

PRABAL TEST PAPER

Time : 1 : 00 Hr.

Question : 50

PHYSICS

01. The time period of a simple pendulum of length L as measured in an elevator descending with acceleration

 $\frac{g}{3}$ is :

- (1) $2\pi\sqrt{\frac{3L}{g}}$ (2) $\pi\sqrt{\frac{3L}{g}}$
 (3) $2\pi\sqrt{\frac{3L}{2g}}$ (4) $2\pi\sqrt{\frac{2L}{3g}}$

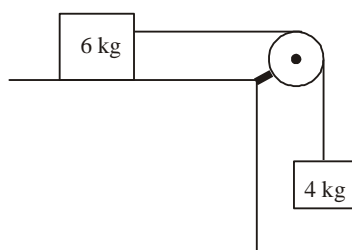
02. The bob of a simple pendulum is a spherical hollow ball filled with water. A plugged hole near the bottom of the oscillating bob gets suddenly unplugged. During observation, till water is coming out, the time period of oscillation would

- (1) First increase and then decrease to the original value
 (2) First decrease and then increase to the original value
 (3) Remain unchanged
 (4) Increase towards a saturation value

03. The velocity of the CM of a system changes from $\vec{v}_1 = 4\hat{i}$ m/s to $\vec{v}_2 = 3\hat{j}$ m/s during time $\Delta t = 2$ s. If the mass of the system is $m = 10$ kg, the constant force acting on the system is

- (1) 25 N (2) 20 N
 (3) 50 N (4) 5 N

04. For the system shown in figure the acceleration of centre of mass is



- (1) $(2.4\hat{i} - 1.6\hat{j})$ m/s² (2) $(2.4\hat{i} + 1.6\hat{j})$ m/s²
 (3) $(1.6\hat{i} + 2.4\hat{j})$ m/s² (4) $(1.6\hat{i} - 2.4\hat{j})$ m/s²

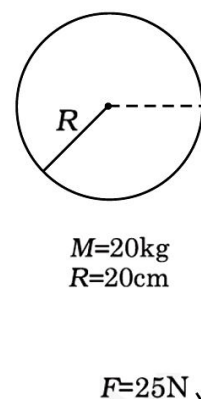
05. Which of the following is the unit vector perpendicular to \vec{A} and \vec{B} ?

- (1) $\frac{\vec{A} \times \vec{B}}{AB \sin \theta}$ (2) $\frac{\vec{A} \times \vec{B}}{AB \cos \theta}$
 (3) $\frac{\vec{A} \times \vec{B}}{AB \sin \theta}$ (4) $\frac{\vec{A} \times \vec{B}}{AB \cos \theta}$

06. A wheel of moment of inertia 2.0×10^3 kgm² is rotating at uniform angular speed of 4 rad s⁻¹. What is the torque required to stop it in one second

- (1) 0.5×10^3 Nm (2) 8.0×10^3 Nm
 (3) 2.0×10^3 Nm (4) none of these

07. A cord of negligible mass is wound round the rim of a flywheel of mass 20 kg and radius 20 cm. A steady pull of 25 N is applied on the cord as shown in Fig. The flywheel is mounted on a horizontal axle with frictionless bearings. Compute the angular acceleration of the wheel.



- (1) 25 s⁻²
 (2) 50 s⁻²
 (3) 12.5 s⁻²
 (4) None

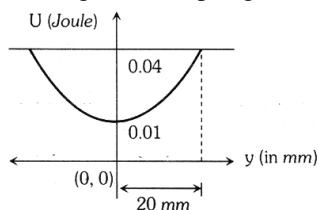
08. A particle of mass m is located in a field such that its potential energy is given by $U(x) = U_0(1 - \cos ax)$ where U_0 and a are positive constants. The period of small oscillations is

- (1) $2\pi\sqrt{\frac{U_0}{ma^2}}$ (2) $2\pi\sqrt{\frac{mU_0}{a^2}}$
 (3) $2\pi\sqrt{\frac{a^2}{mU_0}}$ (4) $2\pi\sqrt{\frac{m}{U_0a^2}}$

