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Ist Floor, Skylark Building,
Newal Kishore Road, Hazratganj, Lucknow.
Call : 7080111582, 7080111595

SAMPLE PAPER - 96

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

PHYSICS

01. A bird is flying towards north with a velocity 40 km/h and a train is moving with velocity 40 km/h towards east. What is the velocity of the bird noted by a man in the train :
(1) $40\sqrt{2}$ km/h north-east
(2) $40\sqrt{2}$ km/h south-east
(3) $40\sqrt{2}$ km/h north-west
(4) $40\sqrt{2}$ km/h south-west.

02. A lift is coming from ground 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. An object moving with a speed of 25 m/s, is decelerated at a rate given by :

$$\frac{dv}{dt} = -2.5\sqrt{v};$$

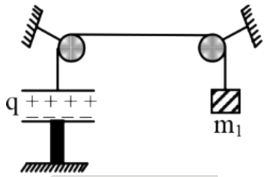
where v is instantaneous speed. The time taken by the object, to come to rest, would be :
(1) 1 s (2) 2 s (3) 4 s (4) 8 s

04. A slab of material of dielectric constant K has the same area as the plates of a parallel plate capacitor but has a thickness $\left(\frac{3}{4}\right)$ d, where d is the separation of the plates.

The ratio of the capacitance C (in the presence of the dielectric) to the capacitance C_0 (in the absence of the dielectric) is:

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

05. In the given system a capacitor of plate area A is charged up to charge q. The mass of each plate is m_2 .The lower plate is rigidly fixed. Find the value of m_1 so that the system is in equilibrium



(1) $m_2 + \frac{q^2}{\varepsilon_0 Ag}$ (2) m_2

(3) $\frac{q^2}{2A\varepsilon_0 g} + m_2$ (4) None of these

06. A parallel plate capacitor is charged by a battery after charging the capacitor, the battery is disconnected and if a dielectric plate is inserted between the plates, then which one of the following statements is not correct
(1) increase in the stored energy
(2) decrease in the potential difference
(3) decrease in the electric field
(4) increase in the capacitance

07. The plates of a parallel plate capacitor with air as medium are separated by a distance of 8 mm. A medium of dielectric constant 2 and thickness 4 mm having the same area is introduced between the plates. For the capacitance to remain the same, the distance between the plates is
(1) 8 mm (2) 6 mm (3) 4 mm (4) 10 mm

08. The true statement is, on increasing the distance between the plates of a parallel plate condenser (assume battery is disconnected)
(1) The electric intensity between the plates will decrease
(2) The electric intensity between the plates will increase
(3) The electric intensity between the plates will remain unchanged
(4) The P.D. between the plates will decrease

09. Which of the following statements is correct regarding the gravitational force ?
(1) The gravitational force is dependent on the intervening medium
(2) The gravitational force is a non-conservative force
(3) The gravitational force forms action-reaction pair
(4) The gravitational force is a non-central force

10. Four particles each of mass m are placed at the vertices of a square of side *l*. The potential at the centre of square is

(1) $-2\frac{Gm}{l}$ (2) $-3\sqrt{2}\frac{Gm}{l}$

(3) $-2\sqrt{2}\frac{Gm}{l}$ (4) $-4\sqrt{2}\frac{Gm}{l}$

11. The two capacitors C_1 and C_2 are charged to potentials V_1 and V_2 and then connected in parallel. There will be no flow of energy, if

(1) $C_1V_1 = C_2V_2$ (2) $V_1 = V_2$

(3) $C_1 = C_2$ (4) $\frac{C_1}{V_1} = \frac{C_2}{V_2}$

12. A capacitor of 20 μF charged upto 400 V is connected in parallel with another capacitor of 10 μF, which is charged upto 100 V. The common potential is

(1) 250 V (2) 300 V
(3) 400 V (4) 600 V

13. Two capacitors of capacitance C_1 and C_2 are connected in parallel. If a charge Q is given to the combination, the charge gets shared. The ratio of the charge on the capacitor C_1 to the charge on the capacitor C_2 is

(1) C_1C_2 (2) C_2/C_1
(3) $C_1 + C_2$ (4) C_1/C_2

14. Two capacitors of 20 μF and 40 μF are connected to 40 V and 20 V sources, respectively. If they are connected in opposite polarity by the wire, then what is the common potential of the capacitors ?

