



Class – XI (Going to XII)
Duration : 2 hrs. | Maximum Marks : 180

IMPORTANT INSTRUCTIONS

1. This Booklet is your Question Paper. DO NOT break seal of Booklet until the invigilator instructs to do so.
2. Fill your APRE Roll No. & Answer Sheet No. in the space provided on the cover page.
3. Please make sure that paper you received is of your class only.
4. The Answer Sheet is provided to you separately which is a machine readable Optical Response Sheet (ORS).
You have to mark your answers in the ORS by darkening bubble, as per your answer choice, by using black or blue ball point pen.
5. After breaking the Question Paper seal, check there are 11 pages in the booklet. This Question Paper contains 60 MCQs with 4 choices (Subjects: Physics: 20, Chemistry: 20, Biology: 20)
6. Think wisely before darkening bubble as there is negative marking for wrong answer. Answer once marked by pen cannot be cancelled.
7. Marking Scheme:
 - a. If darkened bubble is RIGHT answer: 3 Marks.
 - b. If darkened bubble is WRONG answer: 1 Mark (Minus One Mark).
 - c. If no bubble is darkened in any question: No Mark.
8. If you are found involved in cheating or disturbing others, then your ORS will be cancelled.
9. Do not put any stain on ORS and hand. It over back properly to the invigilator.

Name of the Candidate: _____

Registration Number: _____

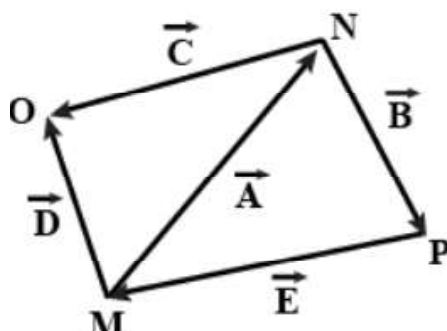
PHYSICS

1. Given that T stands for time period and l stands for the length of simple pendulum. If g is the acceleration due to gravity, then which of the following statements about the relation $T^2 = (l/g)$ is correct?
 - (A) It is correct both dimensionally as well as numerically
 - (B) It is neither dimensionally correct nor numerically
 - (C) It is dimensionally correct but not numerically
 - (D) It is numerically correct but not dimensionally.

2. In the relation $\frac{dy}{dt} = 2\omega \sin(\omega t + \phi_0)$, the dimensional formula for $\omega t + \phi_0$ is
 - (A) MLT
 - (B) MLT^0
 - (C) ML^0T^0
 - (D) $M^0L^0T^0$

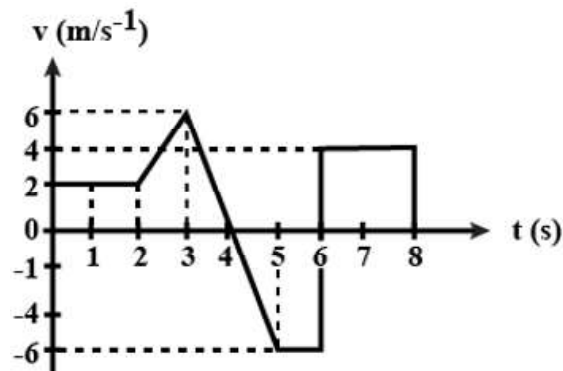
3. If frequency F , velocity V , and density D are considered fundamental units the dimensional formula for momentum will be
 - (A) DVF^2
 - (B) DV^2F^{-1}
 - (C) $D^2V^2F^2$
 - (D) DV^4F^{-3}

4. From figure, the correct relation is



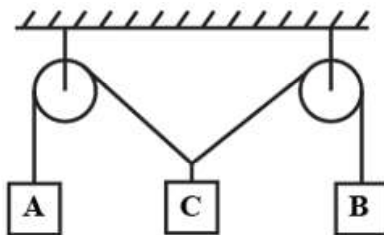
- (A) $\vec{A} + \vec{B} + \vec{E} = \vec{0}$ (B) $\vec{C} - \vec{D} = -\vec{A}$ (C) $\vec{B} + \vec{E} - \vec{C} = -\vec{D}$ (D) All of the above

