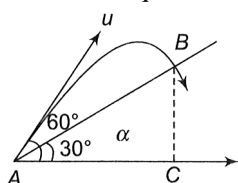


SAMPLE PAPER - 56

Time : 1 : 15 Hr.
Question : 60

PHYSICS

01. Time taken by the projectile to reach from A to B is t . Then the distance AB is equal to:

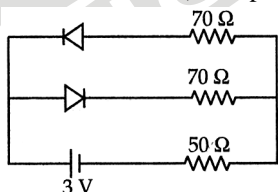


- (1) $\frac{ut}{\sqrt{3}}$ (2) $\frac{\sqrt{3}ut}{2}$ (3) $\sqrt{3} ut$ (4) $2 ut$

02. One mole of an ideal monoatomic gas at temperature T_0 expands slowly according to the law $\frac{P}{V} = \text{constant}$. If the final temperature is $2T_0$, heat supplied to the gas is

- (1) $2RT_0$ (2) RT_0 (3) $\frac{3}{2} RT_0$ (4) $\frac{1}{2} RT_0$

03. The circuit shown in the figure contains two diodes each with a forward resistance of 30Ω and with infinite backward resistance. If the battery is 3V, the current through the 50Ω resistance (in ampere) is



- (1) Zero (2) 0.01
(3) 0.02 (4) 0.03

04. Which of the following statement is correct ?
 (1) In myopia, the image of distant objects is focused before retina
 (2) In hypermetropia, the image of nearby object is focused before retina
 (3) In hypermetropia, the image of distant object is focused before retina
 (4) In myopia, the image of distant object is focused beyond retina

05. A man decides to dig so deep into the earth that acceleration due to gravity at the depth is $\frac{3}{4}$ th of the acceleration due to gravity on the surface of earth. The radius of earth is 6400 km and acceleration due to gravity at the surface of earth is 9.8 m/s^2 . The depth upto which man would have to dig is

- (1) 400 km (2) 800 km
(3) 1600 km (4) 3200 km

06. The threshold intensity of human ear is 10^{-12} W/m^2 . The intensity of a 60 dB sound is

- (1) 10^6 W/m^2 (2) 1 m W/m^2
(3) $1 \mu \text{ W/m}^2$ (4) 100 M W/m^2

07. Permanent magnets are made of steel because steel has
 (1) low permeability and high coercivity
 (2) high permeability and high coercivity
 (3) low permeability and low coercivity
 (4) high permeability and low coercivity

08. How much steam at 100°C will just melt 3200 g of ice at -10°C ? (Specific heat of ice = $0.5 \text{ cal/g}^\circ\text{C}$, specific heat of water = $1 \text{ cal/g}^\circ\text{C}$, latent of fusion of ice = 80 cal/g , and latent heat of vaporisation of water = 540 cal/g)

- (1) 425 g (2) 525 g
(3) 625 g (4) 725 g

09. In the Young's double slit experiment the intensities, at two points P_1 and P_2 on the screen, are respectively I_1 and I_2 . If P_1 is located at the centre of a bright fringe and P_2 is located at a distance equal to a quarter of fringe

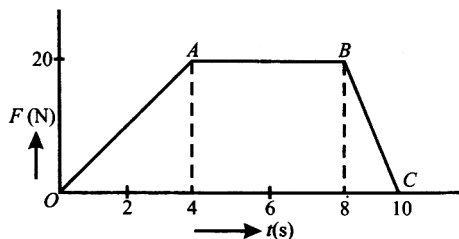
width from P_1 , then $\frac{I_1}{I_2}$ is :

- (1) 2 : 1 (2) 1 : 2
(3) 4 : 1 (4) 16 : 1

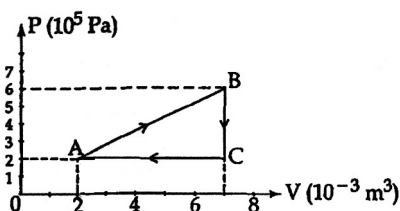
10. If the potential in the region of space near the point $(-2, 4, 6\text{m})$ is $V = (80x^2 + 60)$ volt. The magnitude of electric field intensely at that point is

- (1) 320 V/m (2) 380 V/m
(3) 80 V/m (4) zero

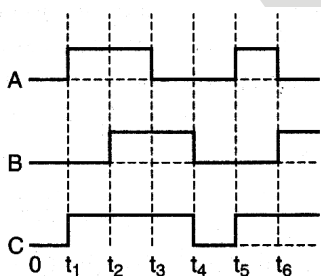
11. A body of mass 5 kg is acted on by a force F which varies with time t as shown in the given figure. Then the momentum gained by the body at the end of 10 seconds is



- (1) 0 kg m s^{-1} (2) 100 kg m s^{-1}
 (3) 140 kg m s^{-1} (4) 200 kg m s^{-1}
12. A gas is taken through the cycle $A \rightarrow B \rightarrow C \rightarrow A$, as shown. What is the net work done by the gas?