(1) 133.3 V (2) 150 V
(3) 300 V (4) 0 V

15. A steel wire hangs vertically under its own weight. If its density is 4000 kg/m^3 and breaking stress is 1000×10^5 N/m^2, then maximum length of wire that will not break under its own weight is

(1) 1250 m (2) 500 m
(3) 2500 m (4) 5000 m

CHEMISTRY

16. Match List I with List II.

	List-I (Monomer Unit)		List-II (Polymer)
(a)	Caprolactum	(i)	Natural rubber
(b)	2-Chloro-1,3-butadiene	(ii)	Buna-N
(c)	Isoperene	(iii)	Nylon 6
(d)	Acrylonitrile	(iv)	Neoprene

Choose the correct answer from the options given below:

(1) (a)→(iv), (b)→(iii), (c)→(ii), (d)→(i)
(2) (a)→(ii), (b)→(i), (c)→(iv), (d)→(iii)
(3) (a)→(iii), (b)→(iv), (c)→(i), (d)→(ii)
(4) (a)→(i), (b)→(ii), (c)→(iii), (d)→(iv)

17. The correct order of electron gain enthalpy is

(1) S > Se > Te > O (2) Te > Se > S > O
(3) O > S > Se > Te (4) S > O > Se > Te

18. Select the correct option for statements (I) and (II).

(I) Molar mass of $(NH_4)_3PO_4 12MoO_3$ (APM) = 1837g

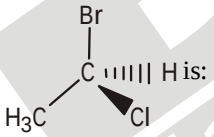
$$P\% = \frac{31}{1837} \times \frac{w_{APM}}{w} \times 100\%$$

(II) Molar mass of $Mg_2P_2O_7$(PP) = 222 g

$$P\% = \frac{62}{222} \times \frac{w_{PP}}{w} \times 100\%$$

(1) Only (I) is correct
(2) Only (II) is correct
(3) Both are correct
(4) Both are wrong

19. The absolute configuration of the compound



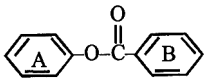
is:

(1) R (2) S (3) E (4) Z

20. Which one of the following orders presents the correct sequence of the increasing basic nature of the given oxides?

(1) $Al_2O_3 < MgO < Na_2O < K_2O$
(2) $MgO < K_2O < Al_2O_3 < Na_2O$
(3) $Na_2O < K_2O < MgO < Al_2O_3$
(4) $K_2O < Na_2O < Al_2O_3 < MgO$

21. Which ring nitrated most readily (A or B) why?



(1) A (2) B (3) A= B (4) none

22. Correct order of basic strength of given amine in aqueous medium

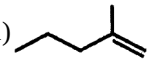
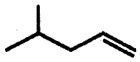
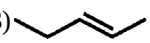
$C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$, $C_6H_5NH_2$

(1) $(C_2H_5)_2NH > C_2H_5NH_2 > (C_2H_5)_3N > C_6H_5NH_2$
(2) $(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2 > C_6H_5NH_2$
(3) $(C_2H_5)_2NH > (C_2H_5)_3N > C_6H_5NH_2 > C_2H_5NH_2$
(4) $(C_2H_5)_3N > (C_2H_5)_2NH > C_2H_5NH_2 > C_6H_5NH_2$

23. In Dumas' method of estimation of nitrogen 0.35 g of an organic compound gave 55 mL of nitrogen collected at 300 K temperature and 715 mm pressure. The percentage composition of nitrogen in the compound would be: (Aqueous tension at 300 K =15 mm)

(1) 14.45 (2) 15.45
(3) 16.45 (4) 17.45

24. 0.2595 g of an organic substance in a quantitative analysis yielded 0.35 g of the barium sulphate. The percentage of sulphur in the substance is
(1) 18.52 g (2) 182.2 g
(3) 17.5 g (4) 175.2 g

25. In which of the following alkenes will a hydrogen shift occur upon addition of HCl ?
(1)  (2) 
(3)  (4) 

26. A gaseous oxide contains 30.4% of nitrogen, one molecule of which contains one nitrogen atom. The density of the oxide relative to oxygen is
(1) 0.94 (2) 1.44
(3) 1.50 (4) 3.0

