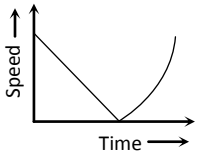
PHYSICS

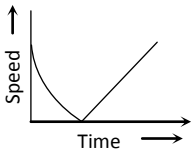
1. A car moving on a straight road covers one third of the distance with 20 km/hr and the rest with 60 km/hr. The average speed is

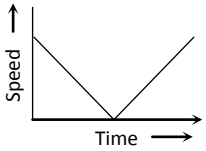
(a) 40 km/hr (b) 80 km/hr

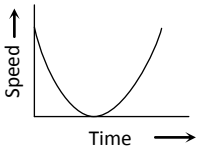
(c) $46\frac{2}{3}\,km/hr$ (d) 36 km/hr

2. A ball is thrown vertically upwards. Which of the following plots represents the speed-time graph of the ball during its flight if the air resistance is not ignored

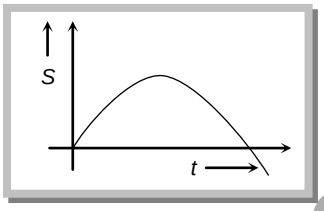
(a) 

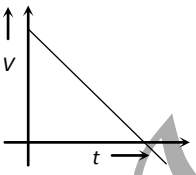
(b) 

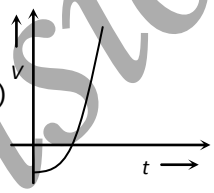
(c) 

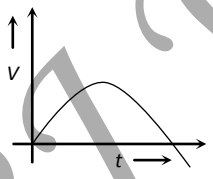
(d) 

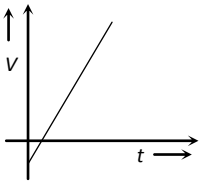
3. The graph of displacement v/s time is Its corresponding velocity-time graph will be



(a) 

(b) 

(c) 

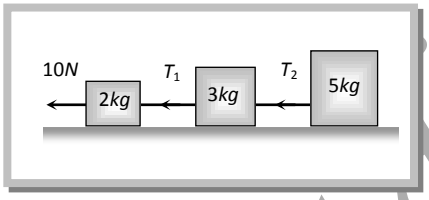
(d) 

4. A body travels for 15 sec starting from rest with constant acceleration. If it travels distances S_1, S_2 and S_3 in the first five seconds, second five seconds and next five seconds respectively the relation between S_1, S_2 and S_3 is

(a) $S_1 = S_2 = S_3$ (b) $5S_1 = 3S_2 = S_3$

(c) $S_1 = \frac{1}{3}S_2 = \frac{1}{5}S_3$ (d) $S_1 = \frac{1}{5}S_2 = \frac{1}{3}S_3$

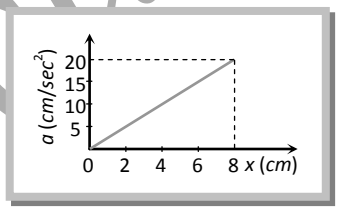
5. Three blocks of masses 2 kg, 3 kg and 5 kg are connected to each other with light string and are then placed on a frictionless surface as shown in the figure. The system is pulled by a force $F = 10\,N$, then tension $T_1 =$



(a) 1N (b) 5 N

(c) 8 N (d) 10 N

6. A 10 kg mass moves along x-axis. Its acceleration as a function of its position is shown in the figure. What is the total work done on the mass by the force as the mass moves from $x = 0$ to $x = 8$ cm



(a) $8\times10^{-2}\,J$ (b) $16\times10^{-2}\,J$

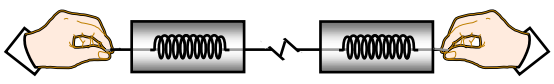
(c) $4\times10^{-4}\,J$ (d) $1.6\times10^{-3}\,J$

7. A bullet of mass 0.01 kg is fired from a gun weighing 5.0 kg. If the initial speed of the bullet is 250 m/s, calculate the speed with which the gun recoils-

(a) – 0.50 m/s (b) – 0.25 m/s

(c) + 0.05 m/s (d) + 0.25 m/s

8. Consider two spring balances hooked as shown in the figure. We pull them in opposite directions. If the reading shown by A is 1.5 N, the reading shown by B will be -