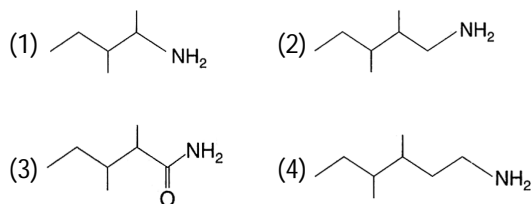
- (1) -2000 J (2) 2000 J
 (3) 1000 J (4) Zero
13. The figure shows a logic circuit with two inputs A and B and the output C . The voltage wave forms across A , B and C are as given. The logic circuit gate is.



- (1) AND gate (2) NAND gate
 (3) OR gate (4) NOR gate
14. One division on the main scale of a vernier callipers is equal to 1 mm. Its vernier scale has 20 equal divisions which match with 16 main scale division. The least count of the vernier callipers is
- (1) 0.02 mm (2) 0.2 mm
 (3) 0.8 mm (4) 0.08 mm
15. When a certain weight is suspended from a long uniform wire, its length increases by 1 cm. If the same weight is suspended from another wire of the same material and length but having a diameter half of the first one then the increase in length will be
- (1) 0.5 cm (2) 2 cm
 (3) 4 cm (4) 8 cm

CHEMISTRY

16. In a sample of H-atom electrons make transition from 5th excited state to ground state, producing all possible types of photons, then the number of lines in infrared region are
- (1) 4 (2) 5
 (3) 6 (4) 3
17. To a 10 mL of $10^{-3} \text{ N H}_2\text{SO}_4$ solution, water has been added to make the total volume of 1 L. Its pOH would be
- (1) 3 (2) 12
 (3) 9 (4) 5
18. The limiting molar conductivities Λ° for NaCl, KBr and KCl are 126, 152 and $150 \text{ S cm}^2 \text{ mol}^{-1}$, respectively. The Λ° for NaBr $\text{S cm}^2 \text{ mol}^{-1}$ is
- (1) 302 (2) 176
 (3) 278 (4) 128
19. Atomic radii of C and H atoms are 77 pm (for single bond) and 37 pm respectively. The bond length of C – H bond is likely to be:
- (1) 114 pm (2) 40 pm
 (3) more than 114 pm (4) less than 114 pm
20. Select the correct statement out of the following:
- (1) Every canonical structure of a compound has higher potential energy than the hypothetical actual structure
 (2) The difference of potential energies of actual structure and the most stable canonical structure is called resonance energy.
 (3) More the number of canonical structures of similar energy, higher is the value of resonance energy and higher is the stability
 (4) All of the above are correct statements
21. What is major product (X)
-
- (1)
- (2)
- (3)
- (4)
22. What is the product of the following reaction?
-

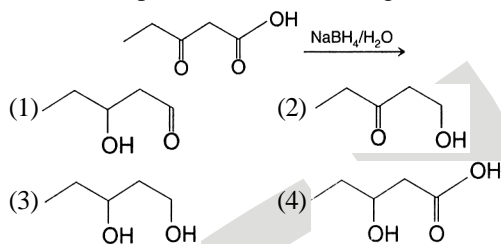


23. A buffer solution is made up of acetic acid ($pK_a = M$) having concentration 1.5 M and sodium acetate having concentration 0.15 M. What is the number of OH^- ions present in 1 L solution?
 (1) $10^{-10} N_A$ (2) $10^{-4} N_A$
 (3) $10^{-3} N_A$ (4) $10^{-6} N_A$

24. A known mass m gram of an organic compound is heated with fuming HNO_3 and $AgNO_3$ in Carius tube. If the molar mass of AgX is M and weight of AgX collected is m_1 the percentage of X (Cl, Br, I) is:

(1) $\frac{\text{At. wt. of } X}{M} \times \frac{m_1}{m} \times 100$ (2) $\frac{\text{At. wt. of } X}{M} \times \frac{m}{m_1} \times 100$
 (3) $\frac{M}{\text{At. wt. of } X} \times \frac{m}{m_1} \times 100$ (4) $\frac{M}{\text{At. wt. of } X} \times \frac{m_1}{m} \times 100$

