

SAMPLE PAPER - 112

Time : 1 : 15 Hr.

Question : 60

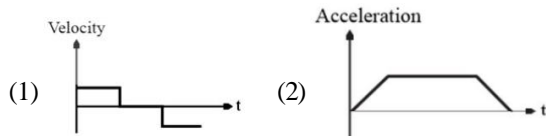
PHYSICS

01. The dimension of $\frac{e^2}{4\pi\epsilon_0hc}$, where e , ϵ_0 , h and c are electric charge, electric permittivity, Planck's constant and velocity of light in vacuum respectively
- (1) $[M^0L^0T^0]$ (2) $[ML^0T^0]$
 (3) $[M^0LT^0]$ (4) $[M^0L^0T]$

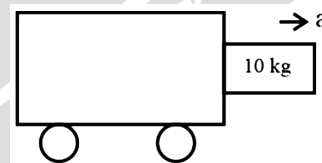
02. A 3 W carbon resistor is color coded with orange, black, brown respectively. The maximum current which can be passed through this resistor is:
- (1) 63 mA (2) 0.4 mA
 (3) 100 mA (4) 20 mA

03. Speeds of two identical cars are u and $4u$, respectively, at a specific instant. If the same retardation is applied to both the cars, the ratio of respective distances in which the two cars are stopped, from that instant, is
- (1) 1 : 1 (2) 1 : 4
 (3) 1 : 8 (4) 1 : 16

04. A boy is pushing a box on a horizontal floor from a position of rest to rest, while moving along a straight line. Consider the three phases of motion. The floor is rough with a small friction coefficient
- (i) Initially a constant hard push on the box to get it moving and attain a maximum velocity
 (ii) Mild push to keep the box moving with constant velocity
 (iii) To pull back the box to bring it to stop with the same retardation
- Which of the following graphs is correct ?



05. A block of mass 10 kg is in contact with a cart. If the coefficient of static friction is $\mu = 0.5$, then the minimum acceleration of cart, that will prevent falling of block, is



- (1) 5 m s^{-2} (2) 10 m s^{-2}
 (3) 20 m s^{-2} (4) 15 m s^{-2}

06. A ball falls from a height of 5 m and strikes a lift which is moving in the upward direction with a velocity of 1 ms^{-1} , then the velocity with which the ball rebounds after collision will be
- (1) 11 ms^{-1} downwards (2) 12 ms^{-1} upwards
 (3) 13 ms^{-1} upwards (4) 12 ms^{-1} downwards

07. Wein's constant is $2892 \times 10^{-6} \text{ m K}^{-1}$ and the value of λ_m for the moon is 14.46 micron. The surface temperature of the moon is
- (1) 100 K (2) 300 K
 (3) 400 K (4) 200 K

08. A certain amount of an ideal gas is contained in a closed vessel. The vessel is moving with a constant velocity v . The rise in the temperature of the gas, when the vessel is

suddenly stopped, is (M is the molecular mass) ($\gamma = \frac{C_P}{C_V}$)

- (1) $\frac{Mv^2(\gamma-1)}{2R}$ (2) $\frac{Mv^2(\gamma+1)}{2R}$
 (3) $\frac{Mv^2}{2R\gamma}$ (4) $\frac{Mv^2}{2R(\gamma+1)}$

09. A perfect gas goes from state A to state B by absorbing 8×10^5 J of heat and doing 6.5×10^5 J of external work. It is now transferred between the same two states in another process in which it absorbs 10^5 J of heat. In the second process,

- (1) Work done on gas is 10^5 J
- (2) Work done on gas is 0.5×10^5 J
- (3) Work done by gas is 10^5 J
- (4) Work done by gas 0.5×10^5 J

10. When Q amount of heat is supplied to an ideal monoatomic gas, the gas performs $\frac{Q}{2}$ amount of work on its surrounding, then molar heat capacity of gas is

- (1) 2R
- (2) 1.5R
- (3) 3R
- (4) 2.5R

11. In a photoelectric experiment, the wavelength of the light incident on a metal is changed from 300 nm to 400 nm. The decrease in the stopping potential is close to :

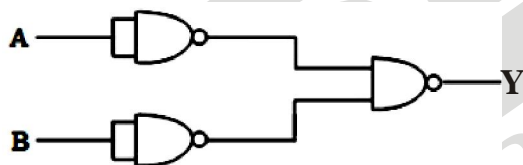
$$\left(\frac{hc}{e} = 1240 \text{ nm} - V \right)$$

- (1) 0.5 V
- (2) 1.0 V
- (3) 2.0 V
- (4) 1.5 V

12. Imagine that a reactor converts all the given mass into energy and that it operates at a power level of 10^9 watt. The mass of the fuel consumed per hour, in the reactor, will be (velocity of light, c is $3 \times 10^8 \text{ ms}^{-1}$)