09. A body is executing Simple Harmonic Motion. At a displacement x , its potential energy is E_1 and at a displacement y , its potential energy is E_2 . The potential energy E at displacement $(x+y)$ is :

- (1) $\sqrt{E} = \sqrt{E_1} - \sqrt{E_2}$
 (2) $\sqrt{E} = \sqrt{E_1} + \sqrt{E_2}$
 (3) $E = E_1 - E_2$
 (4) $E = E_1 + E_2$

10. The variation of potential energy of harmonic oscillator is as shown in figure. The spring constant is :

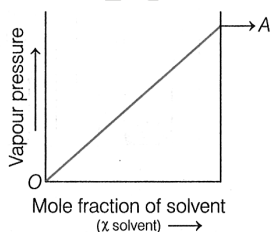


- (1) $1 \times 10^2 \text{ N/m}$ (2) 150 N/m
 (3) $0.667 \times 10^2 \text{ N/m}$ (4) $3 \times 10^2 \text{ N/m}$

CHEMISTRY

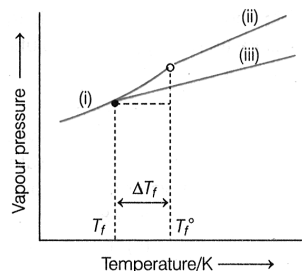
11. 184 g ethyl alcohol is mixed with 72 g of water. The ratio of mole fraction of alcohol to water is
 (1) 3 : 4 (2) 1 : 2
 (3) 1 : 4 (4) 1 : 1

12. What does A point signifies in the figure given below?



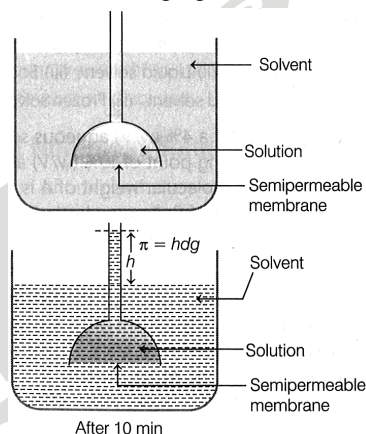
- (1) Vapour pressure of solute
 (2) Vapour pressure of pure solvent
 (3) Vapour pressure of solution
 (4) Mole fraction of solute

13. Identify (i), (ii) and (iii) in the following diagram.



- (1) (i) Solution (ii) Frozen solvent (iii) Liquid solvent
 (2) (i) Frozen solvent (ii) Solution (iii) Liquid solvent
 (3) (i) Frozen solvent (ii) Liquid solvent (iii) Solution
 (4) (i) Solution (ii) Liquid solvent (iii) Frozen solvent

14. Consider the following figure.



Mark the incorrect information derived from the figure.

- (1) Solute molecule passes through the semipermeable membrane from pure solvent to the solution.
 (2) The level of solution increases due to osmosis.
 (3) Solvent molecules flow from pure solvent to solution.
 (4) Osmotic pressure is needed to prevent this process.
15. A 6% solution of urea is isotonic with
 (1) 0.05 M solution of glucose
 (2) 6% solution of glucose
 (3) 25% solution of glucose
 (4) 1 M solution of glucose
16. Osmotic pressure present in the fluid inside the blood cell is equivalent to
 (1) 0.9% (m/V) NaCl solution
 (2) less than 0.9% (m/V) NaCl solution
 (3) more than 0.9% (m/V) NaCl solution
 (4) 0.9% (m/V) Na_2SO_4 solution
17. Match List-I with List-II.

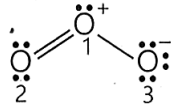
- | List-I | List-II |
|--------------------|---------------------------|
| (a) PCl_5 | (i) Square pyramidal |
| (b) SF_6 | (ii) Trigonal planar |
| (c) BrF_5 | (iii) Octahedral |
| (d) BF_3 | (iv) Trigonal bipyramidal |

Choose the correct answer from the options given below.