25. What is the product of the following reaction?



26. At the top of the mountain, the thermometer reads $0^\circ C$ and the barometer reads 710 mm Hg. At the bottom of the mountain, the temperature is $30^\circ C$ and pressure is 760 mm Hg. Density of air at the top with that at the bottom is
 (1) 1 : 1 (2) 1.04 : 1
 (3) 1 : 1.04 (4) 1 : 1.5

27. What would be the normality of 0.3 M H_3PO_3 , when it undergoes the following reaction:
 $H_3PO_3 + 2OH^- \longrightarrow HPO_3^{2-} + 2H_2O$
 (1) 0.6 N (2) 0.15 N
 (3) 0.9 N (4) 0.1 N

28. For the reaction $2A \longrightarrow B + 3C$, if $\frac{d[A]}{dt} = k_1[A]^2$,
 $\frac{d[B]}{dt} = k_2[A]^2$, $\frac{d[C]}{dt} = k_3[A]^2$, the correct reaction between k_1 , k_2 and k_3 is
 (1) $k_1 = k_2 = k_3$ (2) $2k_1 = k_2 = 3k_3$
 (3) $4k_1 = k_2 = 3k_3$ (4) $\frac{k_1}{2} = k_2 = \frac{k_3}{3}$

29. According to valence bond theory:
 (1) a sigma bond is stronger than a pi-bond
 (2) pi-bond is formed in addition to a sigma bond in the same two atoms already bonded by sigma bond.
 (3) overlapping of atomic orbitals is to a larger extent in a sigma bond than a pi-bond.
 (4) all of the above

30. Which of the following will not evolve O_2 on reaction with ozone?
 (1) PbS (2) $KMnO_4$
 (3) Hg (4) KI

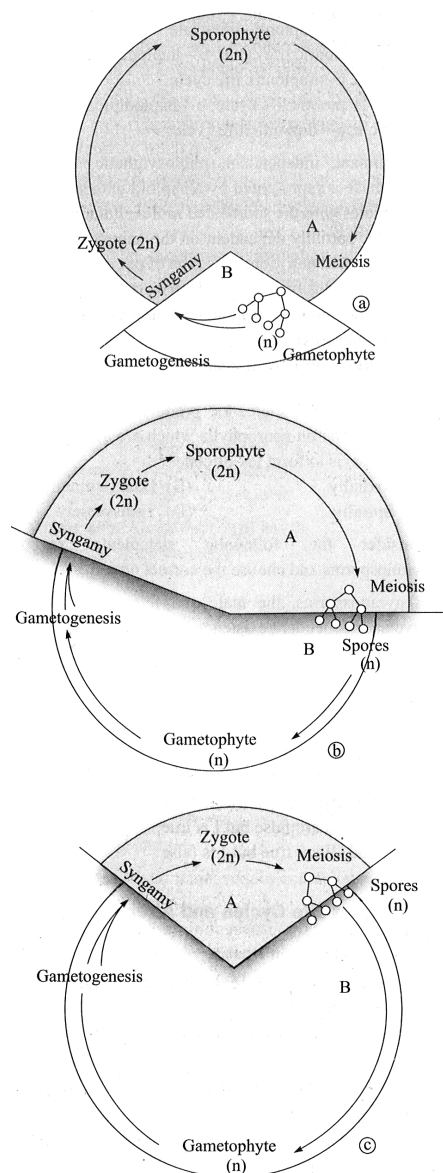
BOTANY

31. Gymnosperms include
 (1) Shrubs (2) Medium sized trees
 (3) Tall trees (4) All of the above
32. Read the following equation:
 $2NO_2^- + O_2 \rightarrow 2NO_3^-$
 This step is carried out by
 (1) Nitrosomonas (2) Nitrobacter
 (3) Nitrococcus (4) Both (1) and (3)
33. What are the reasons why plants can get along without respiratory organs?
 a. Each plant part takes care of its own gas exchange needs. There is very little transport of gases from one plant part to another.
 b. Plants do not present great demands for gaseous exchange; root, stem and leaves respire at rates far lower than animals do.
 c. The distance that gases must diffuse even in large, bulky plants is not great.
 (1) a and b (2) b and c
 (3) c and a (4) a, b and c
34. Protein synthesis involves
 I. transcription. II. translation.
 III. transversion. IV. translocation.
 Choose the correct combination.
 (1) I, II, III and IV (2) II, III and IV
 (3) I, II and III (4) I and II
35. IARI, New Delhi released several vegetable crops that are rich in vitamins and minerals. With respect to that select the correct match.