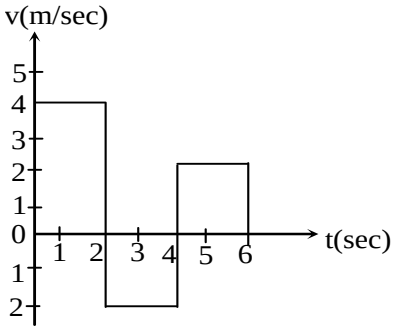


A B

(a) 1.5 N (b) 2.5 N

(c) 3.0 N (d) zero

9. The velocity-time graph of a body moving in a straight line is shown in figure. The displacement and distance travelled by the body in 6 second are respectively-



(a) 8m, 16m (b) 16m, 8m
(c) 16m, 16m (d) 8m, 8m

10. A car travels $\left(\frac{1}{4}\right)^{th}$ of a circle with radius r. The ratio of the distance to its displacement is-

(a) $1:\frac{\pi}{2\sqrt{2}}$ (b) $\frac{\pi}{2\sqrt{2}}:1$
(c) $2\sqrt{2}:\pi$ (d) $\pi 2\sqrt{2}:1$

CHEMISTRY

1. Fifth state of matter is
(a) Solid (b) Liquid
(c) Plasma (d) BEC

2. Which of the following will show "Tyndall effect"
(a) Salt solution (b) Sugar solution
(c) Copper sulphate solution (d) Milk

3. When 20 g of $NaHCO_3$ is heated, 12.62 g of Na_2CO_3 and 5.24g of CO_2 is produced. How many grams of H_2O is produced?
(a) 2.14 gms (b) 3.14 gms
(c) 1.14 gms (d) 5.14 gms

4. The number of neutrons in a drop of water (20 drops = 1mL) at 4°C
(a) 6.023×10^{22} (b) 1.338×10^{22}
(c) 6.023×10^{20} (d) 7.338×10^{22}

5. A compound contains 3.2% of oxygen. The minimum mol wt. of the compound is
(a) 300 (b) 440
(c) 350 (d) 500

6. The experiment which led to discovery of nucleus was performed by
(a) Goldstein (b) J.J. Thomson
(c) Dalton (d) Rutherford

7. The maximum number of electrons present in a shell is given by the formula _____ where 'n' is the orbit number
(a) n^2 (b) $2n^2$
(c) n (d) un^2

8. Atomicity of phosphorus is
(a) 1 (b) 2
(c) 4 (d) 6

9. Arrange the following in order of decreasing mass
i. 1F atom ii. 1 N atom
iii. 1 O atoms iv. 1 H atom
(a) i > iii > iv >ii (b) iv < ii < iii < i
(c) i > iii > ii > iv (d) iii >i > ii > iv

10. Which amongst the following are called Magic numbers
(a) 2, 8, 8, 18 (b) 2, 8, 8, 32
(c) 2, 8, 18, 32 (d) None of these

BIOLOGY

1. Which of the following is an example of fungus?
(a) Paramoecium (b) Aspergillus
(c) Funfairs (d) Ulva

2. Plants of which group bear naked seeds?
(a) Angiosperm (b) Gymnosperm
(c) Cladophora (d) Pteridophyta

3. Wuchereria belongs to-
(a) Mollusca (b) Nematoda
(c) Annelida (d) Arthropoda

4. Following features belongs to-
(1) Lack of scales in skin
(2) Three chambered heart
(3) They lay eggs
(a) Hemidactylus (b) Salamander
(c) Turtle (d) Anabas

5. Which of the following organism is responsible for disease sleeping sickness?
(a) Ascaris lumbricoides (b) Trypanosoma
(c) Staphylococci (d) SARS

6. How antibiotic penicillin affects bacteria?
(a) Blocks bacterial processes that build the cell wall
(b) Blocks bacterial replication
(c) Blocks bacterial transcription
(d) Blocks cell membrane formation

7. Vaccine is given against which of the following disease
(a) Tetanus (b) Whooping cough
(c) Measles & polio (d) All of the above

8. Which muscle cells are cylindrical, branched & Uninucleated?

(a) Striated muscles (b) Smooth muscles

(c) Cardiac muscles (d) All of the above

9. Which of the following connective tissue contains Haversian Canal?

(a) Areolar tissue (b) Adipose tissue

(c) Compact bone (d) Hyaline cartilage

10. Which is known as "suicide bag"?

(a) Mitochondria (b) Vacoules

(c) Plastids (d) Lysosome

MATHEMATICS

1. Find the value of x :- $\sqrt[3]{4x-7} - 5 = 0$

(a) 33 (b) 30

(c) 38 (d) 40

2. Simplify : $\sqrt[5]{\sqrt[4]{(2^3)^4}}$

(a) $\sqrt[5]{10}$ (b) $\sqrt[5]{8}$

(c) $\sqrt[5]{4}$ (d) $\sqrt[5]{10}$

3. $\frac{(63)^4 \times 144}{132 \times 9} = ?$

(a) $\frac{2^2 \times 3^7 \times 7^4}{11}$ (b) $\frac{2^2 \times 3^5 \times 7^2}{11}$

(c) $\frac{2^2 \times 3^2 \times 7^2}{11}$ (d) $\frac{2^7 \times 3^5 \times 7^4}{11}$

4. If the polynomials $ax^3 + 4x^2 + 3x - 4$ and $x^3 - 4x + a$ leave the same remainder when divided by (x–3), find the value of a.

