SAMPLE PAPER - 73

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

PHYSICS

01. At time t, the position of a body moving along the x–axis is $x = t^3 - 6t^2 + 9t$ m. The deceleration of the body at 1 s is
(1) 6ms^{-2} (2) 4ms^{-2}
(3) 8ms^{-2} (4) none

02. If the first one-third of a journey is travelled at 20 km h^{-1}, next one-third at 40 km h^{-1} and the last one-third at 60 km h^{-1}, then the average speed for the whole journey will be
(1) 32.7 km h^{-1} (2) 35 km h^{-1}
(3) 40 km h^{-1} (4) 45 km h^{-1}

03. Which of the following graphs represents the motion of a particle moving with constant velocity ?



(i)   (ii)
(iii)   (iv)
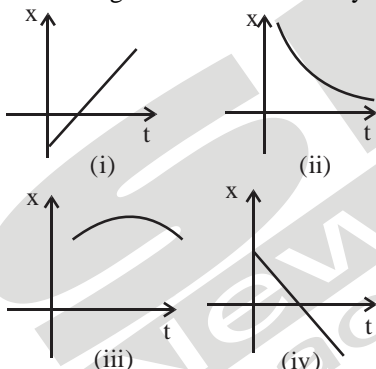
(1) graphs (i) and (iii)   (2) graphs (i) and (iv)
(3) graphs (i) and (ii)   (4) graph (i)

04. One stone is dropped from a tower from rest and simultaneously another stone is projected vertically upwards from the tower with some initial velocity. The graph of the distance(s) as (before either stone hits the ground)

(1)   (2)

(3)   (4)
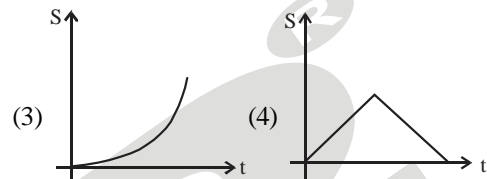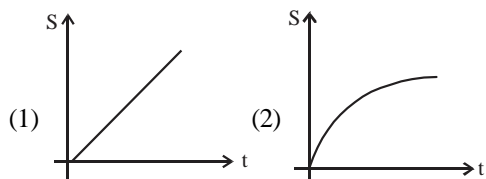
05. A particle starts from rest at t = 0 and moves in a straight line with acceleration as shown in figure. The velocity of the particle at t = 3 s is
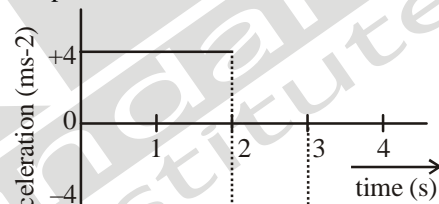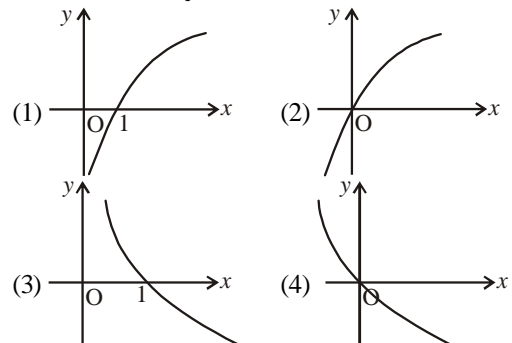

(1) 2 ms^{-1} (2) 4 ms^{-1} (3) 6 ms^{-1} (4) 8 ms^{-1}

06. Sum of infinite series
$x + x^2 + x^3 + x^4 + ...$
where $-1 < x < 1$, is
(1) $\dfrac{x}{1+x}$ (2) $\dfrac{x}{1-x}$ (3) $\dfrac{1}{1+x}$ (4) $\dfrac{1}{1-x}$

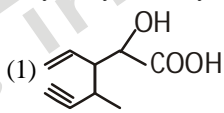**07.** Graph of $y = \log_e(1 + x)$ is

(1)   (2)

(3)   (4)

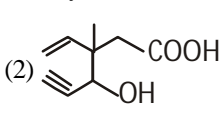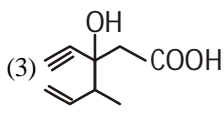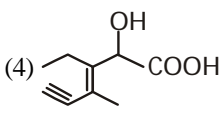**08.** If $y = t^2 e^{-t}$, then $\dfrac{dy}{dt} = 0$
(1) only at t = 2   (2) both at t = 0 and t = 2
(3) only at t = 0   (4) none of the above

09. If $y = \log_e \left(\dfrac{3x+1}{2x+2} \right)$, then at $x = 1$, $\dfrac{dy}{dx} =$

(1) 1   (2) $\dfrac{1}{2}$ (3) $\dfrac{1}{4}$ (4) $-\dfrac{1}{4}$

10. If $y = x^4$ and x increases by 20% then y is increased by nearly
(1) 46%   (2) 40%
(3) 14%   (4) None

11. A train accelerates from rest at constant rate α for distance s_1 and time t_1. After that it retards to rest at constant rate β for distance s_2 and time t_2. Which of the following relations is correct ?