	Column-I		Column-II
1.	Vitamin A	A.	Carrot, spinach, pumpkin
2.	Vitamin C	B.	Bitter gourd, bathua, mustard, tomato
3.	Fe and Ca	C.	Spinach and bathua
4.	Protein	D.	Bean-broad, lablab, French and garden peas

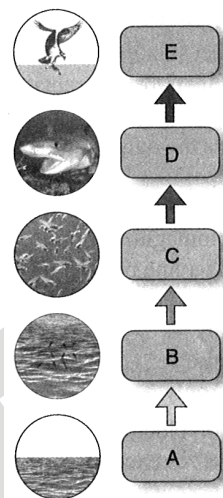
- (1) A-2, B-3, C-1, D-4 (2) A-1, B-2, C-3, D-4
 (3) A-4, B-1, C-2, D-3 (4) A-3, B-4, C-1, D-2

36. Binomial nomenclature consists of two words
 (1) Genus and species (2) Order and family
 (3) Family and genus (4) Species and variety
37. The sequence of events by which a cell duplicates its genome, synthesizes the other constituent of cells and eventually divides into two daughter cells is termed as _____.
 (1) Cytology (2) Cell division
 (3) Cell cycle (4) Cell biology
38. Recognise the figure and find out the correct matching:



- (1) a–Haplontic life cycle, b–diplontic life cycle, c–haplodiplontic life cycle
 (2) a–Haplodiplontic life cycle, b–diplontic life cycle, c–haplontic life cycle
 (3) a–Diplontic life cycle, b–haplodiplontic life cycle, c–haplontic life cycle
 (4) a–Haplontic life cycle, b–haplodiplontic life cycle, c–diplontic life cycle

39. Letter symbol refers to the dominant factors give a ...A... or upper case latter of the alphabet. A corresponding ...B... or lower case letter is used for recessive factor. Here A and B refers to
 (1) A-capital; B-small (2) A-small; B-capital
 (3) A-capital; B-capital (4) A-small; B-small
40. What is the concentration of DDT in stages A, B, C, D and E in the figure?



The above diagram shows the biomagnification of DDT.
 (1) A: Water (DDT 0.003 ppm), B: Fish-eating birds (DDT 25 ppm), C: Small fish (DDT 0.5 ppm), D: Large fish (DDT 2 ppm), E: Zooplankton (DDT 0.04 ppm).
 (2) A: Fish-eating birds (DDT 25 ppm), B: Large fish (DDT 2 ppm), C: Small fish (DDT 0.5 ppm), D: Zooplankton (DDT 0.04 ppm), E: Water (DDT 0.003 ppb).
 (3) A: Water (DDT 0.003 ppb), B: Zooplankton (DDT 0.04 ppm), C: Small fish (DDT 0.5 ppm), D: Large fish (DDT 2 ppm), E: Fish-eating birds (DDT 25 ppm).
 (4) A: Small fish (DDT 0.5 ppm), B: Large fish (DDT 2 ppm), C: Zooplankton (DDT 0.04 ppm), D: Water (DDT 0.003 ppm), E: Fish-eating birds (DDT 25 ppm).

41. I. In Rhodophyceae, food is stored as mannitol and laminarin.
 II. Ovules of Gymnosperms are not enclosed by ovary wall.
 III. Salvinia is heterosporous.
 IV. In diplontic life cycle, free living gametophyte represents dominant phase.
 Of the above statements:
 (1) II and III are correct, I and IV are wrong
 (2) II and IV are correct, I and III are wrong
 (3) III and IV are correct, I and II are wrong
 (4) I and II are correct, III and IV are wrong
42. Which of following element group is present in plant tissue in less than 10 mmole kg⁻¹ of dry matter?
 (1) Sodium, silicon, selenium and cobalt
 (2) Carbon, hydrogen, oxygen and nitrogen
 (3) Magnesium, manganese, molybdenum and nickel
 (4) Zinc, boron, iron and copper

43. There are three major ways in which different cells handle pyruvic acid produced by glycolysis. These are
 (1) Fermentation, TCA and ETS
 (2) Fermentation, aerobic respiration and TCA
 (3) Alcoholic fermentation, lactic acid fermentation and aerobic respiration
 (4) Alcoholic fermentation, lactic acid fermentation and ETS

