

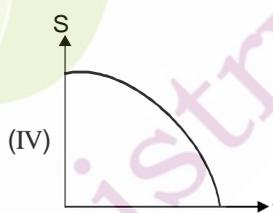
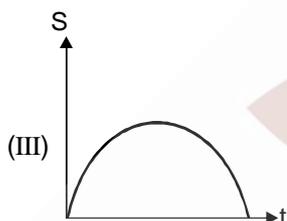
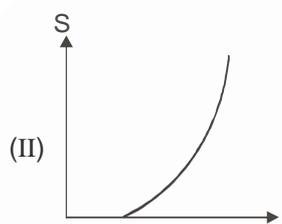
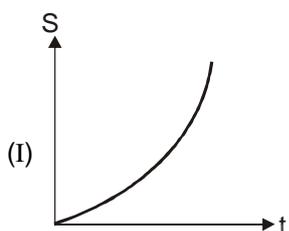
# YEAR-2009-10\_NSEJS(STAGE-I)

## (PART A-1)

Only one out of four options is correct :

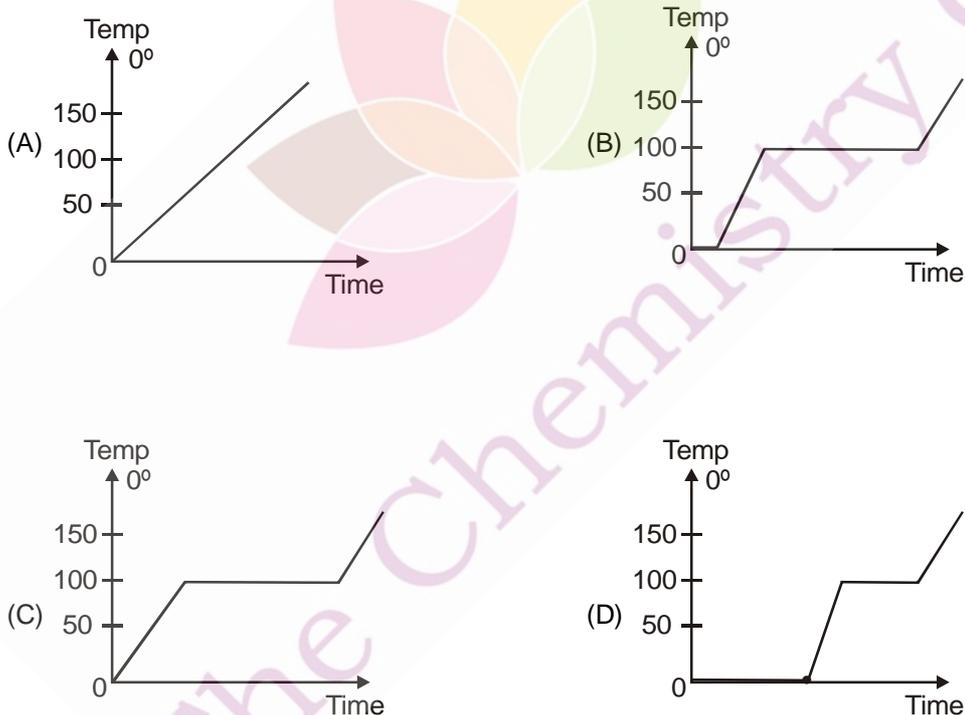
- A beaker containing water is placed on the platform of a digital weighing machine. It reads 1100 g. A metal body of density 8g/cc and mass 200 g is suspended in water in the beaker (without touching the walls of the beaker). It is attached by a suitable string fixed to some support. Now the reading of weighing machine will be :  
(A) 1100g                      (B) 1125 g                      (C) 1275                      (D) 1300 g
- The sum of all natural numbers less than 400 which are NOT divisible by 6, is :  
(A) 13266                      (B) 66534                      (C) 79800                      (D) 93066
- In the figure shown, the bigger circle has radius 1 unit. Therefore, the radius of smaller circle must be  
(A)  $\sqrt{2} + 1$   
(B)  $\frac{1}{2}$   
(C)  $\frac{1}{\sqrt{2}}$   
(D)  $\frac{1}{\sqrt{2}+1}$
- Three containers A, B and C of equal volume contain  $N_2$ ,  $NO_2$  and  $CO_2$  respectively at the same temperature and pressure, The ascending order of their masses is :  
(A) A, C, B                      (B) C, A, B                      (C) B, C, A                      (D) C, B, A
- A 3.7 litre 1.0 M NaOH solution is mixed with another 5 litre 0.30 M NaOH solution. The molarity of the resulting solution is :  
(A) 0.80 M                      (B) 0.10 M                      (C) 0.73 M                      (D) 0.59 M
- The animal body is formed of many cells, but the cells show no coordination to form tissues in :  
(A) protozoans                      (B) coelenterates                      (C) sponges                      (D) flat worms
- An indicator of  $SO_2$  pollution is :  
(A) moss                      (B) lichens                      (C) algae                      (D) pteridophytes
- The one that CANNOT be used for DNA fingerprints is :  
(A) leucocytes                      (B) erythrocytes                      (C) hair bulbs                      (D) sperms

