

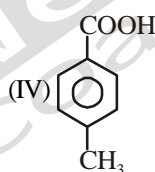
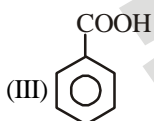
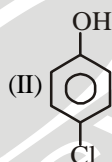
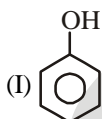

SAMPLE PAPER - 93
Time : 1 : 15 Hr.
Question : 60
PHYSICS

01. A spherical drop of capacitance $1 \mu\text{F}$ is broken into eight drops of equal radius. Then, the capacitance of each small drop is
 (1) $\frac{1}{2} \mu\text{F}$ (2) $\frac{1}{4} \mu\text{F}$ (3) $\frac{1}{8} \mu\text{F}$ (4) $8 \mu\text{F}$
02. Three point charges q , $-2q$ and $-2q$ are placed at the vertices of an equilateral triangle of side a . The work done by some external force to increase their separation to $2a$ will be
 (1) $\frac{1}{4\pi\epsilon_0} \frac{2q^2}{a}$ (2) $\frac{1}{4\pi\epsilon_0} \frac{q^2}{2a}$
 (3) $\frac{1}{4\pi\epsilon_0} \frac{8q}{a^2}$ (4) zero
03. A $500 \mu\text{F}$ capacitor is charged at the steady rate of $100 \mu\text{Cs}^{-1}$. How long will it take to raise the potential difference between the plates of the capacitor to 10 V ?
 (1) 5 s (2) 10 s
 (3) 50 s (4) 100 s
04. Two charged spheres of radii R_1 and R_2 have equal surface charge density. The ratio of their potential is
 (1) R_1/R_2 (2) R_2/R_1
 (3) $(R_1/R_2)^2$ (4) $(R_2/R_1)^2$
05. A small conducting sphere of radius r is lying concentrically inside a bigger hollow conducting sphere of radius R . The bigger and smaller spheres are charged with Q and q ($Q > q$) and are insulated from each other. The potential difference between the spheres will be
 (1) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{r} - \frac{q}{R} \right)$ (2) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{R} - \frac{Q}{r} \right)$
 (3) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{r} - \frac{Q}{R} \right)$ (4) $\frac{1}{4\pi\epsilon_0} \left(\frac{Q}{R} + \frac{q}{r} \right)$
06. A man walks on a straight road from his home to a market 2.5 km away with a speed of 5 km/h . Finding the market closed, he instantly turns and walks back home with a speed of 7.5 km/h . The average speed of the man over the interval of time 0 to 40 min . is equal to
 (1) 5 km/h (2) $\frac{25}{4} \text{ km/h}$
 (3) $\frac{30}{4} \text{ km/h}$ (4) $\frac{45}{8} \text{ km/h}$
07. The motors of an electric train can give it an acceleration of 1 m/s^2 and the brakes can give it a negative acceleration of 3 m/s^2 . The shortest time in which the train can make a trip between two stations 1215 m apart is:
 (1) 14.2 s (2) 28.4 s
 (3) 56.8 s (4) 113.6 s
08. For a particle moving along a straight line, the displacement x depends on time t as $x = \alpha t^3 + \beta t^2 + \gamma t + \delta$. The ratio of its initial acceleration to its initial velocity depends.
 (1) only on α and β (2) only on β and γ
 (3) only on α and γ (4) only on α .
09. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s . The height of the tower is : ($g = 10 \text{ m/s}^2$)
 (1) 360 m (2) 340 m (3) 320 m (4) 300 m
10. Two cars P and Q start from a point at the same time in a straight line and their positions are represented by $x_P(t) = at + bt^2$ and $x_Q(t) = ft - t^2$. At what time do the cars have the same velocity?
 (1) $\frac{a+f}{2(1+b)}$ (2) $\frac{f-a}{2(1+b)}$
 (3) $\frac{a-f}{1+b}$ (4) $\frac{a+f}{2(b-1)}$

