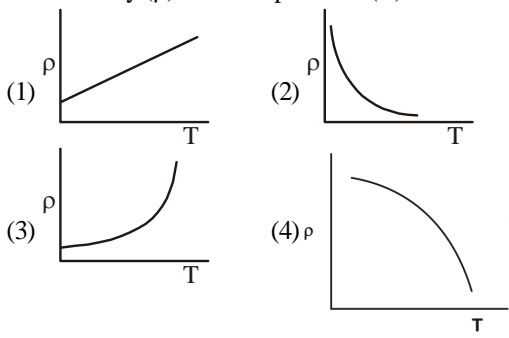


SAMPLE PAPER - 123

Time : 1 : 15 Hr.

Question : 60

PHYSICS

01. Two particles are projected simultaneously in the same vertical plane, from the same point, but with different speeds and at different angles with horizontal. The path followed by one, as seen by the other is
 (1) a vertical line
 (2) a parabola
 (3) a hyperbola
 (4) a straight line making a constant angle with the horizontal
02. A block is projected over a rough surface with speed 9.8 m/s. If friction coefficient of surface-block interface is 0.5. Find distance after which block stops
 (1) 4.9 m (2) 9.8 m
 (3) 14.7 m (4) 19.6 m
03. For diatomic gas the relation between pressure of a gas and temperature T is $P \propto T^C$ where C is. (For adiabatic process) :
 (1) $\frac{7}{5}$ (2) $\frac{2}{7}$
 (3) $\frac{5}{7}$ (4) $\frac{7}{2}$
04. Two bodies have their moments of inertia I and $2I$ respectively about their axis of rotation. If their angular momentum are equal, then their kinetic energies will be in the ratio:
 (1) 1 : 2 (2) $\sqrt{2} : 1$
 (3) $1 : \sqrt{2}$ (4) 2 : 1
05. A simple harmonic oscillator has an amplitude a and time period T . The time required by it to travel from $x = a/2$ to $x = a$ then returning back to $x = a/2$ is:
 (1) $T/6$ (2) $T/4$
 (3) $T/3$ (4) $T/2$.
06. A simple pendulum has a time period T in vacuum. Its time period when it is completely immersed in a liquid of density one-fourth of the density of material of the bob is
 (1) $\sqrt{\frac{3}{4}} T$ (2) $\sqrt{\frac{4}{3}} T$ (3) $\sqrt{\frac{5}{3}} T$ (4) $\sqrt{\frac{3}{5}} T$
07. A wind with speed 40 m/s blows parallel to the roof of a house. The area of the roof is 500 m². Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be: ($\rho_{\text{air}} = 1.2 \text{ kg/m}^3$)
 (1) $4.8 \times 10^5 \text{ N}$, upwards
 (2) $2.4 \times 10^5 \text{ N}$, upwards
 (3) $2.4 \times 10^5 \text{ N}$, down wards
 (4) $4.8 \times 10^5 \text{ N}$, down wards
08. As one moves from center to surface of a uniformly charged dielectric sphere the electric field strength E :
 (1) increases
 (2) decreases
 (3) remains the same as at the surface
 (4) is zero at all points.
09. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for nichrome?

10. Heat produced in a resistance R , carrying current I in time t is given as $H = I^2Rt$. If percentage error in measurement of current, resistance and time are 2%, 1% and 2% respectively, then error in measurement of heat would be
 (1) 4% (2) 7% (3) 6% (4) 5%

11. A body of mass m is kept on a rough horizontal surface (coefficient of friction = μ) A horizontal force is applied on the body, but it does not move. The resultant of normal reaction and the frictional force acting on the object is given by F , where F is:

- (1) $|\vec{F}| = mg + \mu mg$ (2) $|\vec{F}| = \mu mg$
 (3) $|\vec{F}| \leq mg\sqrt{1+\mu^2}$ (4) $|\vec{F}| = mg$

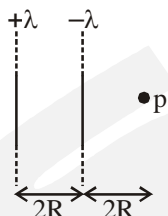
12. A ring is rolling down an inclined plane which is inclined at an angle of 30° to the horizontal. Then the speed of ring after travelling a distance of 10 m is

- (1) 10 ms^{-1} (2) $\sqrt{50} \text{ ms}^{-1}$
 (3) $\sqrt{30} \text{ ms}^{-1}$ (4) 2 ms^{-1}

13. Four particles of masses m , $3m$, $2m$ and $4m$ are kept in sequence at the corners of a square of side a . The magnitude of gravitational force acting on a particle of mass m placed at the centre of the square will be

- (1) $\frac{\sqrt{2}m^2G}{a^2}$ (2) $\frac{2\sqrt{2}m^2G}{a^2}$
 (3) $\frac{4\sqrt{2}Gm^2}{a^2}$ (4) Zero

14. Two parallel infinite line charges with linear charge densities $+\lambda \text{ C/m}$ and $-\lambda \text{ C/m}$ are placed at a distance of $2R$ in free space. What is the electric field at point p ?