(a) a = 1 (b) a = 3

(c) a = - 1 (d) a = 2

5. Let R_1 and R_2 are the remainders when the polynomials $x^3 + 2x^2 - 5ax - 7$ and $x^3 + ax^2 - 12x + 6$ are divided by x + 1 and x – 2 respectively. If $2R_1 + R_2 = 6$, find the value of a.

(a) a = 2 (b) a = - 2

(c) a = 6 (d) a = 4

6. If $ax^3 + bx^2 + x - 6$ has x + 2 as a factor and leaves a remainder 4 when divided by (x – 2), find the values of a and b.

(a) a = 4, b = 0 (b) a = 2, b = 0

(c) a = 0, b = - 2 (d) a = 0, b = 2

7. If $x + \frac{1}{x} = 6$, find : $x^4 + \frac{1}{x^4}$

(a) 1158 (b) 1156

(c) 1154 (d) 1150

8. If $a^2 + b^2 + c^2 = 250$ and ab + bc + ca = 3, find a + b + c.

(a) ± 16 (b) ± 20

(c) ± 14 (d) ± 18

9. If $x = 3 + \sqrt{8}$ and $y = 3 - \sqrt{8}$ then $\frac{1}{x^2} + \frac{1}{y^2} =$

(a) -34 (b) 34

(c) $12\sqrt{8}$ (d) $-12\sqrt{8}$

10. If $\frac{3+\sqrt{7}}{3-\sqrt{7}} = a + b\sqrt{7}$ then (a, b) =

(a) (8, -3) (b) (-8, -3)

(c) (-8, 3) (d) (8, 3)

MENTAL ABILITY

1. Which is the number that comes next in the following sequence?

4, 6, 12, 14, 28, 30, (...)

(a) 32

(b) 60

(c) 62

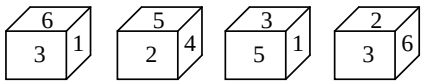
(d) 64

2. __ __ aba__ __ ba __ ab

(a) abbba (b) abbab

(c) baabb (d) bbaba

3. A dice has been thrown four times and produces following results.



(i) (ii) (iii) (iv)

Which number will appear opposite to the number 3 ?

(a) 4 (b) 5

(c) 6 (d) 1

4. aab __ aaa ___ bba___

(a) baa (b) abb

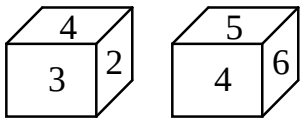
(c) bab (d) aab

5. __ __ babbba__ a __ __

(a) ababb (b) baaab

(c) bbaba (d) babbb

6. The figures given below show the two different positions of a dice. Which number will appear to number 2.



(i) (ii)

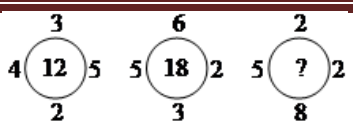
(a) 3 (b) 4

(c) 5 (d) 6

(Q- 7 & Q – 8) Magic Circle Problems

This unit is based on numerical calculations. Usually these are circles, the first two of which have four numbers at four points on the circle and one inside the circle. These numbers are placed according to some rules or sequence. The third cycle has any four numbers with fifth missing. We are required to find this number from the given choice, according to the same rule that holds good for other two circles.

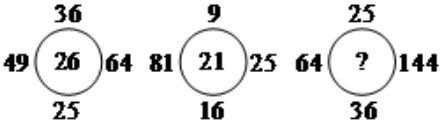
7.



(a) 12 (b) 14

(c) 16 (d) 18

8.



(a) 24 (b) 25

(c) 23 (d) 31

9 Which is the number that comes next in the sequence : 0, 6, 24, 60, 120, 210?

(a) 240 (b) 290

(c) 336 (d) 504

10. Which number would replace question mark in the series 7, 12, 19, ?, 39.

(a) 29 (b) 28

(c) 26 (d) 24

SPACE FOR ROUGH WORK