   
 (3)  $6.6 \times 10^{-2}$  (4)  $8.25 \times 10^{-2}$

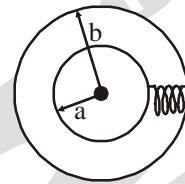
04. A straight wire of mass 100 g and length 1 m carries current of 2A. It is suspended in mid air by applying uniform horizontal magnetic field B perpendicular to wire. The magnitude of B is

- (1) 4 T (2) 2 T  
 (3) 1 T (4) 0.5 T

05. Two point charges  $+4\mu\text{C}$  and  $+2\mu\text{C}$  are separated by a distance of 1m in air. The distance of the point on the line joining the charges, where the resultant electric field is zero, from  $+2\mu\text{C}$  charge is :

- (1) 0.42 m (2) 0.75 m  
 (3) 0.67 m (4) 0.81 m

06. Two spherical shells A and B of radii a and b ( $b > a$ ) are placed concentrically in air. The two shells are connected by a wire. The electrical capacitance of the system is:

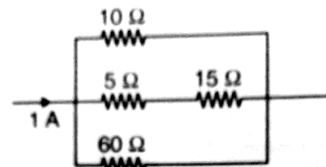


- (1)  $4\pi \epsilon_0 \left( \frac{ab}{b-a} \right)$  (2)  $4\pi \epsilon_0 \left( \frac{b^2}{b-a} \right)$   
 (3)  $4\pi \epsilon_0 a$  (4)  $4\pi \epsilon_0 b$

07. A certain galvanometer has a resistance of  $400\Omega$  and deflects full scale for a current of 0.2 mA through it. The shunt resistance required to convert it into 3A ammeter is:

- (1)  $0.0135\Omega$  (2)  $0.027\Omega$   
 (3)  $0.0405\Omega$  (4)  $0.054\Omega$

08. In the circuit shown below, voltage drop across  $5\Omega$  resistance is



- (1) 5 V (2) 1.5 V  
 (3) 3.5 V (4) 6.5 V

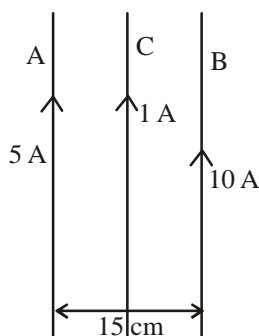
09. Proton, Deuteron and alpha particle of the same kinetic energy are moving in circular trajectories in a constant magnetic field. The radii of proton, deuteron and alpha particle are respectively in the ratio of :

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

10. A coil having 100 square loops each of side 10 cm is placed with its plane perpendicular to the magnetic field which increases at the rate of 2 T/s. The induced emf in the loop is

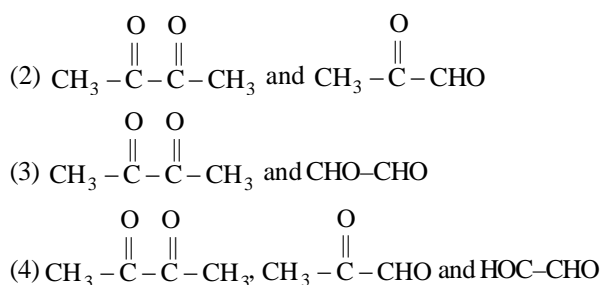
- (1) 1 V (2) 0.1 V (3) 2 V (4) 0.2 V

11. The potential energy of a bar magnet of magnetic moment  $10 \text{ A m}^2$  placed in a uniform magnetic field of  $1 \text{ T}$  at an angle of  $60^\circ$  is  
 (1)  $20 \text{ J}$  (2)  $10 \text{ J}$  (3)  $-5 \text{ J}$  (4)  $-10 \text{ J}$
12. Three long, straight and parallel wires carrying currents are arranged as shown in the figure. The wire C which carries a current  $1 \text{ A}$  is so placed that it experience no force. The distance of wire C from wire B is



