NEW STANDARD ACADEMY

PHYSICS

1. Which one of the following statements is not true about Newton's second law of motion $\vec{F} = m\vec{a}$?
   (a) The second law of motion is consistent with the first law
   (b) The second law of motion is a vector law
   (c) The second law of motion is applicable to a single point particle
   (d) The second law of motion is not a local law

2. A bullet of mass 40 g moving with a speed of 90 m s^{-1} enters a heavy wooden block and is stopped after a distance of 60 cm. The average resistive force exerted by the block on the bullet is :
   (a) 180 N (b) 220 N (c) 270 N (d) 320 N

3. A constant force acting on a body of mass of 5 kg change its speed from 5 m s^{-1} to 10 m s^{-1} in 10 s without changing the direction of motion. The force acting on the body is :
   (a) 1.5 N (b) 2 N (c) 2.5 N (d) 5 N

4. In the system shown in the figure, the acceleration of 1kg mass is :

   (a) $\frac{g}{4}$ downwards (b) $\frac{g}{2}$ downwards
   (c) $\frac{g}{2}$ upwards (d) $\frac{g}{4}$ upwards
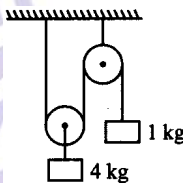
5. Figure shows the position-time (x-t) graph of one dimensional motion of a body of mass 500 g. What is the time interval between two consecutive impulses received by the body?


   (a) 2 s (b) 4 s (c) 6 s (d) 8 s
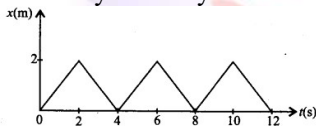
6. A body of mass 0.4 kg starting at origin at t = 0 with a speed of 10 m s^{-1} in the positive x-axis direction is subjected to a constant F = 8 N towards negative x-axis. The position of the body after 25 s is :
   (a) -6000 m (b) -8000 m (c) +4000 m (d) +7000 m

7. The position-time graph of a body of mass 2 kg is as shown in figure. What is the impulse on the body at t 4 s?
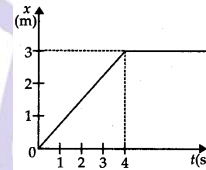
   (a) $\frac{2}{3}$ kg m s-1 (b) $-\frac{2}{3}$ kg m s^{-1}
   (c) $\frac{3}{2}$ kg m s^{-1} (d) $-\frac{3}{2}$ kg m s^{-1}

8. The figure shows (x, t), (y, t) diagram of a particle moving in 2-dimensions. If the particle has a mass of 500 g, the force acting on the particle is :
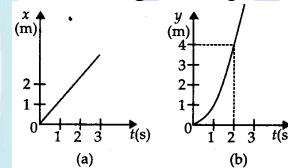
   (a) 1 N along y-axis (b) 1 N along x-axis
   (c) 0.5 N along x-axis (d) 0.5 N along y-axis

9. Figure shows the position-time graph of a particle of mass 4 kg. Let the force on the particle for $t < 0,\ 0 < t < 4\ s,\ t\ F_2 > 4\ s\ be\ F_1$, and F_3 respectively. Then:
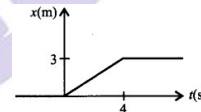
   (a) $F_1 = F_2 = F_3 = 0$ (b) $F_1 > F_2 = F_3$
   (c) $F_1 > F_2 > F_3$ (d) $F_1 < F_2 < F_3$

10. Ten one-rupee coins are put on top of each other on a table. Each coin has a mass m. The reaction of the 6th coin (counted from the bottom) on the 7th coin is :
   (a) 4mg (b) 6mg (c) 7mg (d) 3mg

CHEMISTRY

11. The element californium belongs to the family
    (a) Actinide series (b) Alkali metal family
    (c) Alkaline earth family (d) Lanthanide series

12. An element with atomic number 20 will be placed in which period of the periodic table
  (a) 4   (b) 3
  (c) 2   (d) 1

13. The electronic structure $(n-1)d^{1-10}ns^{0-2}$ is characteristic of
  (a) Transition elements   (b) Lanthanides
  (c) Actinides   (d) Rare gases