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

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

18. **Assertion:** The correct Lewis structure of O_3 may be drawn as



Reason: In O_3 , the formal charges on atom 1, 2 and 3 are +1, 0 and -1, respectively.

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 (2) Both Assertion and Reason are true and Reason is not the correct explanation of Assertion.
 (3) Assertion is false but Reason is true.
 (4) Assertion is true but Reason is false.

19. Consider the following structure CC(N)C(O)C(=O)O

Principal functional group in this compound is :

- (1) amino (2) carbonyl
 (3) carboxyl (4) hydroxyl

20. p_A and p_B are the vapour pressure of pure liquid components A and B respectively of an ideal binary solution. If χ_A represents the mole fraction of component A, the total pressure of the solution will be
 (1) $p_A + \chi_A (p_B - p_A)$ (2) $p_A + \chi_A (p_A - p_B)$
 (3) $p_B + \chi_A (p_B - p_A)$ (4) $p_B + \chi_A (p_A - p_B)$

BOTANY

21. Which of the following possess heterocyst ?
 (1) Nostoc (2) Anabaena
 (3) Both (1) and (2) (4) Spirogyra
22. Select the correct statement about slime moulds?
 (1) Saprophytic, plasmodium with cell wall, spores dispersed by air currents
 (2) Saprophytic, plasmodium without cell wall, spores with true cell wall and dispersed by air currents
 (3) Parasitic, plasmodium without cell wall, spores dispersed by air currents
 (4) Parasitic, plasmodium without cell wall, spores with true cell wall and dispersed by air current
23. Select the incorrect statement about viruses:
 (1) They can be crystallized
 (2) They are obligate parasites but sometimes facultative
 (3) They can be killed by antibiotics
 (4) Both (2) and (3)

24. Who recognised certain microbes as causal organism of the mosaic disease ?
 (1) Ivanowsky (2) Pasteur
 (3) Beijerinck (4) Stanely

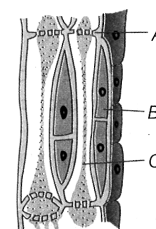
25. Read the following statements
 (A) No virus contains both DNA and RNA
 (B) A virus is a nucleoprotein and the genetic material is infectious
 (C) Viruses that infect animals can have single stranded RNA
 (D) In general, viruses that infect plants have either single or double stranded RNA or double stranded DNA
 (E) Bacteriophages usually have ds DNA
 How many statements are not correct ?
 (1) 1 (2) 0 (3) 3 (4) 2

26. Identify the correct statements from those given below.
 I. The sporophyte in liverworts is more elaborate than that in mosses.
 II. Life cycle of all seed bearing plants is diplontic.
 III. Life cycle of any sexually reproducing plant has alternation of generations between haplontic, diplontic or intermediate.
 IV. In angiosperms, male sex organ (stamen) and female sex organ (pistil) are borne in a flower.
 (1) I and II (2) II, III and IV
 (3) I, III and IV (4) All are correct

27. Identify the red algae species among the following?
 (1) Ecotocarpus, Dictyota
 (2) Gelidium, Porphyra
 (3) Sargassum, Ectocarpus
 (4) Laminaria, Fucus

28. Angiospermic xylem consists of
 P. Vessels and tracheids
 Q. Fibres and parenchyma
 R. Metaxylem
 S. Protoxylem
 T. Sieve tube and sieve pore
 U. Companion cells
 V. Bast fibres
 Choose the most appropriate option from the following.
 (1) P, R, T, V (2) P, Q, U, V
 (3) P, Q, R, S (4) Q, R, S, V

29. In the given diagram of tissue, identify A, B and C and choose the correct option which states their correct functions and features.