44. **Process** **Occur in**
 I. Transcription (eukaryotic) ...A...
 II. Translation (eukaryotic) ...B...
 III. Replication (eukaryotic) ...C...
 IV. Transcription (prokaryotic) ...D...
 V. Translation (prokaryotic) ...E...
 VI. Replication (prokaryotic) ...F...
 Fill up A to F.
 (1) A–Nucleus, B–Cytoplasm, C–Nucleus, D–Cytoplasm, E–Cytoplasm, F–Cytoplasm
 (2) A–Cytoplasm, B–Cytoplasm, C–Nucleus, D–Cytoplasm, E–Nucleus, F–Cytoplasm
 (3) A–Cytoplasm, B–Cytoplasm, C–Nucleus, D–Nucleus, E–Nucleus, F–Cytoplasm
 (4) A–Cytoplasm, B–Nucleus, C–Nucleus, D–Cytoplasm, E–Nucleus, F–Cytoplasm

45. What kind of microbes is present in 'flocs' formed during secondary treatment of sewage?
 (1) Aerobic (2) Anaerobic
 (3) Symbiotic (4) Aero tolerant

ZOOLOGY

46. Read the following (A-D) statements
 A. Plasma without the clotting factors is called lymph
 B. The spleen is the graveyard of RBCs
 C. Eosinophils resist infections and are also associated with allergic reactions
 D. The universal donor blood group is O+ve
 How many of the above statements are correct ?
 (1) Four (2) Three
 (3) Two (4) One
47. Receptorsites for neurotransmitters are present on
 (1) membranes of synaptic vesicles
 (2) pre-synaptic membrane
 (3) tips of axons
 (4) post-synaptic membrane
48. Which of the following antibody can be characterized by the following features?
 1. It is the heaviest antibody.
 2. The first antibody which comes into action after entry of the pathogen.
 3. It is a pentamer.
 (1) IgA (2) IgG
 (3) IgM (4) IgE

49. Match the items given in column I with those in column II and choose the correct option:

	Column-I		Column-II
a.	Rennin	i.	Vitamin B ₁₂
b.	Enterokinase	ii.	Facilitated transport
c.	Oxyntic cells	iii.	Milk proteins
d.	Fructose	iv.	Trypsinogen

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

50. In MOET _____ cell stage, the fertilized eggs are recovered non-surgically and transferred to surrogate mothers.
 (1) 8–32 (2) 2–4 (3) 6–8 (4) 4–6
51. By the year 2000, the world population rocketed to
 (1) 6 million (2) 6 billion
 (3) 6 trillion (4) 600 million
52. The nitrogenous organic base purine occurring in RNA is
 (1) Cytosine (2) Thymine
 (3) Guanine (4) Uracil
53. In bird exceptionally (A) gland is present at the (B).
 (1) A = Oil B = Base of fore limb
 (2) A = Oil B = Base of tail
 (3) A = preen B = Base of beak
 (4) A = Uropygeal B = Base of beak
54. Select the incorrect statement:
 (1) Male fruit fly is heterogametic.
 (2) In male grasshoppers, 50% of sperms have no sex-chromosome.
 (3) In domesticated fowls sex of progeny depends on the type of sperm rather than egg.
 (4) Human males have one of their sex-chromosome much shorter than the other.
55. Conjugated proteins containing carbohydrates as prosthetic group are known as
 (1) Chromoproteins
 (2) Glycoproteins
 (3) Lipoproteins
 (4) Nucleoproteins
56. An organ X has a large blood supply. It produces a hormone lack of which cause a disease called as cretinism. The cause is:
 (1) Excess growth hormone
 (2) Absence of insulin
 (3) Excess adrenalin
 (4) Hyposecretion of thyroid in childhood
57. How many cranial nerves in the list given below are of mixed nature?
 Olfactory, Trochlear, Trigeminal, Abducens, Facial, Auditory, Glossopharyngeal, Vagus
 (1) four (2) three (3) two (4) one

58. Match the columns with regards to vector -disease.

	Column-I		Column-II
p.	Culex	i.	Dengue
q.	Anopheles	ii.	Filariasis
r.	Aedes	iii.	Malaria

- (1) p-i, q-ii, r-iii
(2) p-ii, q-iii, r-i
(3) p-ii, q-i, r-iii
(4) p-i, q-iii, r-ii

59. Cystic fibrosis is an autosomal recessive disease. In an island having a population of 200 people, 98 people suffer from cystic fibrosis. How many people are carriers of this disease?

- (1) 42 (2) 84 (3) 18 (4) 64

60. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of:

- (1) Non-recombinant bacteria containing beta galactosidase
(2) Insertional inactivation of alpha galactosidase in non-recombinant bacteria
(3) Insertional inactivation of alpha galactosidase in recombinant bacteria
(4) Inactivation of β glycosidase enzyme in recombinant bacteria

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