- (1) zero (2) $\frac{2\lambda}{\pi\epsilon_0 R} \text{ N/C}$
 (3) $\frac{\lambda}{\pi\epsilon_0 R} \text{ N/C}$ (4) $\frac{\lambda}{8\pi\epsilon_0 R} \text{ N/C}$

15. The value of $\sin 15^\circ$ is

- (1) $\frac{1}{4}$ (2) 15
 (3) $\frac{1}{2}\sqrt{2-\sqrt{3}}$ (4) can not be calculated

CHEMISTRY

16. Conjugate base for Bronsted acids H_2O and HF are:

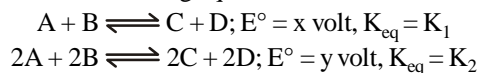
- (1) H_3O^+ and H_2F^+ , respectively
 (2) OH^- and H_2F^+ , respectively

- (3) H_3O^+ and F^- , respectively
 (4) OH^- and F^- , respectively

17. Which solution has the highest vapour pressure?

- (1) 0.02 M NaCl at 50°C
 (2) 0.03 M sucrose at 15°C
 (3) 0.005 M CaCl_2 at 50°C
 (4) 0.005 M CaCl_2 at 25°C

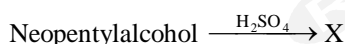
18. Consider the following equations for a cell reaction



then:

- (1) $x = y, K_1 = K_2$ (2) $x = 2y, K_1 = 2K_2$
 (3) $x = y, K_1^2 = K_2$ (4) $x^2 = y, K_1^2 = K_2$

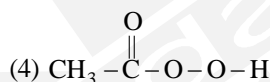
19. In the reaction given below, X is:



- (1) 2-methylpentane (2) Neo-pentane
 (3) 2-methylpent-2-ene (4) 2-methylbut-2-ene

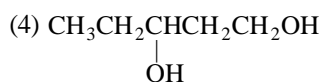
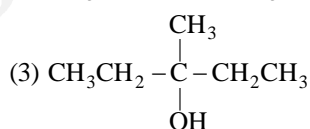
20. Propan-1-ol may be prepared by the reaction of propene with:

- (1) H_3BO_3
 (2) $\text{B}_2\text{H}_6/\text{NaOH} - \text{H}_2\text{O}_2$
 (3) $\text{H}_2\text{SO}_4/\text{H}_2\text{O}$



21. Among the following compounds which can be dehydrated very easily?

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



22. Which of the following is dihydric alcohol?

- (1) Glycerol (2) Ethylene glycol
 (3) Catechol (4) Resorcinol

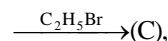
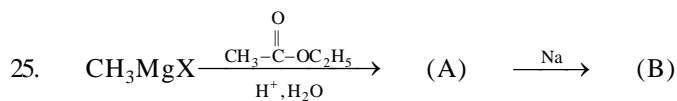
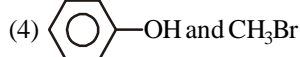
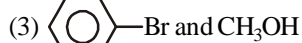
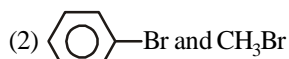
23. Which of the following will produce only one product on reduction with LiAlH_4 ?

- (1) $\text{CH}_3\text{COOCH}_2\text{CH}_3$ (2) $\text{CH}_3\text{CH}_2\text{OCOCH}_2\text{CH}_3$
 (3) $\text{CH}_3\text{CH}_2\text{OCOCH}_3$
 (4) $\text{CH}_3\text{CH}_2\text{OCOCH}_2\text{CH}_2\text{CH}_3$

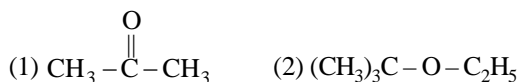
24. In the reaction $\text{C}_6\text{H}_5\text{OCH}_3 \xrightarrow{\text{HBr}}$

The product are:

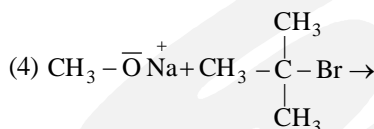
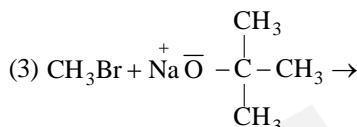
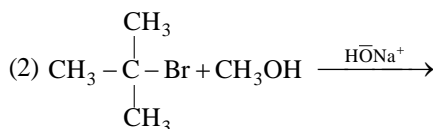
- (1) $\text{Br}-\text{C}_6\text{H}_4-\text{OCH}_3$ and H_2