27. 5 moles of a gas in a closed vessel was heated from 300 K to 600 K. the pressure of the gas doubled. The number of moles of the gas will be
(1) 5 (2) 2.5
(3) 10 (4) 20

28. For the reaction $A + 2B \rightarrow C$, 5 moles of A and 8 moles of B will produce
(1) 5 moles of C (2) 4 moles of C
(3) 8 moles of C (4) 13 moles of C

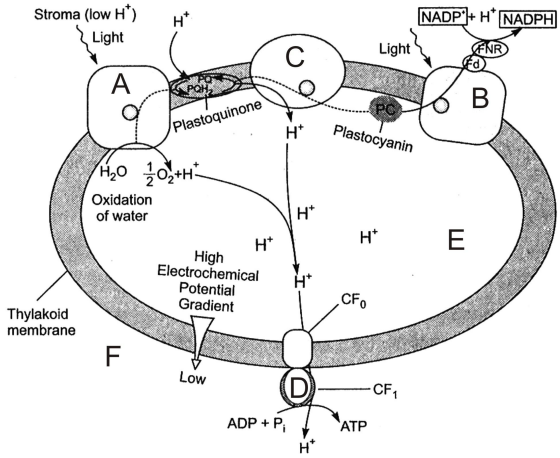
29. When an ideal binary solution is in equilibrium with its vapour, molar ratio of the two components in the solution and in the vapour phases is
(1) same
(2) different
(3) may or may not be same depending upon volatile nature of the two components
(4) None of the above

30. Which one of the following pairs of solution can we expect to be isotonic at the same temperature?
(1) 0.1 M urea and 0.1 M NaCl
(2) 0.1 M urea and 0.2 M $MgCl_2$
(3) 0.1 M NaCl and 0.1 M Na_2SO_4
(4) 0.1 M $Ca(NO_3)_2$ and 0.1 M Na_2SO_4

BOTANY

31. Asparagine and glutamine are two important amides which are formed from aspartic acid and glutamic acid, respectively, by replacing the ...a... by another ...b... radicle.
(1) a-hydroxyl part of acid ; b-NH_2^-
(2) a-NH_2^- group of amino acid ; b-OH^-
(3) a-amino group ; b–keto group
(4) a-keto group ; b-amino group

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



(1) A—ATP synthase, B–photosystem I, C—photosystem II, E—stroma, F—lumen, D—cytochrome b and f
(2) D—ATP synthase, A—photosystem I; B—photosystem II, F—stroma, E—lumen, C—cytochrome b and f
(3) D—ATP synthase, B–photosystem I, A—photosystem II, F—stroma, E—lumen, C—cytochrome b and f
(4) D—ATP synthase, A—photosystem I, B—photosystem II, E–stroma, F—lumen, C—cytochrome b and f

33. On which basis nutrients are divided into macro and micronutrients ?
(1) Quantitative requirement
(2) Qualitative requirement
(3) Both (1) and (2)
(4) None of these

34. Ribosomes take part in protein synthesis in
(1) Viruses
(2) Prokaryotes only
(3) Both prokaryotes and eukaryotes
(4) Eukaryotes only

35. F_1 particles occur in
(1) Mitochondria
(2) Chloroplasts
(3) Ribosomes
(4) Rough endoplasmic reticulum

36. Small particles projecting from inner surfaces of cristae and inner mitochondrial membrane are
(1) Microsomes (2) Oxysomes
(3) Myeloid bodies (4) Informosomes

37. Axoneme with 9+2 microtubular arrangement occurs in
(1) Cilia (2) Flagella
(3) Both (1) and (2) (4) Centriole

38. Calculate amount of DNA in a cell after meiosis II, if DNA content of cell is 4 pg at S phase.
(1) 4 pg (2) 2 pg (3) 1 pg (4) 8 pg

39. Mark the correct match.
(1) Stage–G_1 phase; Ploidy– n; DNA content–2C
(2) Stage–S phase; Ploidy–2n; DNA content–4C
(3) Stage–G_2 phase; Ploidy–4n; DNA content–4C
(4) Stage–Prophase; Ploidy–2n; DNA content–2C