- (1) 6.6×10^{-5} g
- (2) 0.96 g
- (3) 4×10^{-2} g
- (4) 0.8 g

13. Following circuit is equivalent to

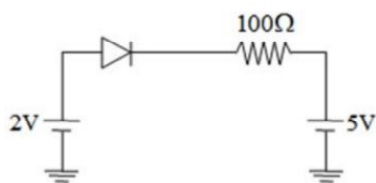


- (1) AND gate
- (2) OR gate
- (3) NOT gate
- (4) X-OR gate

14. In a transistor

- (1) emitter is more highly doped than collector
- (2) collector is more highly doped than emitter
- (3) both emitter and collector are equally doped
- (4) None of these

15. Current through the ideal diode is



- (1) Zero
- (2) 20 A
- (3) 1/20 A
- (4) 1/50 A

16. For the second period elements the correct increasing order of first ionisation enthalpy is:

- (1) $\text{Li} < \text{Be} < \text{B} < \text{C} < \text{N} < \text{O} < \text{F} < \text{Ne}$
- (2) $\text{Li} < \text{B} < \text{Be} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$
- (3) $\text{Li} < \text{B} < \text{Be} < \text{C} < \text{N} < \text{O} < \text{F} < \text{Ne}$
- (4) $\text{Li} < \text{Be} < \text{B} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$

17. Identify the incorrect match.

Name	IUPAC Official Name
(a) Unnilunium	(i) Mendeleevium (Md)
(b) Unniltrium	(ii) Lawrencium (Lr)
(c) Unnilhexium	(iii) Seaborgium (Sg)
(d) Unununnium	(iv) Darmstadtium (Ds)

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

18. Match the species in Column-I with the type of hybrid orbitals in Column-II.

	Column-I		Column-II
(i)	SF_4	(A)	sp^3d^2
(ii)	IF_5	(B)	d^2sp^3
(iii)	NO_2^+	(C)	sp^3d
(iv)	NH_4^+	(D)	sp^3
		(E)	sp

- (1) (i)→C; (ii)→B; (iii)→E; (iv)→D
- (2) (i)→A; (ii)→B; (iii)→C; (iv)→D
- (3) (i)→C; (ii)→A; (iii)→D; (iv)→E
- (4) (i)→A; (ii)→C; (iii)→D; (iv)→D

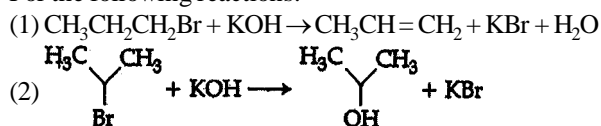
19. Which of the following set of molecules will have zero dipole moment?

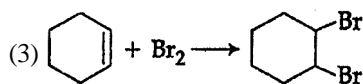
- (1) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene
- (2) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene
- (3) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
- (4) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene

20. The IUPAC name of $\text{C}_6\text{H}_5\text{COCl}$ is

- (1) Benzene chloro ketone
- (2) Benzoyl chloride
- (3) Chloro phenyl ketone
- (4) Benzene carbonyl chloride

21. For the following reactions:





Which of the following statements is correct?

(1) (1) is substitution, (2) and (3) are addition reactions
 (2) (1) and (2) are elimination reactions and (3) is addition reaction.

(3) (1) is elimination, (2) is substitution and (3) is addition reaction

(4) (1) is elimination, (2) and (3) are substitution reaction

22. Match the following and identify the correct option.

- (a) $\text{CO(g)} + \text{H}_2\text{(g)}$ (i) Temporary hardness of water
 (b) $\text{Mg(HCO}_3)_2 + \text{Ca(HCO}_3)_2$ (ii) An electron deficient hydride
 (c) B_2H_6 (iii) Synthesis gas
 (d) H_2O_2 (iv) Non-planar structure

(1) (a)-(iii) (b)-(i) (c)-(ii) (d)-(iv)

(2) (a)-(iii) (b)-(ii) (c)-(i) (d)-(iv)

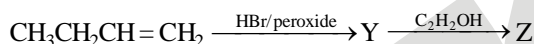
(3) (a)-(iii) (b)-(iv) (c)-(ii) (d)-(i)

(4) (a)-(i) (b)-(iii) (c)-(ii) (d)-(iv)

23. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts is put under an electric field?