		Functions	Features
(1)	A-Sieve tube element	Maintain adhesion and pit compaction	Made up of sclerenchymatous cells
(2)	B-Companion cells	Maintain pressure gradient	Specialised parenchymatous cells
(3)	C-Xylem parenchyma	Majorly storage of food	Controlled by nucleus of companion cells
(4)	A-Phloem parenchyma	Maintain water transportation	Absent in the primary phloem

30. Consider the following statements.
 I. Water impermeable waxy material suberin is deposited on the ... (i)... in the form of ... (ii)...
 II. Initiation of lateral roots and vascular cambium during secondary growth occurs in... (iii)...
 III. Inner endodermis tissues such as vascular bundles and pith constitute ... (iv)...
 (1) (i)–endodermal cell; (ii)–Casparian strips; (iii)–pericycle; (iv)–stele
 (2) (i)–epidermal cells; (ii)–vascular bundle; (iii)–bast cells; (iv)–periderm
 (3) (i)–protodermal cells; ; (ii)–conjunctive tissue; (iii)–pith; (iv)–endodermis
 (4) (i)–endodermis; (ii)–lignin; (iii)–bast cells; (iv)–stele
31. During unfavourable condition lower organisms like algae and fungi perform sexual reproduction to:
 (1) Create uniformity in the offsprings
 (2) Increase the chances of mortality in the offsprings
 (3) Create genetic variation in the offsprings for better survival and adaptation in the unfavourable condition
 (4) Decreases the chances of mortality in the offsprings by creating genetic uniformity
32. Read the following statements and select the incorrect statement
 (1) The colonies of cyanobacteria are generally surrounded by gelatinous sheath
 (2) The cyanobacteria are unicellular, colonial or filamentous, freshwater/marine or terrestrial algae
 (3) Rhizopus belongs to class phycomycetes of kingdom fungi
 (4) Bacteria are grouped under two categories based on their shape
33. **Statement I:** In conifers, the needle like leaves reduce the surface area.
Statement II: Leaves in gymnosperms are adapted to withstand extremes of temperature, humidity and wind.
 (1) Both statement I and statement II are incorrect
 (2) Statement I is correct, but statement II is incorrect
 (3) Statement I is incorrect, but statement II is correct
 (4) Both statement I and statement II are correct

34. Choose the incorrect match from the following options.
 (1) Vessels - Cells are dead with thick chitinous cell walls
 (2) Tracheids - Elongated tube-like cells with-thick, lignified walls and tapering ends
 (3) Xylem fibres - Septate or Aseptate
 (4) Xylem parenchyma - Cells are living with thin cellulosic cell walls
35. The conjunctive tissue is made up of
 (1) parenchymatous cells, which lie between the xylem and phloem
 (2) sclerenchymatous cells, which lie between the xylem and phloem
 (3) collenchymatous cells, which lie between the xylem and phloem
 (4) meristematic cells, which lie between the xylem and phloem

ZOOLOGY

36. Choose the correct pair of animals and their excretory organs.
 (1) Earthworm – Malpighian tubules
 (2) Prawn – Green gland
 (3) Cockroach – Nephridia
 (4) Crustacea – Flame cells
37. Match the column-I and Column-II.
- | | Column-I | | Column-II |
|----|--------------------|-------|---------------------|
| A. | Uremia | (i) | Kidney stone |
| B. | Glomerulonephritis | (ii) | Blood in urine |
| C. | Renal calculi | (iii) | High blood urea |
| D. | Hematuria | (iv) | Kidney inflammation |
- (1) A–(ii), B–(iv), C–(i), D–(iii)
 (2) A–(iii), B–(iv), C–(i), D–(ii)
 (3) A–(iv), B–(iii), C–(i), D–(ii)
 (4) A–(iii), B–(iv), C–(ii), D–(i)
38. Which of the following statements are incorrect?
 A. Malpighian corpuscle, PCT and DCT of the nephron are situated in the cortical region of the kidney.
 B. DCT extends from the cortex of the kidney to the inner parts of the medulla.
 C. The descending limb is impermeable to water but allows transport of electrolytes actively or passively.
 D. DCT maintains the pH and sodium-potassium balance in blood.
 (1) A and B (2) A and D (3) B and C (4) A and C
39. **Assertion:** ADH and RAAS work in response to low blood volume and blood pressure.
Reason: ANF works in response to high blood volume and blood pressure.
 (1) Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
 (2) Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
 (3) Assertion is True but the Reason is False.