11. A boy goes 10 m towards north, then 20 m towards east, then its displacement is nearly
 (1) 22 m (2) 25 m
 (3) 30 m (4) none of these
12. If the angle between two forces increases, the magnitude of their resultant
 (1) decreases
 (2) increases
 (3) remains unchanged
 (4) decreases and increases.
13. The resultant of two forces, one double the other in magnitude, is perpendicular to the smaller of the two forces. The angle between the two forces is :
 (1) 120° (2) 60° (3) 90° (4) 150°
14. A 120 m long train is moving west at a speed of 10 m/s. A small bird flying east at a speed of 5 m/s crosses the train. What is the time taken by the bird to cross the train?
 (1) 4 s (2) 8 s (3) 12 s (4) 24 s.
15. Rain is falling vertically 4 ms^{-1} . A man is moving due east with 3 ms^{-1} . The direction in which he shall hold the umbrella with the vertical is
 (1) 53° east of vertical (2) 37° east of vertical
 (3) 53° west of vertical (4) 37° west of vertical

CHEMISTRY

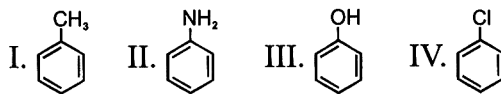
16. The correct acidity order of the following is:



- (1) IV > III > I > II (2) III > IV > II > I
 (3) II > III > IV > I (4) III > II > I > IV
17. Which of the following is not nucleophile-
 (1) NH_3 (2) $\text{CH}_3-\ddot{\text{O}}\text{H}$
 (3) OH^\ominus (4) NH_4^\oplus
18. Correct order of basic strength of given amine in aqueous medium
 $\text{C}_2\text{H}_5\text{NH}_2$, $(\text{C}_2\text{H}_5)_2\text{NH}$, $(\text{C}_2\text{H}_5)_3\text{N}$, $\text{C}_6\text{H}_5\text{NH}_2$
 (1) $(\text{C}_2\text{H}_5)_2\text{NH} > \text{C}_2\text{H}_5\text{NH}_2 > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_6\text{H}_5\text{NH}_2$
 (2) $(\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_2\text{H}_5\text{NH}_2 > \text{C}_6\text{H}_5\text{NH}_2$

- (3) $(\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_6\text{H}_5\text{NH}_2 > \text{C}_2\text{H}_5\text{NH}_2$
 (4) $(\text{C}_2\text{H}_5)_3\text{N} > (\text{C}_2\text{H}_5)_2\text{NH} > \text{C}_2\text{H}_5\text{NH}_2 > \text{C}_6\text{H}_5\text{NH}_2$

19. Arrange in decreasing order of rate of reactivity.



- (1) I > II > III > IV (2) II > III > I > IV
 (3) III > II > I > IV (4) I > II > III > IV

20. For the following, the increasing order of nucleophilicity is I^- , Cl^- , Br^-

- (1) $\text{I}^- < \text{Cl}^- < \text{Br}^-$ (2) $\text{Br}^- < \text{Cl}^- < \text{I}^-$
 (3) $\text{I}^- < \text{Br}^- < \text{Cl}^-$ (4) $\text{Cl}^- < \text{Br}^- < \text{I}^-$

21. In which of the following pairs of compounds the ratio of C, H and O is same

- (1) Acetic acid and methyl alcohol
 (2) Glucose and acetic acid
 (3) Fructose and sucrose
 (4) All of these

22. Under the same conditions, two gases have the same number of molecules. They must

- (1) be noble gases
 (2) have equal volume
 (3) have a volume of 22.4 dm^3 each
 (4) have an equal number of atoms

23. A hydrocarbon contains 84% carbon, 448 ml of the hydrocarbon weight 2 g at STP. Then the hydrocarbon is an

- (1) Alkane (2) Alkene
 (3) Alkyne (4) Arene

24. A compound was found to contain nitrogen and oxygen in the ratio 28 g and 80 g respectively. The formula of compound is