- (1) K (2) Rb (3) Li (4) Na

24. Identity Z in the sequence of reactions,



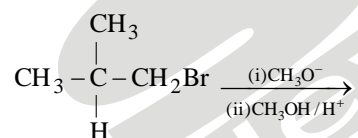
(1) $\text{CH}_3 - (\text{CH}_2)_3 - \text{O} - \text{CH}_2\text{CH}_3$

(2) $(\text{CH}_3)_2\text{CH}_2 - \text{O} - \text{CH}_2\text{CH}_3$

(3) $\text{CH}_3 (\text{CH}_2)_4 - \text{O} - \text{CH}_3$

(4) $\text{CH}_3\text{CH}_2 - \text{CH}(\text{CH}_3) - \text{O} - \text{CH}_2\text{CH}_3$

25. The major product formed in the following reaction is

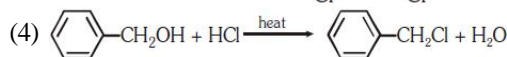
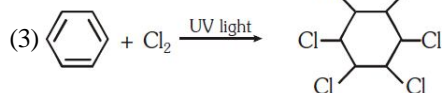
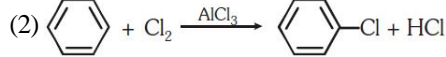
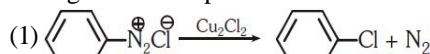


(1) $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{H}}{\text{C}}} - \text{CH}_2\text{OCH}_3$

(2) $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{OCH}_3}{\text{C}}} - \text{CH}_2\text{CH}_3$

(3) $\text{CH}_3 - \overset{\text{CH}_3}{\text{C}} = \text{CH}_2$ (4) $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{OCH}_3}{\text{C}}} - \text{CH}_3$

26. Among the following, the reaction that proceeds through an electrophilic substitution is :



27. Which of the following statement about primary amines is false ?

(1) Alkylamines are stronger base than aryl amines

(2) Alkylamines react with nitrous acid to produce alcohols

(3) Arylamines react with nitrous acid to produce phenols

(4) Alkylamines are stronger bases than ammonia

28. The compound A on treatment with Na gives B, and with PCl_5 gives C. B and C react together to give diethyl ether. A, B and C are in the order

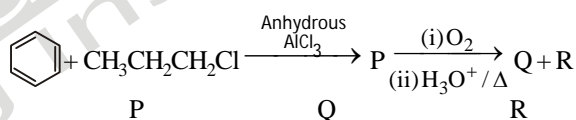
(1) $\text{C}_2\text{H}_5\text{OH}$, $\text{C}_2\text{H}_5\text{ONa}$, $\text{C}_2\text{H}_5\text{Cl}$

(2) $\text{C}_2\text{H}_5\text{Cl}$, C_2H_6 , $\text{C}_2\text{H}_5\text{OH}$

(3) $\text{C}_2\text{H}_5\text{OH}$, $\text{C}_2\text{H}_5\text{Cl}$, $\text{C}_2\text{H}_5\text{ONa}$

(4) $\text{C}_2\text{H}_5\text{OH}$, C_2H_6 , $\text{C}_2\text{H}_5\text{Cl}$

29. Identify the products P, Q and R in the following sequence of reactions:



(1)

(2)

(3)

(4)

30. In the reaction

(1) Cu_2Cl_2

(2) H_3PO_2 and H_2O

(3) $\text{H}^+/\text{H}_2\text{O}$

(4) $\text{HgSO}_4/\text{H}_2\text{SO}_4$

BOTANY

31. Match the following columns.

	Column-I		Column-II
A.	Monohybrid cross	1.	T and t
B.	Test cross	2.	TT
C.	Alleles	3.	Tt × Tt
D.	Homozygous tall	4.	t t
		5.	Tt × tt

(1) A-3; B-5; C-4; D-2 (2) A-5; B-3; C-2; D-4
(3) A-3; B-5; C-1; D-2 (4) A-3; B-1; C-5; D-2

32. Identify the stop codons in given options.

(1) UAA, UAG, UGA (2) UCA, UCC, UCA
(3) UGC, UCG, UCC (4) UUU, UAT, UTA

33. Which of the following factor is required for the protein synthesis?

I. Initiation codon II. GTP and ATP
III. Peptidyl transferase IV. tRNA
V. mRNA
VI. Amino acid activating enzyme
VII. rRNA

Choose the correct combination.

(1) I, II and III (2) III, IV and V
(3) V, VI and VII (4) All of these

34. Virus with nucleic acid but without protein coat is

(1) Virion (2) Viroid (3) Capsid (4) Prion

35. Aleurone layer is found in the outermost region of

(1) Coleoptile (2) Caruncle
(3) Endosperm (4) Coleorhiza

36. Bud is the modification of

(1) Root (2) Shoot
(3) Leaf (4) Flower

37. Mitochondria and chloroplast are

I. Semi-autonomous organelles
II. Formed by division of pre-existing organelles and they contain DNA but lack protein synthesising machinery.
Which one of the following options is correct?
(1) Both I and II are correct
(2) II is true but I is false
(3) I is true but II is false
(4) Both I and II are false

38. EcoSAN toilets are working in many areas of

(1) Assam and West Bengal
(2) Kerala and Sri Lanka
(3) Maharashtra and Andhra Pradesh
(4) Karnataka and Sri Lanka