9. A rainbow has circular shape because :  
 (A) the earth is spherical. (B) rain drops are spherical  
 (C) the sun is spherical (D) none of these
10. An observer in a car P moving towards north with speed  $v$  observes that another car Q is moving towards east with the same speed  $v$ . The true velocity of Q is :  
 (A)  $v$  towards east (B)  $\sqrt{2} v$  towards north-east  
 (C)  $v$  towards south-east (D)  $v \sqrt{2}$  towards south-west
11. A body describes uniform, accelerated motion along a straight line. Which of the following displacement time graphs shown represent the motion correctly ?



- (A) (I) only (B) (I) and (IV) only  
 (C) (I), (III) and (IV) only (D) (I), (II), (III) and (IV) all
12. Transition metal ion in amethyst is :  
 (A)  $\text{Cr}^{3+}$  (B)  $\text{Fe}^{3+}$  (C)  $\text{Mn}^{3+}$  (D)  $\text{Co}^{3+}$
13. Among the following the most powerful oxidizing agent is -  
 (A)  $\text{O}_2$  (B)  $\text{KClO}_3 + \text{O}_2$  (C)  $\text{H}_2\text{O}$  (D)  $\text{O}_3$
14. The half-life period of radioactive element is 14 hours. The fraction of the radioactive element that disintegrates in 56 hours is :  
 (A) 0.125 (B) 0.625 (C) 0.9025 (D) 0.9375

15. Three line segments in a plane have lengths  $a$ ,  $b$  and  $c$ . No two of these are parallel. If  $\sqrt{a} + \sqrt{b} = \sqrt{c}$ , then :
- (A) can form an acute angled triangle.                      (B) can form a right angled triangle.  
 (C) can form an isosceles triangle                      (D) cannot form a triangle.
16. A cell, an ammeter and a voltmeter are all connected in series. The ammeter reads a current  $I$  and the voltmeter a potential difference  $V$ . If a torch bulb is connected across the voltmeter, then.
- (A) both  $I$  and  $V$  will increase                      (B) both  $I$  and  $V$  will decrease  
 (C)  $I$  will increase but  $V$  will decrease                      (D)  $I$  will decrease but  $V$  will increase
17. Dispersion of white light into its constituent colours occurs during
- (A) reflection at a plane mirror  
 (B) reflection at a concave mirror.  
 (C) internal reflection inside a spherical drop of water  
 (D) refraction at the boundary of a transparent medium.
18. Ice at  $0^\circ\text{C}$  is put in a closed container and heat is supplied to it continuously at a uniform rate. Which of the following graphs gives the temperature variation with time correctly ?



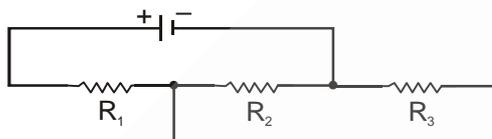
19. Two circles of radii 2 and 3 cm touch each other externally. The length of direct common tangent to the two circles will be :
- (A)  $2\sqrt{6}$  cm                      (B)  $\sqrt{26}$  cm                      (C) 5 cm                      (D) 2.4 cm

20. Formalin is 40% aqueous solution of :  
(A) formic acid  
(B) freon gas  
(C) formaldehyde  
(D) a mixture of formic acid and formaldehyde in a ratio 1 : 1
21. "Green fuel" means  
(A) fuel obtained from plant leaves  
(B) green coloured fuel  
(C) chemicals used for the growth of plants  
(D) fuel obtained from plastic waste
22. Which one of the following is a true fruit ?  
(A) Pear  
(B) Coconut  
(C) Apple  
(D) Cashewnut
23. The number of chromosomes can be counted at :  
(A) anaphase  
(B) interphase  
(C) metaphase  
(D) prophase
24. Which one of the following is true fish ?  
(A) Star fish  
(B) Gold fish  
(C) Silver fish  
(D) Hag fish
25. Newton deduced the inverse square law of gravitation :  
(A) by observing motion of an apple falling from a tree.  
(B) by using kepler's laws of planetary motion.  
(C) by studying motion of different objects in the laboratory.  
(D) by using data obtained from Cavendish experiment.
26. If  $D = a^2 + b^2 + c^2$  where a and b are consecutive integers and  $c = ab$ , then  $\sqrt{D}$  is :  
(A) always an even integer.  
(B) always an odd integer.  
(C) an integer, odd or even  
(D) sometimes an irrational number
27. If  $a^2 + 2b = 7$ ,  $b^2 + 4c = -7$  and  $c^2 + 6a = -14$ , then the value of  $(a^2 + b^2 + c^2)$  is -  
(A) 14  
(B) 25  
(C) 36  
(D) 47
28. The part of the digestive system that digests lipids in the food is :  
(A) stomach  
(B) duodenum  
(C) ilium  
(D) large intestine
29. One mole of oxalic acid is equivalent to :  
(A) 0.5 mole of NaOH  
(B) 1 mole of NaOH  
(C) 1.5 mole of NaOH  
(D) 2 mole of NaOH
30. The trigonometric expression :  $\cot^2\theta \left[ \frac{\sec\theta - 1}{1 + \sin\theta} \right] + \sec^2\theta \left[ \frac{\sin\theta - 1}{1 + \sec\theta} \right]$  has the value :  
(A) -1  
(B) 0  
(C) 1  
(D) 2