- (1)  $5 \text{ cm}$  (2)  $10 \text{ cm}$  (3)  $7.5 \text{ cm}$  (4)  $2.5 \text{ cm}$
13. The relation between force  $F$  and density  $d$  is  $F = \frac{x}{\sqrt{d}}$ .  
 The dimension of  $x$  is  
 (1)  $[M^{3/2} L^{-1/2} T^{-2}]$  (2)  $[M^{1/2} L^{-1/2} T^{-2}]$   
 (3)  $[M^{3/2} L^{-1} T^{-2}]$  (4)  $[M^{1/2} L^{-1} T^{-2}]$
14. The time taken by an alternating current of  $50 \text{ Hz}$  in reaching from zero to its maximum value will be  
 (1)  $0.5 \text{ s}$  (2)  $0.005 \text{ s}$   
 (3)  $0.05 \text{ s}$  (4)  $5 \text{ s}$
15. An L-C circuit is in the state of resonance. If  $C = 0.1 \mu\text{F}$  and  $L = 0.25 \text{ H}$ , then what is the frequency of oscillations?  
 (1)  $1007 \text{ Hz}$  (2)  $100 \text{ Hz}$   
 (3)  $109 \text{ Hz}$  (4)  $500 \text{ Hz}$
19. Permanent hardness of water is due to the presence of chlorides or sulphates of  
 (1) Ca or Mn (2) Mg or Fe  
 (3) Na or Ca (4) Ca or Mg
20. A substance which gives brick red flame and breaks down on heating to give oxygen and a brown gas is  
 (1) Magnesium nitrate (2) Calcium nitrate  
 (3) Barium nitrate (4) Strontium nitrate
21. Identify the optically active compounds from the following?  
 (1)  $[\text{Co}(\text{en})_3]^{3+}$  (2)  $\text{Trans} [\text{Co}(\text{en})_2\text{Cl}_2]^+$   
 (3)  $\text{Cis} [\text{Co}(\text{en})_2\text{Cl}_2]^+$  (4) Both (1) & (3)
22. Which of the following amine does not react with Hinsberg reagent?  
 (1) Neopentyl amine (2) Isopropyl amine  
 (3) Triethyl amine (4) Ethyl methyl amine
23. The correct order of increasing basic nature for the bases  $\text{NH}_3$ ,  $\text{CH}_3\text{NH}_2$  and  $(\text{CH}_3)_2\text{NH}$  in aqueous solutions is:  
 (1)  $\text{CH}_3\text{NH}_2 < \text{NH}_3 < (\text{CH}_3)_2\text{NH}$   
 (2)  $\text{NH}_3 < \text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH}$   
 (3)  $\text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH} < \text{NH}_3$   
 (4)  $(\text{CH}_3)_2\text{NH} < \text{NH}_3 < \text{CH}_3\text{NH}_2$
24. The incorrect matching among following  
 (1)  $50 \text{ PPM}$ - Upper limit of Pb in drinking water  
 (2)  $500 \text{ PPM}$ - Lower limit of sulphate in drinking water  
 (3) Excess  $\text{NO}_3^-$  - In drinking water causes blue baby syndrome  
 (4)  $1 \text{ PPM}$ - Fluoride ion suitable in drinking water
25. Which is Finkelstein reaction-  
 (1)  $\text{CH}_3 - \text{CH}_2 - \text{Cl} + \text{NaI} \xrightarrow{\text{Acetone}}$   
 (2)  $\text{CH}_3 - \text{CH}_2 - \text{Br} + \text{AgF} \xrightarrow{\Delta}$   
 (3)  $\text{CH}_3 - \text{CH}_2 - \text{OH} + \text{HCl} \xrightarrow{\text{ZnCl}_2}$   
 (4)  $\text{CH}_3 - \text{CH}_2 - \text{OH} + \text{SOCl}_2 \longrightarrow$
16. Which of the following does not take place in Cannizzaro reaction?  
 (1) Nucleophilic addition  
 (2) Transfer of acidic hydrogen  
 (3) Hydride transfer  
 (4) Loss of water molecule
17. Norethindrone and ethynylestradiol are  
 (1) Neurotransmitters (2) Antifertility drugs  
 (3) Bactericidal antibiotics  
 (4) Bacteriostatic antibiotics
18. Correct order of  $1^{\text{st}}$  ionisation enthalpy is  
 (1)  $\text{Be} < \text{B} < \text{C} < \text{N}$  (2)  $\text{B} < \text{Be} < \text{C} < \text{N}$   
 (3)  $\text{B} < \text{C} < \text{Be} < \text{N}$  (4)  $\text{B} < \text{C} < \text{N} < \text{Be}$
26. Aromatic nitriles ( $\text{Ar}-\text{CN}$ ) are not prepared by:  
 (1)  $\text{Ar}-\text{X} + \text{KCN}$  (2)  $\text{ArN}_2\text{Cl} + \text{CuCN}$   
 (3)  $\text{ArCONH}_2 + \text{P}_2\text{O}_5$  (4)  $\text{ArCONH}_2 + \text{SOCl}_2$
27. How many moles of iodine are liberated when 1 mole of potassium dichromate reacts with potassium iodide?  
 (1) 4 (2) 3  
 (3) 6 (4) 9
28. O-xylene on ozonolysis will give:  
 (1)  $\text{HOOC}-\text{CHO}$  and  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CHO}$