14. The elements with atomic number 10, 18, 36, 54 and 86 are all
  (a) Light metals   (b) Inert gases
  (c) Halogens   (d) Rare–earths

15. An element has the electronic configuration $1s^2, 2s^2 2p^6,\ 3s^2 3p^6 3d^5, 4s^1$. It is a
  (a) s-block element   (b) p-block element
  (c) d-block element   (d) Inert gas

16. Which of the following show diagonal relationship
  (a) B and Si (b) B and Al
  (c) B and Ga (d) B and C

17. Which pair of elements has same chemical properties
  (a) 13, 22   (b) 3, 11
  (c) 4, 24   (d) 2, 4

18. Mosley's name is most closely associated with the discovery of
  (a) Positron   (b) Deuterons
  (c) Atomic number   (d) Atomic weight

19. In the periodic table going down in fluorine group
  (a) Reactivity will increase
  (b) Electro negativity will increase
  (c) Ionic radius will increase
  (d) Ionization potential will increase

20. The screening effect of d-elections is
  (a) Equal to that of p-electrons
  (b) More than that of p-electrons
  (c) Same as f-electrons
 (d) Less than p-electrons

BIOLOGY

21. Choose the correct option.
  (a) Study of internal structure of plant is called anatomy
  (b) Plants have cells as the basic unit which are organized into tissues
  (c) Tissues are organized into organs
  (d) All of the above

22. Angiosperm xylem consists of
  (a) Vessels and tracheids only
  (b) Triacheids and fibres only
  (c) Vessels, tracheids, fibres and parenchyma
  (d) Parenchyma and fibres only

**23.** Choose the incorrect match.
  (a) Stomata – Transpiration

  (b) Guard cells – Possess chloroplast
  (c) Root hairs – Multicellular
  (d) Trichomes – Shoot system

24. Radial vascular bundles characteristically occur in
  (a) monocot and dicot stems
  (b) monocot and dicot leaves
  (c) monocot and dicot roots
  (d) All of the above

25. Identify type of vascular bundle with respect to A, B and C figure.
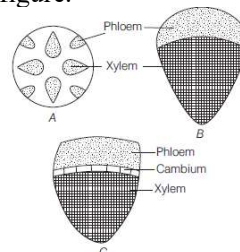
(a) A–Conjoint closed, B–Conjoint open, C–Radial
(b) A–Radial, B–Conjoint open, C–Conjoint closed
(c) A–Radial, B–Conjoint closed , C–Conjoint open
(d) A–Conjoint open, B–Conjoint closed, C–Radial

26. Casparian strips occur in
  (a) cortex   (b) pericycle
  (c) epidermis   (d) endodermis

27. Identify A to E in the given diagram of dicot root.
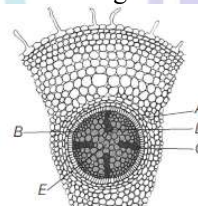
(a) A–Endodermis, B–Pericycle, C–Protoxylem, D–Metaxylem, E–Pith
(b) A–Endodermis, B–Pericycle, C–Protoxylem, D–Pith E–Metaxylem
(c) A–Endodermis, B–Pericycle, C–Pith, D–Protoxylem, E–Metaxylem
(d) A–Endodermis, B–Pith, C–Pericycle, D–Protoxylem, E–Metaxylem

**28.** Choose the correct option for identification of A to D in the given diagram of monocot stem.
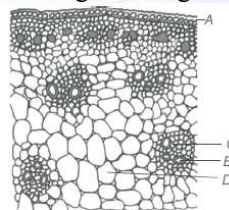
(a) A–Hypodermis, B–Xylem, C–Phloem, D–Ground tissue
(b) A–Hypodermis, B–Phloem, C–Xylem, D–Ground tissue
(c) A–Endodermis, B–Phloem, C–Xylem, D–Ground tissue
(d) A–Endodermis, B–Xylem, C–Phloem, E–Ground tissue

29. The vertical section of a dorsiventral leaf through the lamina shows three main parts namely, pidermis, …*A*… and vascular system. The epidermis, which covers the upper surface is …*B*… and lower surface is covered by …*C*… of the leaf.