39. Cattle ranches are known to cause acute greenhouse effect. This is due to
(1) Mechanized milking practices
(2) Methanogenic bacteria in rumen
(3) Decomposition of leftover fodder
(4) Decomposition of organic remains in faeces

40. Algal bloom in a lake
(1) Increases CO₂ level
(2) Leads to oxygen depletion
(3) Kills fishes
(4) All of these

41. Which one of the following is exotic species?

(1) Parthenium (2) Lantana
(3) Eichhornia (4) All of these

42. Who gave 'Rivet Popper hypothesis'?

(1) E.P. Odum (2) Paul Ehrlich
(3) Ram Deo Misra (4) A. Tansley

43. Ecological pyramids are of types

(1) Two (2) Three
(3) Four (4) Five

44. Mr. Ramu is drinking milk. For this he is occupying trophic level

(1) First (2) Second
(3) Third (4) Fourth

45. Resemblance of an organism to another for protection and hiding is

(1) Camouflage (2) Mimicry
(3) Predation (4) Adaptation

ZOOLOGY

46. Cancers of internal organs can be detected by
(1) Radiography (2) CT
(3) MRI (4) All of these

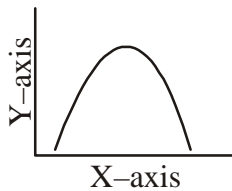
47. If females are administered anabolic steroids, which of the following symptoms are observed?

(1) Abnormal menstruation
(2) Excessive hair growth
(3) Enlargement of clitoris
(4) All of these

48. The first triploblastic animal is

(1) Coelenterates
(2) Platyhelminthes
(3) Aschelminthes
(4) Annelids

49. Cockroach has which type of mouth parts?
 (1) Biting and chewing type
 (2) Siphoning type
 (3) Sponging type
 (4) All of these
50. A typical fat molecule is made up of:
 (1) Three glycerol molecules and one fatty acid molecule
 (2) One glycerol and three fatty acid molecules
 (3) One glycerol and one fatty acid molecule
 (4) Three glycerol and three fatty acid molecules
51. The chitinous exoskeleton of arthropods is formed by the polymerization of
 (1) D-glucosamine (2) N-acetyl glucosamine
 (3) Lipoglycans
 (4) Keratin sulphate and chondroitin sulphate
52. The curve given below shows enzymatic activity with relation to three conditions (pH, temperature and substrate concentration)



What do the two axes (X and Y) represent?

	X-axis	Y-axis
(1)	Temperature	Enzyme activity
(2)	Substrate concentration	Enzymatic activity
(3)	Enzymatic activity	Temperature
(4)	Enzymatic activity	pH

53. Proteins perform many physiological functions. For example, some functions as enzymes. One of the following represents an additional function that some proteins discharge
 (1) Antibiotics
 (2) Pigments conferring colour to skin
 (3) Pigments making colours of flowers
 (4) Hormones
54. The partial pressure of oxygen in the alveoli of the lungs is
 (1) More than that found in the blood
 (2) Less than that found in the blood
 (3) Less than that of carbon dioxide
 (4) Equal to the blood

55. Match the items given in Column-I with those in Column-II and select the correct option given below:

	Column I (Function)		Column II (Part of Excretory System)
A.	Ultrafiltration	i.	Henle's loop
B.	Concentration of urine	ii.	Ureter
C.	Transport of urine	iii.	Urinary bladder
D.	Storage of urine	iv.	Malpighian corpuscle
		v.	Proximal convoluted tubule

- (1) A-iv; B-v; C-ii; D-iii
 (2) A-v; B-iv; C-i; D-ii
 (3) A-iv; B-i; C-ii; D-iii
 (4) A-v; B-iv; C-i; D-iii
56. Which of the following hormones can play a significant role in osteoporosis?
 (1) Aldosterone and prolactin
 (2) Estrogen and parathyroid hormone
 (3) Progesterone and aldosterone
 (4) Parathyroid hormone and prolactin
57. Extrusion of second polar body from egg nucleus occurs:
 (1) After fertilization
 (2) Before entry of sperm into ovum
 (3) Simultaneously with first cleavage
 (4) After entry of sperm but before fertilization
58. Which of the following contraceptive methods play the role of a hormone?
 (1) Barrier method, Lactational amenorrhea, Pills
 (2) CuT, Pills, Emergency contraceptives
 (3) Pills, Emergency Contraceptives, Barrier methods
 (4) Lactational amenorrhea, Pills, Emergency contraceptives
59. In a population of 1000 individuals, 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population is:
 (1) 0.4 (2) 0.5
 (3) 0.6 (4) 0.7
60. Which of the following had the smallest brain capacity?
 (1) Homo erectus
 (2) Homo sapiens
 (3) Homo neanderthalensis
 (4) Homo habilis