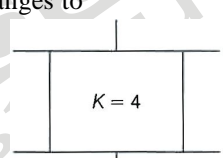
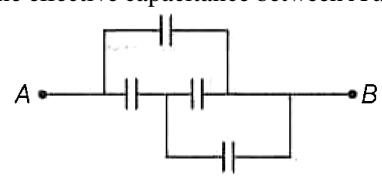
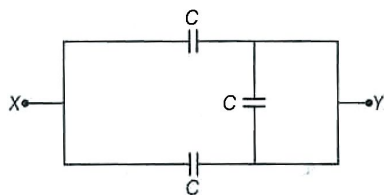


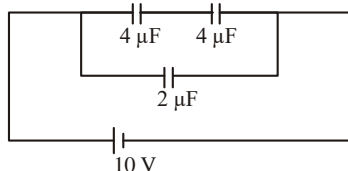
SAMPLE PAPER - 94
Time : 1 : 15 Hr.
Question : 60
PHYSICS

01. Two projectiles A and B thrown with velocities v and $\frac{v}{2}$ have the same range. If B is thrown at an angle of 15° to the horizontal, A must have been thrown at an angle
- (1) $\sin^{-1}\left(\frac{1}{16}\right)$ (2) $\sin^{-1}\left(\frac{1}{4}\right)$
 (3) $2\sin^{-1}\left(\frac{1}{4}\right)$ (4) $\frac{1}{2}\sin^{-1}\left(\frac{1}{8}\right)$
02. A body of mass 2 kg tied to the end of string of length 1 metre is whirled in a horizontal circle, with a uniform angular velocity of 4 rad/s. Then, the tension of the string will be :
- (1) 32 N (2) 16 N (3) 10 N (4) 8 N
03. The roadway bridge over a canal is in the form of an arc of a circle of radius 39.2 m. What is the maximum speed with which a car can move without leaving the ground at the highest point ? (Given : $g = 9.8 \text{ m s}^{-2}$)
- (1) 9.8 m s^{-1} (2) 19.6 m s^{-1}
 (3) 39.2 m s^{-1} (4) none of these
04. A particle moves in a circle of radius 5 cm with constant speed and time period $0.2\pi \text{ s}$. The acceleration of the particle is
- (1) 25 m/s^2 (2) 36 m/s^2
 (3) 5 m/s^2 (4) 15 m/s^2
05. A projectile is given an initial velocity of $\hat{i} + 3\hat{j}$. The Cartesian equation of its path is : ($g = 10 \text{ m/s}^2$)
- (1) $y = 2x - 5x^2$ (2) $y = 3x - 5x^2$
 (3) $4y = 2x - 5x^2$ (4) $y = 2x - 25x^2$
06. An aeroplane is flying horizontally with a velocity of 360 km/hr and at a height of 1960 m. When it is vertically above a point A on the ground, a bomb is released from it. The bomb strikes the ground at a point B. The distance AB is (ignoring air resistance)
- (1) 2 km (2) 4 km
 (3) 1 km (4) None of these
07. A cricketer can throw a ball to a maximum horizontal distance of 200 m. With the same speed how much high above the ground can the cricketer throw the same ball?
- (1) 50 m (2) 100 m
 (3) 150 m (4) 200 m
08. Consider a parallel plate capacitor of $10\mu\text{F}$ with air filled in the gap between the plates. Now, one-half of the space between the plates is filled with a dielectric of dielectric constant 4, as shown in the figure. The capacity of the capacitor changes to
- 
- (1) $25\mu\text{F}$ (2) $20\mu\text{F}$
 (3) $40\mu\text{F}$ (4) $5\mu\text{F}$
09. In the figure below, the capacitance of each capacitor is $3\mu\text{F}$. The effective capacitance between A and B is
- 
- (1) $\frac{3}{4}\mu\text{F}$ (2) $3\mu\text{F}$
 (3) $6\mu\text{F}$ (4) $5\mu\text{F}$
10. An air capacitor is connected to a battery. The effect of filling the space between the plates with a dielectric is to increase
- (1) the charge and the potential difference
 (2) the potential difference and the electric field
 (3) the electric field and the capacitance
 (4) the charge and the capacitance

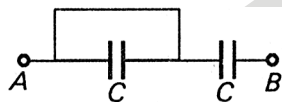
11. The equivalent capacity between the points X and Y in the circuit with $C = 1 \mu\text{F}$ is