- (1) NO (2) N_2O_3 (3) N_2O_5 (4) N_2O_4

25. A molal solution is one that contains one mole of a solute in

- (1) 1000 g of the solvent
 (2) one litre of the solvent
 (3) one litre of the solution
 (4) 22.4 litres of the solution

26. Which of the following changes with increase in temperature?

- (1) Molality
 (2) Weight fraction of solute
 (3) Fraction of solute present in water
 (4) Mole fraction

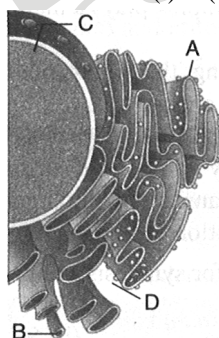
27. The density of a solution prepared by dissolving 120 g of urea (mol. Mass = 60 u) in 1000 g of water is 1.15 g/mL. The molarity if this solution is

- (1) 0.50 M (2) 1.78 M (3) 1.02 M (4) 2.05 M

28. The mole fraction of a given sample of I_2 in C_6H_6 is 0.2. The molality of I_2 in C_6H_6 is
 (1) 0.32 (2) 3.2 (3) 0.032 (4) 0.48
29. The molality of a urea solution in which 0.0100 g of urea, $[(NH_2)_2CO]$ is added to 0.3000 dm³ of water at STP is
 (1) 5.55×10^{-4} M (2) 33.3 M
 (3) 3.33×10^{-2} M (4) 0.555 M
30. One litre of CO_2 is passed over hot coke. The volume becomes 1.4 litre. The per cent composition of products is:
 (1) 0.6 litre CO
 (2) 0.8 litre CO_2
 (3) 0.6 litre CO_2 and 0.8 litre CO
 (4) None of these

BOTANY

31. Which of the events listed below is not observed during mitosis?
 (1) Chromatin condensation
 (2) Movement of centrioles to opposite poles
 (3) Appearance of chromosomes with two chromatids joined together at the centromere
 (4) Crossing over
32. Astral rays arise from
 (1) Centriole (2) Cytoplasm
 (3) Chromatid (4) Centromere
33. Read the following statement carefully and mark them as true (T) or false (F).
 A. The content of nucleolus is continuous with the rest of the nucleoplasm.
 B. In the chromoplast, water soluble carotenoid pigments like carotene and xanthophyll are present.
 C. Basal body of bacterial flagellum has 9 + 2 arrangement of microtubules.
 (1) T, F, F (2) F, T, T (3) T, F, T (4) T, T, F
34. Identify the components labelled A, B, C and D in the diagram below from the list (i) to (vii) given along with:



Components:

- (1) Cristae of mitochondria
 (2) Inner membrane of mitochondria
 (3) Cytoplasm
 (4) Smooth endoplasmic reticulum

- (5) Rough endoplasmic reticulum
 (6) Mitochondrial matrix
 (7) Cell vacuole
 (8) Nucleus
 The correct components are:
 (1) A-5, B-4, C-8, D-3 (2) A-1, B-4, C-8, D-4
 (3) A-6, B-5, C-4, D-7 (4) A-5, B-1, C-3, D-2

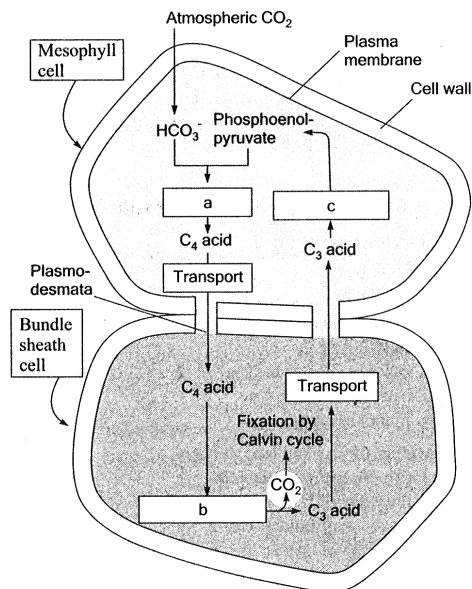
35. Match the columns and identify the correct option.