5. The vector sum of two forces is perpendicular to their vector difference. The forces are
 (A) Equal to each other (B) Equal to each other in magnitude
 (C) Not equal to each other in magnitude (D) Cannot be predicted
6. A ball is released from the top of a tower of height h . It takes time T to reach the ground. What is the position of the ball (from ground) after time $T/3$?
 (A) $h/9$ m (B) $7h/9$ m (C) $8h/9$ m (D) $17h/18$ m
7. The velocity acquired by a body moving with uniform acceleration is 30 ms^{-1} in 2 s and 60 ms^{-1} in 4s. The initial velocity is
 (A) zero (B) 2 ms^{-1} (C) 3 ms^{-1} (D) 10 ms^{-1}
8. The relation between time t and distance x is $t = \alpha x^2 + \beta x$ where α and β are constants. The retardation is
 (A) $2\alpha v^3$ (B) $2\beta v^3$ (C) $2\alpha\beta v^3$ (D) $2\beta^2 v^3$
9. A drunkard is walking along a straight road. He takes five steps forward and three steps backward and so on. Each step is 1 m long and takes 1s. There is a pit on the road 11 m away from the starting point. The drunkard will fail into the pit will be
 (A) 29 s (B) 21 s (C) 37 s (D) 31 s
10. The velocity – time graph of a body is shown in figure. The displacement of the body in 8 s is



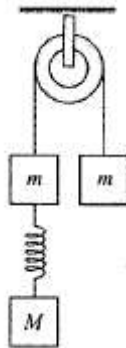
- (A) 9 m (B) 12 m (C) 10 m (D) 28 m

11. A ball is thrown at different angles with the same speed u and from the same point and it has the same range in both the cases. If y_1 and y_2 are the heights attained in the two cases, then $y_1 + y_2$ is equal to
- (A) $\frac{u^2}{g}$ (B) $\frac{2u^2}{g}$ (C) $\frac{u^2}{2g}$ (D) $\frac{u^2}{4g}$
12. Two paper screens A and B are separated by 150 m. A bullet pierces A and B. The hole in B is 15 cm below the hole in A. If the bullet is travelling horizontally at the time of hitting A, then the velocity of the bullet at A is ($g = 10 \text{ ms}^{-2}$)
- (A) $100\sqrt{3} \text{ ms}^{-1}$ (B) $200\sqrt{3} \text{ ms}^{-1}$ (C) $300\sqrt{3} \text{ ms}^{-1}$ (D) $500\sqrt{3} \text{ ms}^{-1}$
13. Ship A is travelling with a velocity of 5 km h^{-1} due east. A second ship is heading 30° east of north. What should be the speed of second ship if it is to remain always due north with respect to the first ship?
- (A) 10 km h^{-1} (B) 9 km h^{-1} (C) 8 km h^{-1} (D) 7 km h^{-1}
14. A plumb bob is hung from the ceiling of a train compartment. The train moves on an inclined track of inclination 30° with horizontal. The acceleration of train up the plane is $a = g/2$. The angle which the string supporting the bob makes with normal to the ceiling in equilibrium is
- (A) 30° (B) $\tan^{-1}(2/\sqrt{3})$ (C) $\tan^{-1}(\sqrt{3}/2)$ (D) $\tan^{-1}(2)$
15. Three blocks A, B and C are suspended as shown in figure. Mass of each of blocks A and B is m . If the system is in equilibrium, and mass of C is M , then



- (A) $M > 2m$ (B) $M = 2m$ (C) $M < 2m$ (D) None of these

16. The system shown in figure is released from rest. The spring gets elongated (Neglect the friction and masses of pulley, string, spring)