40. If a cell has 2n number of chromosome in G_1 phase, what is the number of chromosome in cell after S phase?
(1) n (2) 4n (3) 2n (4) 8n

41. If one cell X has a $\psi_w = -2000$ kPa, and the other Y has $\psi_w = -1000$ k Pa, what is the direction of movement of water?
(1) X to Y (2) Y to X
(3) X to Y and Y to X (4) X to Y or Y to X

42. Choose the correct option. Mycorrhizae is a symbiotic association of fungus with root system which helps in :
(i) Absorption of water (ii) Mineral absorption
(iii) Translocation (iv) Gaseous exchange
(1) Only (i) (2) Only (ii)
(3) Both (i) and (ii) (4) Both (ii) and (iii)

43. Isobilateral leaf found in:
(1) Monocotyledonous
(2) Dicotyledonous
(3) Both monocotyledonous and dicotyledonous
(4) None of these

44. Casparian strips occur in
(1) cortex (2) pericycle
(3) epidermis (4) endodermis

45. Number of elements needed for healthy growth and development of plants is
(1) 17 (2) 24 (3) 34 (4) 10

ZOOLOGY

46. Probability of four sons to a couple is:
(1) $\frac{1}{4}$ (2) $\frac{1}{8}$
(3) $\frac{1}{16}$ (4) $\frac{1}{32}$

47. A normal woman whose father was colourblind marries a colourblind man. What percentage of girls born to these parents would be colourblind?
(1) 50% (2) 25%
(3) 75% (4) 100%

48. Goitre can occur as a consequence of all the following except :
(1) Iodine deficiency
(2) Pituitary adenoma
(3) Grave's disease
(4) Excessive intake of exogenous thyroxine

49. Variations during mutations of meiotic recombinations are:
(1) random and directionless
(2) random and directional
(3) random and small
(4) random, small and directional

50. First form of life could have come from pre-existing non-living organic molecules like RNA and protein and the formation of life was preceded by chemical evolution was proposed by:
(1) Lamarck
(2) Oparin and Haldane
(3) Darwin
(4) Hugo de Vries

51. Homology is based on A where analogy is result of B. A and B are respectively:
(1) Convergent evolution, Divergent evolution
(2) Divergent evolution, convergent evolution
(3) Natural selection, Genetic drift
(4) Adaptive radiation, convergent evolution

52. Stanley miller observed the formation of ___ during his experiment :
(1) Nucleic acid (2) Nucleotides
(3) Amino acid (4) Polypeptide

53. Which type of selection is industrial melanism observed in moth, Biston bitularia:
(1) Stabilising (2) Directional
(3) Disruptive (4) Artificial

54. Match column-I and column-II and select the correct option from the codes given below :

	Column-I		Column-II
A.	Mutation	(i)	Changes in population's allele frequencies due to chance alone
B.	Gene flow	(ii)	Differences in survival and reproduction among variant individual
C.	Natural selection	(iii)	Immigration, emigration change allele frequencies
D.	Genetic drift	(iv)	Source of new alleles

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

55. The process of evolution of different species in a given geographical area starting from a point and literally radiating to these areas of geography is called as:
(1) Divergent evolution
(2) Adaptive radiation
(3) Parallel adaptation
(4) Convergent radiation

56. How many of the following develops as a result of divergent evolution i.e., the same structure developed along different directions due to adaptation to different needs.
(1) Sweet potato and potato
(2) Thorn of Bougainvillea and tendril of cucurbita
(3) Flippers of penguin and dolphin
(4) Vertibrates hearts or brains
(1) Two (2) Three
(3) Four (4) Five

57. Animals of which class are mostly terrestrial and their body is covered by dry and cornified skin, epidermal scales or scutes?
(1) Amphibia (2) Reptilia
(3) Aves (4) Mammalia

58. Both male and female pigeons secrete milk through:
(1) Mammary glands (2) Crop glands
(3) Salivary glands (4) Gizzard glands

59. Which of the following is an oviparous mammal?
(1) Balaenoptera (2) Ornithorhynchus
(3) Pteropus (4) Delphinus

60. Ear pinna is found in:
(1) Reptiles (2) Mammals
(3) Aves (4) All vertebrates