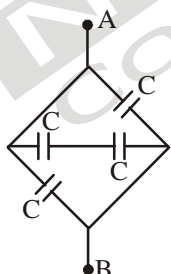
- (1) $2 \mu\text{F}$ (2) $3 \mu\text{F}$ (3) $1 \mu\text{F}$ (4) $0.5 \mu\text{F}$
12. The two circular metallic plates of radius r are placed at a distance d apart and its capacity is C . If a plate of radius $r/2$ and thickness d of dielectric constant 6 is placed between the plates of the condenser, then its capacity will be
- (1) $7C/3$ (2) $3C/7$ (3) $6C/3$ (4) $9C/4$
13. If initial charge on all the capacitors were zero, work done by the battery in the circuit shown is



- (1) 0.2 mJ (2) 200 mJ (3) 0.4 mJ (4) 400 mJ
14. Two capacitors each of capacitance C are connected as shown in the figure. What is the equivalent capacitance between A and B



- (1) $\frac{C}{2}$ (2) C (3) $2C$ (4) ∞
15. Four identical capacitors are connected as shown in figure. When a battery of 6V is connected between A and B, the charge drawn from battery is $1.5 \mu\text{C}$. The value of C is



- (1) $2.5 \mu\text{F}$ (2) $1 \mu\text{F}$ (3) $1.5 \mu\text{F}$ (4) $0.1 \mu\text{F}$

CHEMISTRY

16. 10 g of hydrogen and 64 g of oxygen were filled in a steel vessel and exploded. Amount of water produced in this reaction will be
- (1) 3 mol (2) 4 mol (3) 1 mol (4) 2 mol

17. What volume of oxygen gas (O_2) measured at 0°C and 1 atm , is needed to burn completely 1 L of propane gas (C_3H_8) measured under the same conditions?
- (1) 7 L (2) 6 L
(3) 5 L (4) 10 L

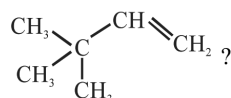
18. The vapour pressure of a liquid in pure state is 50 mm Hg while that in solution state is 40 mm Hg . Find the mole fraction of that liquid in solution state
- (1) 0.40 (2) 0.50
(3) 0.60 (4) 0.80

19. Which of the following is not true about the Raoult's law?
- (1) It is applicable to only very dilute solutions
(2) It is applicable to solution containing non-volatile solute
(3) It is applicable to solution containing electrolytic solute
(4) All of the above statements are true

20. Which of the following solution obey Raoult's law at almost all concentration ranges?
- (1) Ideal solution
(2) Non-ideal solution with positive deviation
(3) Non-ideal solution with negative deviation
(4) All of the above solution

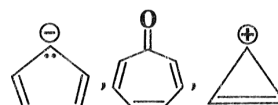
21. A. Phenyl methanamine B. N,N -Dimethylaniline
C. N -Methyl aniline D. Benzenamine
Choose the correct order of basic nature of the above amines.
- (1) $A > C > B > D$ (2) $D > C > B > A$
(3) $D > B > C > A$ (4) $A > B > C > D$

22. What is the major product formed by HI on reaction with



- (1) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH} - \text{CH}_2\text{I} \\ | \\ \text{CH}_3 \end{array}$ (2) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
(3) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH} - \text{CH}_3 \\ | \quad | \\ \text{I} \quad \text{CH}_3 \end{array}$ (4) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH} - \text{CH} - \text{CH}_2 - \text{CH}_3 \\ | \quad | \\ \text{CH}_3 \quad \text{I} \end{array}$

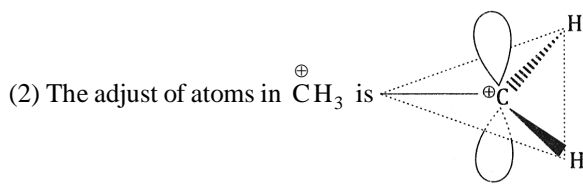
23. Which class of organic compounds do the following compounds belong to?



- (1) Benzenoid aromatics
(2) Non-benzenoid aromatics
(3) Heterocyclics (4) Acyclic compounds

24. Select the correct statement (s) out of the following for a carbocation:

(1) C[⊕] - atom is sp² hybridised



(3) Any nucleophile can attack it from either side of the plane
 (4) All of the above are correct

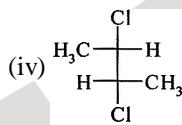
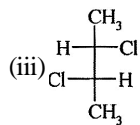
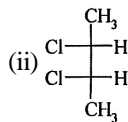
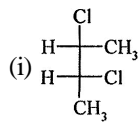
25. The maximum number of alkene isomers possible for an alkene with molecular formula C₄H₈ is:

(1) 2 (2) 3
 (3) 4 (4) 5

26. C₅H₁₀O is a carbonyl compound. The number of structural isomers possible for this molecular formula are

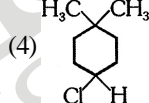
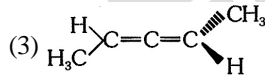
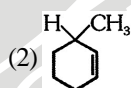
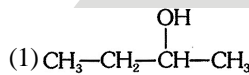
(1) 5 (2) 8 (3) 6 (4) 7

27. Which of the following pair is diastereomers ?



(1) i, ii (2) i, iii (3) i, iv (4) iii, iv

28. Which of the following compound is optically inactive ?



29. The IUPAC symbol for the element with atomic number 119 would be:

(1) unh (2) uun
 (3) une (4) uue

30. What is the correct increasing order of ionic atomic radii in the following?

(1) Si⁴⁺ < P⁵⁺ < S⁶⁺ < Cl⁷⁺
 (2) P⁵⁺ < Si⁴⁺ < Cl⁷⁺ < S⁶⁺
 (3) Cl⁷⁺ < S⁶⁺ < P⁵⁺ < Si⁴⁺
 (4) S⁶⁺ < P⁵⁺ < Cl⁷⁺ < Si⁴⁺

31. Water splitting complex is associated with
 (1) PS I (2) PS II
 (3) Both (1) and (2) (4) None of these

32. Stroma lamellae lacks all except
 (1) PS II
 (2) NADP reductase
 (3) PS I
 (4) Water splitting complex

33. NADPH₂ generated through
 (1) Glycolysis (2) Photosystem I
 (3) Photosystem II (4) Anaerobic respiration

34. Pigment system I conducts
 (1) Cyclic photophosphorylation
 (2) Non-cyclic photophosphorylation
 (3) Both (1) and (2)
 (4) None of these

35. The similarity between C₃ and C₄ pathway is
 (1) Both are equally efficient
 (2) organic acid is formed as the first product of CO₂ fixation
 (3) Both requires one type of cell to occur
 (4) Both takes place in all the plants

36. Glycolysis occurs in how many controlled steps ?
 (1) 1 (2) 5 (3) 10 (4) 15

37. The key product of glycolysis is
 (1) Acetyl-CoA (2) Pyruvic acid
 (3) Lactic acid (4) Ethanol

38. In plants flowering is delayd due to the deficiency of
 (1) Mo, S and N (2) Mo, S, N and K
 (3) Ca, Mg, Cu and K (4) Mg, Zn, Mn and K

39. Omnis cellula-e cellula is generalisation given by
 (1) Lamarck (2) Dutrochet
 (3) Leeuwenhoek (4) Virchow

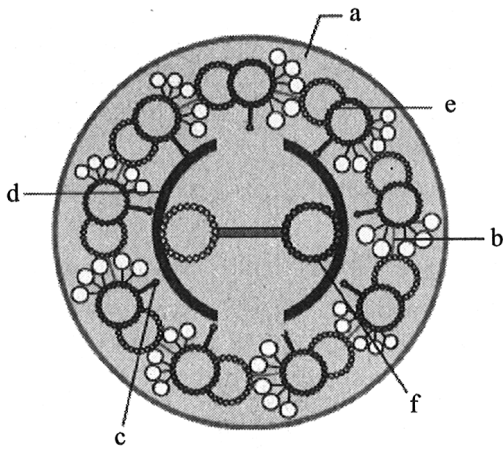
40. Lysosomal enzymes are active at pH
 (1) 5 (2) 7 (3) 8 (4) Variable

41. Sedimentation coefficient(s) indirectly is a measure of
 (1) Density (2) Size
 (3) Volume (4) Both (1) and (2)

42. The number of chloroplast varies from 1 per cell in ...a... to ...b... per cell in the mesophyll.
 (1) a-Chlorella, b-15 to 20
 (2) a-Chlamydomonas, b-20 to 40
 (3) a-Chlamydomonas, b-15 to 20
 (4) a-Chlamydomonas, b-10 to 40

43. Stack of lamella found inside a plastid is
 (1) Thylakoid (2) Stroma
 (3) Granum (4) Oxyosome

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



- (1) d-plasma membrane, b-radial spoke, a-central sheath, c-interdoublet bridge, f-peripheral microtubule, e-central microtubule
 (2) d-plasma membrane, c-radial spoke, a-central sheath, b-interdoublet bridge, e-peripheral microtubule, f-central microtubule
 (3) a-plasma membrane, b-radial spoke, d-central sheath, c-interdoublet bridge, e-peripheral microtubule, f-central microtubule
 (4) a-plasma membrane, c-radial spoke, d-central sheath, b-interdoublet bridge, e-peripheral microtubule, f-central microtubule

45. Fill in the blanks:

- Centrioles are ...a... structures that lie ...b... to each other.
- Centrioles have an organisation like ...c....
- Centrioles are made up of nine evenly spaced peripheral fibrils of ...d... protein.
- Each peripheral fibril of centriole is ...e...
- Central part of the proximal region of the centriole is called ...f... which proteinaceous.