- (A) If $M > m$ (B) If $M > 2m$ (C) If $M > m/2$ (D) For any value of M
17. The upper half of an inclined plane with inclination ϕ is perfectly smooth while the lower half is rough. A body starting from rest at the top will again come to rest at the bottom if the coefficient of friction for the lower half is given by
(A) $2 \tan \phi$ (B) $\tan \phi$ (C) $2 \sin \phi$ (D) $2 \cos \phi$
18. A block of mass M is being pulled along rough horizontal surface. The coefficient of friction between the block and the surface is μ . If another block of mass $M/2$ is placed on the block and it is again pulled on the surface, the coefficient of friction between the block and the surface will be
(A) μ (B) $\frac{3\mu}{2}$ (C) 2μ (D) $\frac{5\mu}{2}$
19. Which of the following statements is correct?
(A) Kinetic energy of a system can be changed without changing its momentum
(B) Kinetic energy of a system cannot be changed without changing its momentum
(C) Momentum of a system cannot be changed without changing its kinetic energy
(D) A system cannot be have energy without having momentum.
20. A pump motor is used to deliver water at a certain rate from a given pipe. To obtain n times water from the same pipe in the same time, by what amount should the power of the motor be increased?
(A) n^2 times (B) n^3 times (C) n times (D) $n^{3/2}$ times

CHEMISTRY

21. There are two common oxides of Sulphur, one of which contains 50% O₂ by weight, the other almost exactly 60%. The weights of sulphur which combine with 1 g of O₂ (fixed) are in the ratio of -
(A) 1 : 1 (B) 2 : 1 (C) 2 : 3 (D) 3 : 2
22. When 10 ml of propane (gas) is combusted completely, volume of CO₂(g) obtained in similar condition is -
(A) 10 ml (B) 20 ml (C) 30 ml (D) 40 ml
23. Which have non-integral bond order -
(A) O₂⁺ (B) O₂⁻ (C) NO (D) All of these
24. Every H₂O molecule is surrounded by maximum how many H₂O molecule -
(A) 2 (B) 3 (C) 4 (D) 6
25. The bond between carbon atom (1) and carbon atom (2) in compound, N≡ $\overset{\text{C}}{\underset{(1)}{\text{---}}}\overset{\text{CH}}{\underset{(2)}{=}}\text{CH}_2$ involves the hybrid as-
(A) sp and sp² (B) sp² and sp³ (C) sp and sp³ (D) sp and sp
26. The dipole moments of the given molecules are such that -
(A) BF₃ > NF₃ > NH₃ (B) NF₃ > BF₃ > NH₃ (C) NH₃ > NF₃ > BF₃ (D) NH₃ > BF₃ > NF₃
27. Predict shape of SbX₆³⁻, TeX₆²⁻ (where X = Cl, Br or I) and BrF₆⁻ -
(A) Octahedral (B) Pentagonal pyramidal
(C) Trigonal bipyramidal (D) None of these
-

28. The frequency of first line of Balmer series in hydrogen atom is ν_0 . The frequency of corresponding line emitted by singly ionised helium atom is -
 (A) $2\nu_0$ (B) $4\nu_0$ (C) $\nu_0/2$ (D) $\nu_0/4$
29. In two H atoms X and Y the electrons move around the nucleus in circular orbits of radius r and $4r$ respectively. The ratio of the times taken by them to complete one revolution is -
 (A) 1 : 4 (B) 1 : 2 (C) 1 : 8 (D) 2 : 1
30. An electron, a proton and an alpha particle have kinetic energies of $16E$, $4E$ and E respectively. What is the qualitative order of their de-Broglie wavelengths ?
 (A) $\lambda_e > \lambda_p = \lambda_\alpha$ (B) $\lambda_p = \lambda_\alpha > \lambda_e$ (C) $\lambda_p > \lambda_e > \lambda_\alpha$ (D) $\lambda_\alpha < \lambda_e \gg \lambda_p$
31. In $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ the O.N. of the complexed iron is -
 (A) + 3 (B) + 2 (C) + 4 (D) + 6
32. What weight of nitrate ion (calculated as HNO_3) is needed to convert 5g of iodine into iodic acid according to the reaction -