(PART A-2)

In question 31 to 40 any number of options (1 or 2 or 3 or 4) may be correct. You are to identify all of them correctly to get 6 marks. Even if one answer identified is incorrect or one correct answer is missed, you get zero score.

31. During contraction of muscle fiber :
- (A) I bands get reduced in length (B) A bands retain the length  
(C) I bands retain the length (D) A bands get reduced in length
32. Out of the following the salt/ s that has /have pH value higher than 7.5 / is/are :
- (A) sodium hydrogen carbonate (B) sodium sulphate  
(C) sodium chloride (D) sodium carbonate
33. In case of the circuit shown below, which of the following statements is/are true ?



- (A)  $R_1$ ,  $R_2$  and  $R_3$  are in series.  
(B)  $R_2$  and  $R_3$  are in series.  
(C)  $R_2$  and  $R_3$  are in parallel.  
(D) The equivalent resistance of the circuit is  $R_1 + \frac{R_2 R_3}{R_2 + R_3}$
34. Which of the following statements is/are true in case of waves ?
- (A) Transverse vibrations are set on the string of a guitar.  
(B) As compared to light, a sound wave produced on the moon will take a time about  $10^6$  times longer to reach the earth.  
(C) A sound note of wavelength 1 cm in air cannot be heard by a man.  
(D) Sound travels faster in water than in air.
35. In a rectangle ABCD the lengths of sides AB, BC, CD and DA are  $(5x + 2y + 2)$  cm,  $(x + y + 4)$  cm,  $(2x + 5y - 7)$  cm and  $(3x + 2y - 11)$  cm respectively. Which of the following statements is /are true ?
- (A) One of the sides of the rectangle is 15 cm long.  
(B) Each diagonal of the rectangle is 39 cm long.  
(C) Perimeter of the rectangle is 102 cm.  
(D) Area of the rectangle is  $560 \text{ cm}^2$
36. What is true about white muscles ?
- (A) Number of mitochondria is few.  
(B) They possess very small quantity of myoglobin.  
(C) The amount of sarcoplasmic reticulum is high  
(D) They depend on anaerobic process of energy.
37. If  $U = \{X \mid X \text{ is a point on straight line } AB\}$ ,  $P = \{M \mid M \text{ is a point on ray } AB\}$ ,  $Q = \{N \mid N \text{ is a point on ray } BA\}$  and  $R = \{L \mid L \text{ is point on segment } AB\}$ , then which of the following statements is/are true ?
- (A)  $P \cap Q = R$  (B)  $P' \cup Q' = Q \cup P$  (C)  $[P' \cup Q']' = R$  (D)  $P \cap Q' = P' \cup Q$

38. In bacterial photosynthesis, usually :  
(A)  $\text{CO}_2$  is not fixed      (B)  $\text{O}_2$  is not released      (C)  $\text{H}_2\text{O}$  is oxidized      (D) chlorophyll taps light
39. A body traveling along a straight line with a uniform acceleration has velocities 5 m/s at a point A and 15 m/s at a point B respectively. If M is the midpoint of AB, then :  
(A) the ratio of times taken by the body to cover distance MB and AM is  $\left[ \frac{\sqrt{5}-1}{2} \right]$ .  
(B) the velocity at M is  $5\sqrt{5}$  m/s  
(C) average velocity over AM is  $\frac{5(\sqrt{5}-1)}{2}$  m/s  
(D) the product of the acceleration and the distance AB is  $100 \text{ m}^2/\text{s}^2$
40. Out of the following the metals, the one/ s that is/ are sonorous is /are :  
(A) Zn                              (B) Na                              (C) Hg                              (D) Cu