## CHEMISTRY

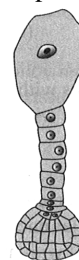


29. Correct order of B.P. (Decreasing order)
- (1)  $\text{BiH}_3 > \text{SbH}_3 > \text{NH}_3 > \text{AsH}_3 > \text{PH}_3$   
 (2)  $\text{B} > \text{Al} > \text{Ga} > \text{In} > \text{Tl}$   
 (3)  $\text{Si} > \text{Ge} > \text{Sn} > \text{Pb}$   
 (4) All are correct
30. Which of the following species have one unpaired electron each ?
- (1)  $\text{O}_2, \text{O}_2^-$  (2)  $\text{O}_2, \text{O}_2^+$   
 (3)  $\text{O}_2^+, \text{O}_2^-$  (4)  $\text{O}_2, \text{O}_2^{2-}$

## BOTANY

31. A few organisms are known to grow and multiply at temperatures of 100-105° C. They belong to
- (1) Marine archabacteria  
 (2) Thermophilic blue-green bacteria  
 (3) Hot-spring blue-green algae (cyanobacteria)  
 (4) Thermophilic subaerial fungi
32. The aleurone layer in maize grain is specially rich in
- (1) auxins (2) proteins  
 (3) starch (4) lipids
33. Which of the following is a form of mesosomes?
- (1) Vesicles  
 (2) Tubules  
 (3) Lamellae  
 (4) All of these
34. In plant cells, peroxisomes are associated with
- (1) Photorespiration  
 (2) Phototropism  
 (3) Photoperiodism  
 (4) Photosynthesis
35. Seed formation without fertilization in flowering plants involves the process of:
- (1) Sporulation  
 (2) Budding  
 (3) Somatic hybridization  
 (4) Apomixis

36. The following figure represents.



- (1) Globular embryo  
 (2) Heart-shaped embryo  
 (3) Zygote  
 (4) Syngamy
37. Which one of the following is not a fungal disease?
- (1) Rust of wheat  
 (2) Smut of Bajra  
 (3) Black rot of crucifers  
 (4) Red rot of sugarcane
38. Match the items in 'Column-A' and 'Column-B' and choose the correct answer.

	Column-I		Column-II
i.	Lady bird	A.	Methanobacterium
ii.	Mycorrhiza	B.	Trichoderma
iii.	Biological control	C.	Aphids
iv.	Biogas	D.	Glomus

The correct answer is

- (1) i-B; ii-D; iii-C; iv-A  
 (2) i-C; ii-D; iii-B; iv-A  
 (3) i-D; ii-A; iii-B; iv-C  
 (4) i-C; ii-B; iii-A; iv-D
39. Nearly \_\_\_\_\_ % of all insects is known to be phytophagous
- (1) 25% (2) 35%  
 (3) 45% (4) 10%
40. Ecotone is
- (1) A polluted area  
 (2) The bottom of a lake  
 (3) Transition between two Biome  
 (4) A zone of developing community
41. About 70% of total global carbon is found in
- (1) oceans (2) forests  
 (3) grasslands (4) agroecosystems
42. Edaphic factor refers to
- (1) Water (2) Soil  
 (3) Relative humidity (4) Altitude
43. The historic convention on Biological Diversity held in Rio de Janeiro in 1992 is known as
- (1) CITES Convention (2) The Earth Summit  
 (3) G-16 Summit (4) MAB Programme