(1) $\dfrac{s_1}{s_2} = \dfrac{\alpha}{\beta} = \dfrac{t_1}{t_2}$ (2) $\dfrac{s_1}{s_2} = \dfrac{\beta}{\alpha} = \dfrac{t_1}{t_2}$

(3) $\dfrac{s_1}{s_2} = \dfrac{\alpha}{\beta} = \dfrac{t_2}{t_1}$ (4) $\dfrac{s_1}{s_2} = \dfrac{\beta}{\alpha} = \dfrac{t_2}{t_1}$

12. Drops of water fall at regular intervals from roof of a building of height $H = 16$ m, the first drop striking the ground at the same moment as the fifth drop detaches itself from the roof. The distance between separate drops in air as the first drop reaches the ground are :
(1) 1m, 5m, 7m, 3m   (2) 1m, 3m, 5m, 7m
(3) 1m, 3m, 7m, 5m   (4) none of the above

13. A bus is moving with a velocity of 10 ms^{-1} on a straight road. A scooterist wishes to overtake the bus in 100 s. If the bus is at a distance of 2 km from the scooterist, the scooterist should chase the bus with a constant velocity of
(1) 50 ms^{-1} (2) 40 ms^{-1}
(3) 30 ms^{-1} (4) 20 ms^{-1}

14. A body starts from rest with uniform acceleration. If its velocity after n seconds is v, then its displacement in the last two seconds is

(1) $\dfrac{2v(n+1)}{n}$ (2) $\dfrac{v(n+1)}{n}$

(3) $\dfrac{v(n-1)}{n}$ (4) $\dfrac{2v(n-1)}{n}$

15. 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 60 m/s. The height of the tower is : ($g = 10$ m/s^2)
(1) 160 m   (2) 340 m
(3) 320 m   (4) 300 m

CHEMISTRY

16. Elements given in column–I and their electron gain enthalpy in column–II. Match the elements with electron gain enthalpy.

	Column-I		Column-II
(i)	Noble gas	(p)	-53 KJ/mole
(ii)	Alkali metal	(q)	-328 KJ/mole
(iii)	Halogen	(r)	-141 KJ/mole
(iv)	Chalcogen	(s)	$+48$ KJ/mole

(1) (i)–(s); (ii)–(q); (iii)–(p); (iv)–(r)
(2) (i)–(s); (ii)–(p); (iii)–(r); (iv)–(q)
(3) (i)–(s); (ii)–(p); (iii)–(q); (iv)–(r)
(4) (i)–(s); (ii)–(r); (iii)–(q); (iv)–(p)

17. The first ionisation enthalpy values of the III period elements Na, Mg, Si are respectively 496, 737 and 786 KJ/mole. The first ΔH_i value for Al will be more close to
(1) 496   (2) 760   (3) 786   (4) 575

18. Correct IUPAC name for $H_3C-\underset{\underset{C_2H_5}{|}}{CH}-\underset{\underset{C_2H_5}{|}}{CH}-CH_3$ is .

(1) 2- ethyl-3-methylpentane
(2) 3,4- dimethylhexane
(3) 2-sec-butylbutane
(4) 2, 3-dimethylbutane

19. Structure of the compound whose IUPAC name is 3-Ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid is

20. The IUPAC name for is

$$CH_3 - \overset{O}{\overset{||}{C}} - CH_2 - CH_2 - \overset{O}{\overset{||}{C}} - OH .$$

(1) 1-hydroxypentane-1,4-dione
(2) 1,4-dioxopentanol
(3) 1-carboxybutan-3-one
(4) 4-oxopentanoic acid

21. 1 mol of CH_4 contains
(1) 6.02×10^{23} atoms of H
(2) 4 g atom of Hydrogen
(3) 1.81×10^{23} molecules of CH_4
(4) 3.0 g of carbon