$$\text{I}_2 + \text{HNO}_3 \longrightarrow \text{HIO}_3 + \text{NO}_2 + \text{H}_2\text{O}$$
 (A) 12.4 g (B) 24.8 g (C) 0.248 g (D) 49.6 g
33. 25 ml of a 0.1 (M) solution of a stable cation of transition metal z reacts exactly with 25 ml of 0.04 (M) acidified KMnO_4 solution. Which of the following is most likely to represent the change in oxidation state of z correctly?
 (A) $Z^+ \longrightarrow Z^{2+}$ (B) $Z^{2+} \longrightarrow Z^{3+}$ (C) $Z^{3+} \longrightarrow Z^{4+}$ (D) $Z^{2+} \longrightarrow Z^{4+}$

34. When we move from left to right in a period electropositive character -
(A) Increases (B) Decreases
(C) No change (D) First increases then decreases
35. The correct order of increasing atomic radius of the following elements is -
(A) $S < O < Se < C$ (B) $O < C < S < Se$ (C) $O < S < Se < C$ (D) $C < O < S < Se$
36. The ratio of the energy of a photon of 2000 Å wavelength radiation to that of 4000 Å radiation is
(A) 1 / 4 (B) 4 (C) 1 / 2 (D) 2
37. The shortest wavelength of He atom in Balmer series is x, then longest wavelength in the Paschene series of Li^{+2} is
(A) $\frac{36x}{5}$ (B) $\frac{16x}{7}$ (C) $\frac{9x}{5}$ (D) $\frac{5x}{9}$
38. Electron affinities of O, F, S and Cl are in the order.
(A) $O < S < Cl < F$ (B) $O < S < F < Cl$ (C) $S < O < Cl < F$ (D) $S < O < F < Cl$
39. PCl_5 exists but NCl_5 does not because :
(A) Nitrogen has no vacant 2d-orbitals (B) NCl_5 is unstable
(C) Nitrogen atom is much smaller than P (D) Nitrogen is highly inert
40. Oxidation number of C in CH_2Cl_2 is -
(A) +2 (B) + 4 (C) - 4 (D) 0
-

BIOLOGY

41. A group of plants and animals with similar traits of any rank is
(A) Taxon (B) Species (C) Genus (D) Order
42. Which is less general in characters as compared to genus?
(A) Family (B) Division (C) Class (D) Species
43. Which of the following is a correct statement?
(A) Mycoplasma have DNA, Ribosome and cell wall.
(B) Cyanobacteria are a group of autotrophic organisms classified under Kingdom Monera.
(C) Bacteria are exclusively heterotrophic organisms.
(D) Slime moulds are saprophytic. organisms classified under Kingdom Monera.
44. Mad cow disease in cattle and Cr Jacob disease in humans are due to infection by_
(A) Bacterium (B) Virus (C) Viroid (D) Prion
45. Identify the pair of heterosporous pteridophytes among the following:
(A) Equisetum and Salvinia (B) Lycopodium and Selaginella
(C) Selaginella and Salvinia (D) Psilotum and Salvinia
46. Which classes of algae possess pigment fucoxanthin and pigment phycoerythrin, respectively?
(A) Phaeophyceae and Chlorophyceae (B) Phaeophyceae and Rhodophyceae
(C) Chlorophyceae and Rhodophyceae (D) Rhodophyceae and Phaeophyceae
47. Which of the following is incorrectly matched?
(A) Volvox - Starch (B) Ectocarpus - Fucoxanthin
(C) Ulothrix - Mannitol (D) Porphyra - Floridean starch
48. Radial symmetry is NOT found in adults of phylum
(A) Echinodermata (B) Ctenophora (C) Hemichordata (D) Coelenterata
-