44. Match the columns.

	Column-I		Column-II
A.	Air (Prevention and Control of Pollution) Act	1.	1987
B.	Water (Prevention and Control of Pollution) Act	2.	1981
C.	Noise added as air pollutant	3.	1974
D.	Environment (Protection) Act	4.	1986

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

45. In the textbook you came across the 'Three Mile Island' and 'Chernobyl' disasters associated with the accidental leakage of radioactive wastes. In India we had Bhopal gas tragedy. It is associated with which of the following?  
 (1) Ethyl Cyanate (2) Methyl isocyanate  
 (3) Ethyl isocyanate (4) Methyl cyanate

## ZOOLOGY

46. A segment of DNA has 120 adenine and 120 cytosine bases. The total number of nucleotides present in the segment is  
 (1) 120 (2) 240 (3) 60 (4) 480
47. Two free ribonucleotides units are interlinked with  
 (1) peptide bond (2) covalent bond  
 (3) hydrogen bond (4) phosphodiester bond
48. A competitive inhibitor of succinic dehydrogenase is  
 (1)  $\alpha$ -ketoglutarate (2) Malate  
 (3) Malonate (4) Oxaloacetate
49. What is vital capacity of our lungs?  
 (1) Inspiratory reserve volume plus expiratory reserve volume  
 (2) Total lung capacity minus residual volume  
 (3) Inspiratory reserve volume plus tidal volume  
 (4) Total lung capacity minus expiratory reserve volume
50. The quantity 1200 ml in the respiratory volumes of a normal human adult refers to  
 (1) Maximum air that can be breathed in and breathed out  
 (2) Residual volume  
 (3) Expiratory reserve volume  
 (4) Total lung capacity
51. A terrestrial animal must be able to  
 (1) Excrete large amounts of water in urine  
 (2) Conserve water  
 (3) Actively pump salts out through the skin  
 (4) Excrete large amounts of salts in urine

52. Solenocytes are the main excretory structures of  
 (1) Platyhelminthes (2) Annelids  
 (3) Molluscs (4) Echinodermates
53. The genetic defect-adenosine deaminase (ADA) deficiency may be cured permanently by  
 (1) administering adenosine deaminase activators  
 (2) introducing bone marrow cells producing ADA into cells at early embryonic stages  
 (3) enzyme replacement therapy  
 (4) periodic infusion of genetically engineered lymphocytes having functional ADAcDNA
54. Cry endotoxins obtained from *Bacillus thuringiensis* are effective against  
 (1) Nematodes (2) Boll worms  
 (3) Mosquitoes (4) Flies
55. The chemical knives of DNA are  
 (1) Polymerases (2) Endonucleases  
 (3) Transcriptase (4) Ligases
56. The following are marine water fishes except  
 (1) Hilsa (2) Sardines  
 (3) Pomfrets (4) Rohu
57. The change of the light-coloured variety of peppered moth (*Biston betularia*) to its darker variety (*Biston carbonaria*) is due to  
 (1) mutation (2) regeneration  
 (3) genetic isolation (4) temporal isolation
58. Study of fossils is  
 (1) Palaeontology (2) Herpetology  
 (3) Saurology (4) Organic evolution
59. Trace the correct path of sperm from seminiferous tubules:  
 (1) Rete testis  $\rightarrow$  vasa efferentia  $\rightarrow$  epididymis  $\rightarrow$  vas deferens  
 (2) Rete testis  $\rightarrow$  epididymis  $\rightarrow$  vasa efferentia  $\rightarrow$  vas deferens  
 (3) Vasa efferentia  $\rightarrow$  rete testis  $\rightarrow$  vas deferens  $\rightarrow$  epididymis  
 (4) Epididymis  $\rightarrow$  vasa efferentia  $\rightarrow$  rete testis  $\rightarrow$  vas deferens
60. Match the items given in Column-I with those in Column-II and select the correct option given below:

	Column-I		Column-II
a.	Proliferative phase	i.	Breakdown of endometrial lining
b.	Secretory phase	ii.	Follicular phase
c.	Menstruation	iii.	Luteal phase

- (1) a-iii; b-ii; c-i (2) a-ii; b-iii; c-i  
 (3) a-i; b-iii; c-ii (4) a-iii; b-i; c-ii