22. The empirical formula of an acid is CH_2O_2, the probable molecular formula of acid may be
(1) CH_2O (2) CH_2O_8 (3) $C_2H_4O_4$ (4) $C_3H_6O_4$

23. Equal mass of Fe_2O_3 and FeO has mass of oxygen in the ratio:
(1) 1.35 (2) 0.74 (3) 0.37 (4) 2.7

24. One atom of an element X weighs 6.643×10^{-23} g. Number of moles of atom in 20 kg is
(1) 140 (2) 150 (3) 250 (4) 500

25. A carbon compound containing carbon and oxygen has an approximate molar mass equal to 290. On analysis it is found to contain 50% by mass of each element. Therefore, the molecular formula of the compound is-
(1) $C_{12}O_9$ (2) C_4O_3 (3) C_3O_4 (4) C_9O_{12}

26. The molecular weight of O_2 and SO_2 are 32 and 64 respectively. At 15 ºC and 150 mm of Hg pressure, one litre of O_2 contains 'N' molecules. The number of molecules in four litres of SO_2 under the same conditions of temperature and pressure will be:

(1) $\dfrac{N}{2}$ (2) N (3) 4N (4) 2N

27. Which of the following is/are correct with respect to ionization enthalpy?
(1) Li > Na > K > Rb > Cs
It is because of dominance of size over nuclear charge.
(2) Li < B < Be
It is because Be has $1s^2$ pair of electrons in valence shell.
(3) C < O < N
It is because of 3-unpaired electrons in 2p, that give extra stability to N-atom.
(4) All are correct

28. Which of the following is not correct for noble gases?
(1) These are mono-atomic
(2) Their radii are very large because of non-bonding nature
(3) We study van der Waals' radii for them
(4) Their valency is always zero.

29. Select the incorrect statement:
(1) Elements of d-block are characterised by filling of inner d-orbitals by electrons.
(2) Zn^{2+}, Cd^{2+} and Hg^{2+} are coloured and paramagnetic.
(3) Most of these metals and their compounds are used as catalyst.
(4) Elements of d-block form a bridge between chemically active metals of s-block and less active elements of 13 group.

30. The number of unpaired electrons present in Cr^{2+}, Fe^{2+}, Co^{2+} and Ni^{2+} is respectively
(1) 4, 2, 1 and 0 (2) 2, 4, 1 and 0
(3) 4, 4, 3 and 2 (4) 4, 2, 0 and 1

BOTANY

31. 'S' in 70S is:
(1) Svedberg's unit (2) Solubility
(3) Surface area (4) Size

32. Cytoskeleton is made of:
(1) Microtubules and E.R.
(2) Microtubules and microfilaments
(3) Cytoplasm
(4) Cytoplasm with network of microtubules and microfilaments

33. The discoverer of lysosome is:
(1) Palade (2) de Duve
(3) Porter (4) Golgi

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

35. Organelle important in spindle formation during nuclear division in animal cell.
(1) Centriole (2) Golgi body
(3) Chloroplast (4) Mitochondrion

36. Facilitated diffusion requires _____ to transport substance across membrane.
(1) Special membrane protein
(2) ATP
(3) Protein inhibitor
(4) All of these

37. Water will move from
(1) Higher pressure potential to lower
(2) Higher solute potential to lower
(3) Higher water potential to lower
(4) Lower water potential to higher

38. Water moves across a selectively permeable mem-brane in which of the following order?
(1) From–Region of higher water potential; To–Region of lower water potential
(2) From–Lower water concentration; To–Higher water concentration
(3) From–Higher solute concentration; To–Lower solute concentration
(4) From–Region of higher osmotic potential; To–Region of lower osmotic potential

39. Water is often a limiting factor for plant growth and _____ in both _____ and _____ environments.
(1) Productivity, agricultural, natural
(2) Movement, agricultural, artificial
(3) Photosynthesis, aquatic, terrestrial
(4) Senescence, agricultural, natural

40. Choose the total number of correct statements from the following
1. Some channels in membrane are always open
2. Porins allow the passage of molecule of size up to small protein
3. Water channel is made up of eight different types of aquaporins
4. Facilitated diffusion is very specific
(1) 1   (2) 2   (3) 3   (4) 4

41.
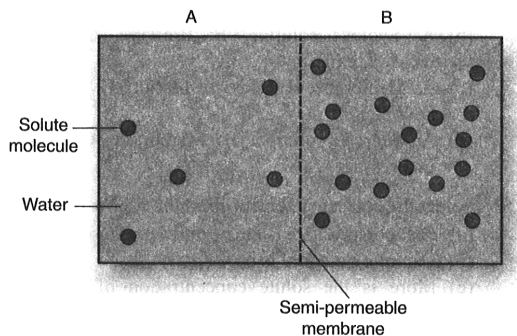
Answer the following questions with respect to the above diagram.
The solution of which chamber has a lower water potential?
(1) A   (2) B
(3) Both have same   (4) Cannot predict