(4) Assertion is False but Reason is True.

40. Juxtaglomerular cells of _____ produces a peptide hormone called _____ which stimulates _____.

- (1) thyroid; erythropoietin; erythropoiesis
- (2) kidney; erythropoietin; erythropoiesis
- (3) kidney; renin; erythropoiesis
- (4) spleen; erythropoietin; erythropoiesis

41. Which of the following is Incorrect about visceral muscles?

- (1) Non-striated muscle (smooth muscle).
- (2) Involuntary muscle.
- (3) Located in inner walls of hollow visceral organs of the body.
- (4) They are under voluntary control.

42. Read the following (a) to (d) statements and select the one option that contains both the correct statements.

- (a) Myosin is polymer of tropomyosin.
- (b) Meromyosin head is called H.M.M.
- (c) G-Actin is polymer of F-actin.
- (d) Z-line is madeup of elastic fibre.

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

43. Match List-I with List-II.

	List-I		List-II
A.	Amoeboid movement	I.	Peristalsis
B.	Ciliary movement	II.	Macrophages
C.	Flagellar movement	III.	Paramecium
D.	Muscular movement	IV.	Spermatozoa

Choose the correct answer from the options given below.

- (1) A-II, B-I, C-III, D-IV
- (2) A-II, B-III, C-IV, D-I
- (3) A-II, B-III, C-I, D-IV
- (4) A-III, B-II, C-IV, D-I

44. Match the columns and find out the correct combination.

Column-I

A. Hypothalamus

B. Anterior pituitary

C. Oxytocin

D. Prolactin

Column-II

(i) Lactation after child birth

(ii) Contraction of uterus

(iii) LH and ACTH

(iv) Gonadotrophins releasing hormone

- (1) A-(ii), B-(iv), C-(iii), D-(i)
- (2) A-(i), B-(iii), C-(ii), D-(iv)
- (3) A-(iv), B-(iii), C-(ii), D-(i)
- (4) A-(ii), B-(iii), C-(i), D-(iv)

45. Select the incorrect statement from the following.

- (1) Invertebrates possess very simple endocrine system.
- (2) Anterior pituitary is under control of hypothalamus by portal system.
- (3) Posterior pituitary is under direct neural regulation of hypothalamus.
- (4) Hypothalamus secretes tropic hormones.

46. Glucocorticoid causes all except

- (1) Proteolysis (2) Lipolysis
- (3) Glycogenolysis (4) Gluconeogenesis

47. Aldosterone causes all except

- (1) Reabsorption of Na^+ and water from renal tubule.
- (2) Removal of K^+ .
- (3) Removal of PO_4^{3-} ion.
- (4) Absorption of K^+ .

48. Arrange the correct working sequence of protein hormone.

- (1) Binding to membrane receptor.
 - (2) Biochemical response
 - (3) Generation of second messenger.
 - (4) Physiological response (Ovarian growth)
- (1) 1 → 2 → 3 → 4 (2) 1 → 3 → 2 → 4
 - (3) 4 → 3 → 2 → 1 (4) 3 → 1 → 4 → 2

49. Mary is about to face an interview. But during the first five minutes before the interview she experiences sweating, increased rate of heart beat, respiration, etc. Which hormone is responsible for her restlessness?

- (1) Oestrogen and progesterone
- (2) Oxytocin and vasopressin
- (3) Adrenaline and noradrenaline
- (4) Insulin and glucagon

50. **Statement I:** Vasa recta are found in Juxta medullary nephrons.

Statement II: Loop of Henle is too short in such nephrons parallel to which vasa recta runs.

- (1) Both Statement-I and Statement-II are correct.
- (2) Both Statement-I and Statement-II are incorrect.
- (3) Statement-I is correct and Statement-II is incorrect.
- (4) Statement-I is incorrect and Statement-II is correct.