Choose the correct option to replace *A*, *B* and *C*.

(a) A–mesophyll, B–adaxial epidermis, C–abaxial epidermis

(b) A–endodermis, B–adaxial epidermis, C–abaxial epidermis

(c) A–endodermis, B–abaxial epidermis, C–adaxial epidermis

(d) A–mesophyll, B–abaxial epidermis, C–adaxial epidermis

30. Choose the correct option in the given diagram of TS of dicot leaf to identify *A* to *E*.
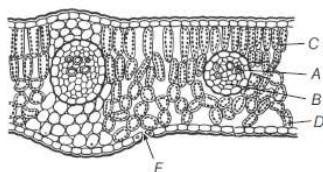
(a) A–Phloem, B–Xylem, C–Palisade mesophyll, D–Spongy mesophyll, E–Stomata

(b) A–Phloem, B–Xylem, C–Palisade mesophyll, D–Spongy mesophyll, E–Hydathodes

(c) A–Xylem, B–Phloem, C–Palisade mesophyll, D–Spongy mesophyll, E–Stomata

(d) A–Xylem, B–Phloem, C–Palisade mesophyll, D–Spongy mesophyll, E–Hydathodes

MATHS

21. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has

a) no solution
b) two solution
c) three solution
d) None of these

22. The most general solutions of the equation $\sec x - 1 = (\sqrt{2} - 1)\tan x$ are given by

a) $n\pi + \dfrac{\pi}{8}$

b) $2n\pi, 2n\pi + \dfrac{\pi}{4}$

c) $2n\pi$

d) None of these

23. The number of solutions of the equation $3\sin^2 x - 7\sin x + 2 = 0$ in the interval $[0, 5\pi]$ is

(a) 0   (b) 5
(c) 6   (d) 10

24. If $\tan\theta + \tan 2\theta + \sqrt{3}\tan\theta\tan 2\theta = \sqrt{3}$, then

(a) $\theta = \dfrac{(6n+1)\pi}{18}, \forall n \in I$ (b) $\theta = \dfrac{(6n+1)\pi}{9}, \forall n \in I$

(c) $\theta = \dfrac{(3n+1)\pi}{9}, \forall n \in I$ (d) None of these

25. The number of integral values of *k*, for which the equation $7\cos x + 5\sin x = 2k + 1$ has a solution is

(a) 4   (b) 8
(c) 10   (d) 12

2. 26. The number of solutions of the equation $|\cos x| = 2[x]$, where $[\cdot]$ is the greatest integer, is

a) One
b) Two
c) Infinite
d) nil

27. The equation $\sqrt{3}\sin x + \cos x = 4$ has

(a) Only one solution   (b) Two solutions
(c) Infinitely many solutions (d) No solution

28. The solution set of $(5 + 4\cos\theta)(2\cos\theta + 1) = 0$ in the interval $[0, 2\pi]$ is

(a) $\left\{\dfrac{\pi}{3}, \dfrac{2\pi}{3}\right\}$ (b) $\left\{\dfrac{\pi}{3}, \pi\right\}$

(c) $\left\{\dfrac{2\pi}{3}, \dfrac{4\pi}{3}\right\}$ (d) $\left\{\dfrac{2\pi}{3}, \dfrac{5\pi}{3}\right\}$

29. If the *x*-co-ordinate of a point *P* on the join of *Q* (2, 2, 1) and *R* (5, 1, –2) is 4, then its *z*-co-ordinate is

(a) 2   (b) 1   (c) –1   (d) –2

31. If centroid of tetrahedron *OABC*, where *A*, *B*, *C* are given by $(a, 2, 3)$, $(1, b, 2)$ and $(2, 1, c)$ respectively be $(1, 2, -1)$, then distance of $P(a, b, c)$ from origin is equal to

(a) $\sqrt{107}$ (b) $\sqrt{14}$

(c) $\sqrt{107/14}$ (d) None of these