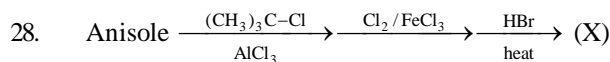
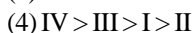
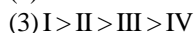
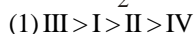
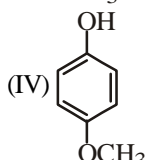
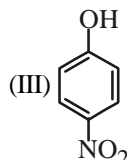
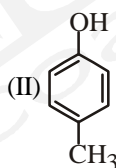
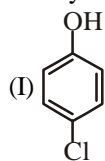
(C) is:



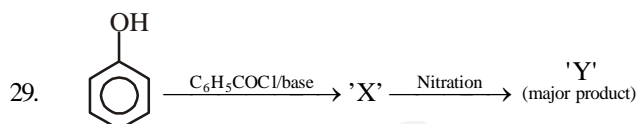
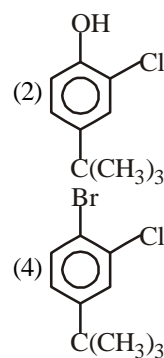
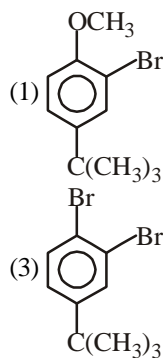
26. In which of the following reactions, the product obtained is tert-butyl methyl ether?



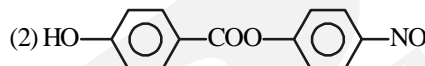
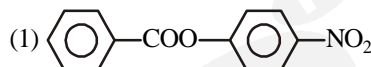
27. Arrange the following compounds in order of decreasing acidity?



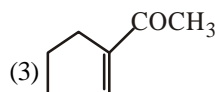
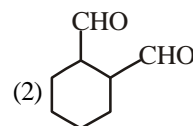
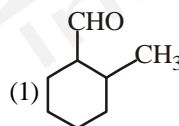
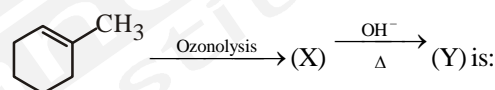
The product (X) in the above series of reaction is:



The product 'Y' is:

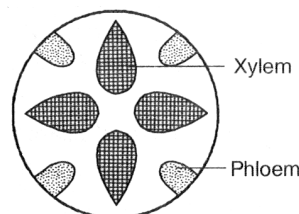


30. The final product (Y) formed in the reaction



BOTANY

31. The following types of vascular bundles are commonly found in



- (1) Stems
(3) Leaves

- (2) Root
(4) Both (1) and (2)