	Column I		Column II
(a)	Thylakoids	(1)	Disc-shaped sacs in Golgi apparatus
(b)	Cristae	(2)	Condensed structure of DNA
(c)	Cisternae	(3)	Flat membranous sacs in stroma
(d)	Chromatic	(4)	Infoldings in mitochondria

- (1) a-3, b-4, c-1, d-2 (2) a-3, b-1, c-4, d-2
 (3) a-3, b-4, c-2, d-1 (4) a-4, b-3, c-1, d-2

36. ATP formation during photosynthesis is
 (1) Phosphorylation
 (2) Photophosphorylation
 (3) Oxidative phosphorylation
 (4) None of the above
37. Fill in the blanks:
 1. All living organisms needa.... for carrying out daily life activities, be it absorption, transport, movement, reproduction or even breathing.
 2. All the energy required for life processes is obtained byb.... some macromolecules that we call food.
 3. Animals are heterotrophic, i.e they obtain food from plant directly (...c...) or indirectly (...d...).
 4.e... like fungi are dependent on dead and decaying matter
 (1) a—food, b oxidation, c—carnivores, d—herbivores, e—parasites
 (2) a — energy, b — reduction, c — herbivores, d—carnivores, e—saprophytes
 (3) a—energy, b—oxidation, c—herbivores, d—carnivores, e—saprophytes
 (4) a—oxygen, b—reduction, c—carnivores, d—herbivores, e—saprophytes
38. C_3 plants responds to higher CO_2 concentration by showing increased rates of photosynthesis leading to higher productivity has been used for some greenhouse crops such as
 (1) Tomato and black pepper
 (2) Tomato, lettuce and seedless cucumber
 (3) Beet and black pepper
 (4) Tomato and bell pepper

39. As compared to C_3 plants, how many additional molecules of ATP are needed for net production of one molecule of hexose sugar by C_4 plants?
 (1) Two (2) Six
 (3) Twelve (4) Zero
40. Primary carboxylation occurs in C_3 and C_4 plants with the help of
 (1) PEP carboxylase and pyruvate carboxylase respectively
 (2) PEP carboxylase and RuBP carboxylase respectively
 (3) RuBP carboxylase and PEP carboxylase respectively
 (4) RuBP carboxylase and pyruvate carboxylase respectively
41. ATP molecules required to synthesize one molecule of glucose by C_4 pathway are
 (1) 12 (2) 18 (3) 24 (4) 30
42. Study the pathway given below: In which of the following options correct words for all the three blanks a, b and c are indicated.



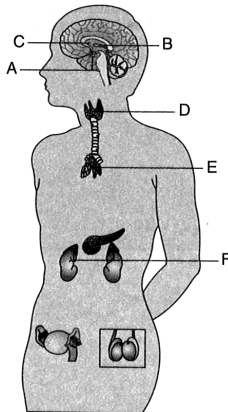
- (1) a—Decarboxylation, b—Reduction, c—Regeneration
 (2) a—Fixation, b—Transamination, c—Regeneration
 (3) a—Fixation, b—Decarboxylation, c—Regeneration
 (4) a—Carboxylation, b—Decarboxylation, c—Reduction
43. Kranz anatomy occurs in
 (1) Leaves (2) Stem
 (3) Flower (4) Seed
44. Light harvesting complexes (LHC) are made up of hundreds of pigment molecules bound to proteins. In LHC, reaction centre of formed by
 (1) A single chlorophyll a molecule
 (2) All the pigments except one molecule of chlorophyll a
 (3) Carotenoids and xanthophylls
 (4) Both B and C