42. Which one is most efficient imbibant
(1) Pectin   (2) Agar-Agar
(3) Cellulose   (4) Lignin

43. Water absorption by root hairs occurs until
(1) Concentration of water in the cell sap is higher
(2) Salt concentration in cell sap is higher
(3) They are separated from the soil by a selectively permeable membrane
(4) Water potential is lower.

44. Omnis-cellula-e-cellula is gene alisation given by:
(1) Lamarck   (2) Dutrochet
(3) Leeuwenhoek   (4) Virchow

45. Slime layer and capsule are types of which of the following?
(1) Glycocalyx   (2) Plasmalemma
(3) Cell wall   (4) Cell envelope

ZOOLOGY

46. Select the living fossil from the following.
(1) Culex   (2) Silkworm
(3) Lac insect   (4) Limulus

47. Select the incorrect matching.
(1) Aurelia – Jelly fish
(2) Sepia – Cattle fish
(3) Octopus – Devil fish
(4) Loligo – Fighting fish

48. Select the correct matching.
(1) Asterias — Sea urchin
(2) Pila — Pearl oyster
(3) Ophiura — Brittle star
(4) Loligo — Cuttlefish

49. The another name of Cucumaria is
(1) Sea urchin   (2) Sea mouse
(3) Sea pen   (4) Sea cucumber

50. The excretory organ proboscis gland is present in
(1) Ascidia   (2) Salpa
(3) Doliolum   (4) Saccoglossus

51. Find out the incorrect statement from the following
(1) Globulines are primarily involved in the defence mechanism of body.
(2) Albumin is the main osmotic protein of blood.
(3) Plasma without clotting factor is called serum.
(4) Factors for coagulation of blood are also present in plasma in active form.

52. Select the true statement about RBC from the following.
(1) RBCs have an average life span of 120 days.
(2) RBCs are destroyed in the spleen (graveyard of RBCs)
(3) RBCs are devoid of nucleus in most of the mammals.
(4) All the above.

53. Which of the following is correct about platelets?
(1) Cell fragments of megakaryocytes.
(2) 1.5 to 3.5 lakh/mm^3 in blood
(3) Also called thrombocytes.
(4) All of these

54. Which of the following events do not occur during joint diastole?
A. All four chambers of heart are in relaxed state.
B. Tricuspid and bicuspid valves open.
C. Action potential is conducted from SAN to AVN.
D. Blood from the pulmonary veins and vena cava flows into the left and right ventricles, respectively through the left and right atria.
E. The semilunar valves are closed.
(1) Only E   (2) Only C
(3) Only D   (4) Only A and B

55. The first cardiac sound (lub) is associated with
(1) Closure of tricuspid and bicuspid valves.
(2) Opening of tricuspid valves
(3) Closure of semilunar valves
(4) Opening of semilunar valves

56. An artery is
    (1) Thick-walled in which blood flows under low pressure.
    (2) Thin-walled in which blood flows under high pressure.
    (3) Thick-walled in which blood flows under high pressure.
    (4) Thin-walled in which blood flows under low pressure.

57. Maximum pressure of blood is experienced
    (1) When blood enters from left atrium to aorta.
    (2) When blood enters from right atrium to aorta.
    (3) When blood enters from left ventricles to aorta.
    (4) When blood enters from right ventricle to aorta.

58. Metameric segmentation is found in
    (1) Annelids   (2) Arthropods
    (3) Both (1) and (2)   (4) Platyhelminthes

59. Select the total number of statements belonging to sponges.
    1. Cellular level of organization.
    2. Body is supported by endoskeleton made up of spicules or sponging fibres.
    3. Larva stage is morphologically different from adult.
    4. Pathway of water transport is helpful in gathering of food, respiratory exchange and removal of waste.
    5. It is an hermaphrodite organism.
    6. They show power of regeneration.
    (1) 5   (2) 6   (3) 4   (4) 3

60. Match the following.

	Column I		Column II
(A)	Ascaris	(1)	Intestinal round worm
(B)	Wuchereria	(2)	Filarial worm
(C)	Ancylostoma	(3)	Hookworm
(D)	Pheretima	(4)	Earthworm

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