32. Mesophyll is differentiated into palisade and spongy tissues in
 (1) Extremely xerophytic leaves
 (2) Hydrophytic leaves
 (3) Monocot leaves
 (4) Dicot leaves
33. Gametophytic generation is dominant in
 (1) Pteridophytes
 (2) Gymnosperms
 (3) Bryophytes
 (4) Angiosperms
34. A certain plant homozygous for yellow seeds and red flowers was crossed with a plant homozygous for green seeds and white flowers. The F_1 plants had yellow seeds and pink flowers. The F_1 plants were selfed to get F_2 progeny. Assuming independent assortment of the two characters, how many phenotypic categories are expected for these characters in the F_2 generation?
 (1) 9 (2) 16 (3) 4 (4) 6
35. R.Q. can vary due to
 (1) Temperature
 (2) Respiratory substrate
 (3) Light and oxygen
 (4) Respiratory product
36. Which of the following is correct if a system performs all the functions of any ecosystem and of the biosphere as a whole?
 (i) Conversion of inorganic into organic material with the help of the radiant energy of the sun by the autotrophs
 (ii) Consumption of the autotrophs by heterotrophs
 (iii) Decomposition and mineralisation of the dead matter to release them back for reuse by the autotrophs
 (iv) There is bidirectional movement of energy towards the higher trophic levels and its dissipation and loss as heat to the environment
 (1) (i) and (ii) (2) (i), (ii) and (iii)
 (3) (iii), (ii) and (iv) (4) (ii), (iii) and (iv)
37. Major biomes of India includes:
 (i) Tropical rainforest (ii) Alpine region
 (iii) Deciduous forest (iv) Desert
 (v) Himalayan region
 (vi) Sea coast
 Choose the correct combination for given question:
 (1) (i), (ii), (iv) and (v) (2) (i), (ii), (iii) and (iv)
 (3) (ii), (iii), (iv) and (vi) (4) (i), (iii), (iv) and (vi)
38. The autonomously independent self-replicating extra nuclear DNA imparting certain factors to some bacterium is called
 (1) Plastid (2) Plasmid
 (3) Phagemid (4) Cosmid
39. In an inflorescence, two types of small, sessile flowers were observed. They are arranged in centripetal manner and have reduced hair-like sepals. Which pair of the following characters are not associated with such flowers?
 I. Nectar glands at the base of the corolla
 II. Axile placentation
 III. Superior ovary
 IV. Scaly bracts
 (1) II and III (2) III and IV
 (3) I and II (4) I and IV
40. Which of the following statements are correct for G₁-phase?
 I. It is the last substage of interphase
 II. Cell organelles do not increase in number
 III. Both cell and nucleus grow in size
 IV. It synthesizes RNAs, proteins and other biochemical for cell growth and subsequent replication of DNA
 Choose the correct option
 (1) I and II
 (2) II and IV
 (3) I and III
 (4) II and III
41. The recombination frequency between the genes a & c is 5%, b & c is 15%, b & d is 9%, a & b is 20%, c & d is 24% and a & d is 29%. What will be the sequence of these genes on a linear chromosome?
 (1) d, b, a, c (2) a, b, c, d
 (3) a, c, b, d (4) a, d, b, c
42. In dorsiventral leaves stomata occur
 (1) More on upper palisade containing surface and less on spongy parenchyma containing lower surface
 (2) Fewer on upper surface and more on lower surface
 (3) Equally on both
 (4) None of the two surfaces
43. Which is not a natural plant hormone
 (1) GA₃ (2) GA₂
 (3) IAA (4) 2, 4-D
44. How many statements are incorrect?
 (i) Ecosystem varies greatly in size from a small pond to a large forest or a sea.
 (ii) Ecosystems are of two types-terrestrial and aquatic.
 (iii) Forest, grassland and desert are some examples of terrestrial ecosystems.
 (iv) Pond, lake, wetland, river and estuary are aquatic ecosystems.
 (v) Crop fields and an aquarium may also be considered as man-made ecosystems.
 (vi) Entire biosphere is a global ecosystem and it is a composite of all local ecosystems on Earth.
 (1) 1 (2) 2
 (3) 4
 (4) None of these

45. How many statements are correct?
- (i) Ecology is a subject which studies the interactions among organisms and between the organism and its physical (abiotic) environment.
- (ii) Temperature, water, light and soil are the key elements that lead to so much variation in the physical and chemical conditions of different habitats.
- (iii) Abiotic factor along with biotic components like pathogens, parasites, predators and competitors also affect habitat of the organism.
- (iv) Mango trees can grow in temperate countries like Canada and Germany.
- (v) Tuna fish normally caught beyond tropical latitudes in the ocean.
- (vi) Majority organisms is eurythermal and few are stenothermal.
- (vii) The levels of thermal tolerance of different species determine to a large extent their geographical distribution.
- (1) 4 (2) 5
(3) 6 (4) All of these

ZOOLOGY

46. 'Black water fever' is a very serious complication of:
- (1) Plasmodium ovale
(2) Plasmodium falciparum
(3) Plasmodium malariae
(4) Plasmodium vivax
47. As AIDS has no cure, prevention is the best option, WHO has started a number of programmes to prevent the spreading of HIV infection. Which of the following steps taken up in HIV susceptible populations for prevention of AIDS?
- (i) Taking blood (from blood banks) safe from HIV.
(ii) Ensuring the use of only disposable needles and syringes in public and private hospitals and clinics.
(iii) Free distribution of condoms
(iv) Controlling drug abuse
(v) Advocating safe sex and promoting regular check-ups
- (1) Only (i), (iii) and (v) are correct
(2) Only (ii), (iii) and (iv) are correct
(3) Only (i), (ii), (iii), (iv) and (v) are correct
(4) All are correct

48. Match the following columns.

	Column-I		Column-II
A.		1.	Scoliodon
B.		2.	Pristis
C.		3.	Myxine
D.		4.	Catla
		5.	Petromyzon