45. Leaf pigments of any green plants can be separated by
 (1) X-ray diffraction
 (2) Sedimentation
 (3) Paper chromatography
 (4) Centrifugation

ZOOLOGY

46. Select the incorrect matching
 (1) Kangaroo - *Macropus*
 (2) Blue whale - *Balaenoptera*
 (3) Monkey - *Macaca*
 (4) Elephas - *Camel*
47. Immune response of any old person is weak because
 (1) Thymus is degenerated in an old individual
 (2) Thymosin production decreases
 (3) Both (1) and (2)
 (4) None of these
48. Androgenic steroids are also secreted by adrenal cortex and it causes
 (1) Growth of axial hair
 (2) Growth of pubic hair
 (3) Growth of facial hair
 (4) All of these
49. Select the total number of hormones from the following which has extra cellular receptor
 Erythropoietin, Gastrin, Secretin, GIP, CCK, Insulin, Glucagon, Thymosin, PTH, ANF
 (1) 8 (2) 7
 (3) 9 (4) 10
50. Which of the following is true for person having blood group B?
 (1) He can donate blood to person of blood groups 'AB' and 'B'
 (2) He can accept blood from those with blood groups 'B' and 'O'
 (3) He can donate blood to and accept from person with blood group 'B' only
 (4) Both (1) and (2)
51. Animal belonging to phylum Chordata shows
 (1) Bilateral symmetry, triploblastic and coelom
 (2) Organ system level of organization
 (3) Closed circulatory system
 (4) All of these
52. Select the total number of organisms which possess two-chambered heart and are poikilothermal.
 Scoliodon, Pristis, Clarias, Betta, Pterophyllum, Salamandra, chelone, tortoise, calotes, Hyla, Labeo, Torpedo, Trygon, Catla.
 (1) 7 (2) 9 (3) 11 (4) 13

53. Males possess claspers in pelvic fins in class_____.
- (1) Cyclostomata (2) Chondrichthyes
(3) Osteichthyes (4) Amphibia
54. Limbless amphibia is
- (1) Frog (2) Tree frog
(3) Ichthyophis (4) Bufo
55. Find out the incorrect matching.
- (1) Reptiles – Chelone, Testudo, Chameleon
(2) Aves – Psittacula, Aptenodytes, Neophron
(3) Mammals – Elephas, Rattus, Delphinus
(4) Amphibians – Naja, Bangarus, Calotes
56. Choose the correct statement from the following.
- (1) All cyclostomes possess jaws and paired fins
(2) All mammals have a four-chambered heart
(3) All pisces have gills covered by an operculum
(4) All mammals are viviparous
57. Identify A, B, C, D, E and F in the given figure.



- (1) A–Hypothalamus, B–Pineal, C–Thymus, D–Adrenal, E–Pituitary, F–Thyroid and parathyroid
(2) A–Pituitary, B–Pineal, C–Hypothalamus, D–Thyroid and parathyroid, E–Thymus, F–Adrenal
(3) A–Thymus, B–Pituitary, C–Thyroid and parathyroid, D–Pineal, E–Hypothalamus, F–Adrenal
(4) A–Pineal, B–Thyroid and parathyroid, C–Pituitary, D–Hypothalamus, E–Adrenal, F–Pineal

58. Hypothalamus is
- (1) Roof of diencephalon
(2) Basal part of diencephalon
(3) Lateral wall of diencephalon
(4) All of the above
59. Over secretion of growth hormone in young one leads to
- (1) Dwarfism (2) Cretinism
(3) Gigantism (4) Tetany
60. Which of the following statement is incorrect?
- (1) Insulin and glucagon are peptide hormones
(2) Insulin acts mainly on hepatocyte and adipocytes and enhance glucose uptake and utilization
(3) Insulin stimulates glycogenesis
(4) Glucagon inhibits the process of gluconeogenesis