49. The unique mammalian characteristics are:
(A) pinna, monocondylic skull and mammary glands (B) hairs, tympanic membrane and mammary glands
(C) hairs, pinna and mammary glands (D) hairs, pinna and indirect development
50. The Transverse section of plant part showed polyarch, radial and exarch xylem, with endodermis and pericycle. The plant is identified as:
(A) Monocot root (B) Dicot root (C) Dicot stem (D) Monocot stem
51. Consider the following plant tissues:
(A) Axillary buds (B) Fascicular vascular cambium
(C) Interfascicular cambium (D) Cork cambium
(E) Intercalary meristem
Identify the lateral meristems among the above
(A) (A), (C) and (D) only (B) (B), (C) and (D) only
(C) (A), (B), (C) and (E) only (D) (A), (B), (D) and (E) only
52. The morphological nature of the edible part of a coconut is
(A) 1. Cotyledon (B) 2. Perisperm (C) 3. Pericarp (D) 4. Endosperm
53. Radial symmetry is found in the flowers of
(A) Cassia (B) Pisum (C) Trifolium (D) Brassica
54. Which of the following statements are correct with respect of Golgi apparatus?
It is the important site for the
A. formation of glycoprotein and glycolipids
B. It produces cellular energy in the form of ATP
C. It modifies the protein synthesized by ribosomes on ER
D. It facilitates the transport of ions
E. It provides mechanical support
Choose the most appropriate answer from the options given below:
(A) (B) and (C) only (B) (A) and (C) only (C) (A) and (D) only (D) (D) and (E) only
55. Which of the following statements with respect to Endoplasmic Reticulum is incorrect?
(A) SER are the sites for lipid synthesis (B) RER has ribosomes attached to ER
(C) SER is devoid of ribosomes (D) prokaryotes only RER are present

56. Select the incorrect match:
- | Column I | Column II |
|--------------------|-----------------------------------|
| (A) Lampbrush | Diplotene bivalents chromosomes |
| (B) Allosomes | Sex chromosomes |
| (C) Submetacentric | L-shaped chromosomes |
| (D) Polytene | Oocytes of amphibians chromosomes |
57. The Golgi complex participates in
- | | |
|-----------------------------|-------------------------------------|
| (A) Fatty acid breakdown | (B) Formation of secretory vesicles |
| (C) Respiration in bacteria | (D) Activation of amino acid |
58. Casparian strips occur in?
- | | | | |
|---------------|---------------|------------|----------------|
| (A) Epidermis | (B) Pericycle | (C) Cortex | (D) Endodermis |
|---------------|---------------|------------|----------------|
59. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**
Assertion (A) : All vertebrates are chordates but all chordates are not vertebrates.
Reason (R) : Notochord is replaced by vertebral column in the adult vertebrates.
 In the light of the above statements, choose the most appropriate answer from the options given below:
- (A) (A) is not correct but (R) is correct.
 (B) Both (A) and (R) are correct and (R) is the correct explanation of (A).
 (C) Both (A) and (R) are correct but (R) is not the correct explanation of (A).
 (D) (A) correct but (R) is not correct.
60. Select the correct statements:
- (a) Platyhelminthes are triploblastic pseudocoelomate and bilaterally symmetrical organisms.
 (b) Ctenophores reproduce only sexually and fertilization is external.
 (c) In tapeworm, fertilization is internal by sexes are not separate.
 (d) Ctenophores are exclusively marine, diploblastic and bioluminescent organisms.
 (e) In sponges, fertilization is external and development is direct.
- Choose the correct answer from the options given below:
- | | |
|---------------------------|---------------------------|
| (A) (a), (c) and (d) only | (B) (b), (c) and (d) only |
| (C) (a) and (e) only | (D) (b) and (d) only |
-