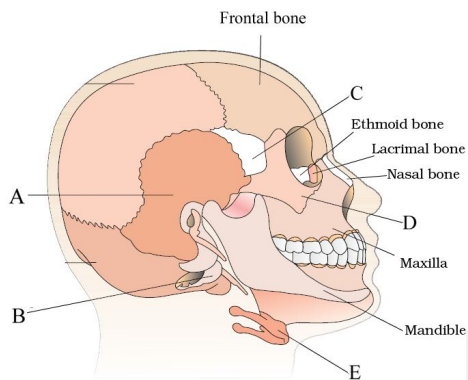
- (1) A-4; B-2; C-5; D-1
(2) A-4; B-2; C-3; D-1
(3) A-1; B-3; C-5; D-2
(4) A-1; B-4; C-5; D-3

49. Which of the following statement(s) is/are correct regarding phylum Aschelminthes?
- A. The body is circular in cross-section hence the name roundworms.
B. Alimentary canal is complete with a well-developed muscular pharynx.
C. Sexes are separate (dioecious), i.e., males and females are distinct.
D. Nephridia help in osmoregulation and excretion.
- (1) A and B (2) C and D
(3) A, B and C (4) All of these
50. A person has protruding eyes, increased basal metabolic rate and weight loss. He is suffering from:
- (1) Cretinism
(2) Diabetes
(3) Hyperthyroidism
(4) Acromegaly
51. Select the option with correct locations of receptors of given hormones:
- (1) Steroidal Hormones–Membrane-bound; Iodothyronine Hormones–Membrane-bound
(2) Steroidal Hormones–Membrane-bound; Iodothyronine Hormones–Intracellular
(3) Steroidal Hormones–Intracellular; Iodothyronine Hormones–Intracellular
(4) Steroidal Hormones–Intracellular; Iodothyronine Hormones–Membrane-bound
52. Identify X and Y in the newly synthesised polypeptide chain given below:



- (1) X = $-\text{NH}_2$, Y = $-\text{COOR}$
(2) X = $-\text{NH}_2$, Y = $-\text{COOH}$
(3) X = $-\text{COOH}$, Y = $-\text{NH}_2$
(4) X = $-\text{COOR}$, Y = $-\text{NH}_2$

53. Which one of the following is the correct statement for respiration in humans?
 (1) Workers in grinding and stone-breaking industries may suffer, from lung fibrosis
 (2) About 90% of carbon dioxide (CO₂) is carried by haemoglobin as carbamino haemoglobin
 (3) Cigarette smoking may lead to inflammation of bronchi
 (4) Neural signals from pneumotaxic centre in pons region of brain can increase the duration of inspiration.
54. Which of the following are ureotelic ?
 (1) Aquatic insects
 (2) Bony fishes and aquatic amphibians
 (3) Mammals and cartilaginous fishes
 (4) Terrestrial amphibians and aquatic insects
55. Identify the human skull bones labelled as A, B, C, D and E



Options	A	B	C	D	E
(1)	Temporal bone	Occipital bone	Zygomatic bone	Sphenoid bone	Hyoid bone
(2)	Temporal bone	Occipital condyle	Sphenoid bone	Zygomatic bone	Hyoid bone
(3)	Parietal bone	Occipital bone	Sphenoid bone	Hyoid bone	Zygomatic bone
(4)	Parietal bone	Occipital bone	Sphenoid bone	Zygomatic bone	Hyoid bone

56. I. Copy number is defined as the number of copies of plasmid present in a cell.
 II. It varies from 15-100 copies per cell.
 Choose regarding the above statements.
 (1) I is true, II is false (2) II is true, I is false
 (3) Both are true (4) Both are false
57. The two main techniques that gave birth to modern biotechnology are
 I. bio chemical engineering.
 II. genetic engineering.
 III. human genome engineering.
 IV. molecular biology
 Choose the correct option.
 (1) I and II (2) I and III
 (3) II and IV (4) II and III

58. Which of the following key factors, makes plasmid, the vector in genetic engineering?
 (1) It is resistant to antibiotics
 (2) It is resistant to restriction enzymes
 (3) Its ability to carry a foreign gene
 (4) Its ability to cause infection in the host
59. Identify correct statement regarding to a particular type of immunity:
 (1) Cellular barriers – Polymorphonuclear leukocytes and monocytes
 (2) Active immunity – Anti-tetanus and anti-snake bite injections
 (3) Physical barriers – Saliva in mouth and tears in eyes
 (4) Physiological barriers - Mucus coating of epithelium lining the urinogential tract and the HCl in stomach
60. Match the columns and find out the correct combination:

	Column-I		Column-II
A.	Gastric inhibitory peptide	1.	Stimulate the exocrine cells of pancreas
B.	Gastrin	2.	Inhibit the secretion of gastric juice
C.	Cholecystokinin	3.	Contraction of gall bladder
D.	Secretin	4.	Secretion of HCl and pepsinogen

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