- (1) a-spherical, b-parallel, c-cart wheel, d-flagellin, e-doublet, f-bridge
 (2) a-cylindrical, b-perpendicular, c-cart wheel, d-tubulin, e-triplet, f-hub
 (3) a-cylindrical, b-perpendicular, c-cart wheel, d-tubulin, e-doublet, f-hub
 (4) a-spherical, b-perpendicular, c-cart wheel, d-tubulin, e-triplet, f-hub

47. Down syndrome and Turner syndrome occur in human beings due to:
 (1) nullisomic and monosomic conditions respectively
 (2) monosomic and nullisomic conditions respectively
 (3) trisomic and monosomic conditions respectively
 (4) monosomic and trisomic conditions respectively

48. The sex determination pattern in honeybee is called:
 (1) XO male and XX female type
 (2) Haploid-diploid type
 (3) ZZ male and ZW female type
 (4) XY male and XX female type

49. In Drosophila, the sex is determined by:
 (1) The ratio of pairs of X-chromosomes to the pairs of autosomes
 (2) Whether the egg is fertilized or develops parthenogenetically
 (3) The ratio of number of X-chromosomes to the sets of autosomes
 (4) X and Y-chromosomes

50. Which of the following symbols are used for representing sex chromosomes of birds?
 (1) ZZ - ZW (2) XX - XY
 (3) XO - XX (4) ZZ - WW

51. The most popularly known blood grouping is the ABO grouping. It is named ABO and not ABC, because "O" in it refers to having:
 (1) no antigens A and B on RBCs
 (2) other antigens besides A and B on RBCs
 (3) overdominance of this type on the genes for A and B types
 (4) one antibody only either anti-A or anti-B on the RBCs

52. A man with type A blood group marries a woman who has AB group. We do not know whether the man is homozygous or heterozygous for I^A allele. Which one of the following types in the progeny of this couple would indicate that the man is heterozygous?
 (1) Type A (2) Type B
 (3) Type O (4) Type AB

53. Two key concepts of Darwin theory of evolution are:
 (1) Saltation and natural selection
 (2) Adaptive radiation and convergent evolution
 (3) Branching descent and natural selection
 (4) Natural selection and divergent evolution

54. According to Hugo de Vries speciation due to mutation is also known as 'Saltation' which means:
 (1) Single step variation
 (2) Variations at regular intervals
 (3) Single step large mutation
 (4) Huge change due to natural selection

ZOOLOGY

46. Leydig cells or interstitial cells secrete
 (1) Oestrogens (2) Progesterone
 (3) Testosterone (4) Relaxin

55. $(p + q)^2 = p^2 + 2pq + q^2 = 1$ represents an equation used in:
(1) population genetics (2) mendelian genetics
(3) biometrics (4) molecular genetics
56. When more than one adaptive radiations appears to have occurred in an isolated geographical area then we call it:
(1) Divergent evolution (2) Convergent evolution
(3) Mega evolution (4) Micro evolution
57. Consider the following four statements (A-D) and select the option which includes all the correct ones only:
(A) The first Mammals were like shrew
(B) Mammals were more intelligent in sensing and avoiding danger at least
(C) When reptiles came down mammals took over this earth
(D) Due to continental drift when North America joined South America these animals were over ridden by South American fauna
(1) Statements A, B and C
(2) Statements A and B
(3) Statements C and D
(4) Statements B, C and D
58. Main drawback of Darwinism was:
(1) Natural selection
(2) Reason of variations
(3) Over production
(4) Adaptation
59. Consider the following four statements (a-b) and select the option which includes all the correct ones only:
(a) Evolution is a process.
(b) Evolution is consequence of a process
(c) Natural resources are limited
(d) Populations are stable in size except for seasonal fluctuation
(1) Statements a, b and c
(2) Statements a, b, c and d
(3) Statements a, b and d
(4) Statements a and d
60. Primitive atmosphere was made up of the mixture of:
(1) Oxygen, ammonia, methane, water
(2) Hydrogen, ammonia, methane, oxygen
(3) Hydrogen, steam, methane, ammonia
(4) Oxygen, methane, water, nickel