



**FACULTY SELECTION TEST**

**INSTRUCTIONS :**

1. Attempt all questions.
2. Indicate your answer on the question paper itself.
3. Each question has four options. Out of these only one is the correct answer.
4. Each correct answer carries +1 marks. for each wrong answer 0.25 marks will be deducted.

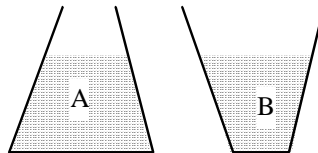
**Q.1** In the relation  $\frac{dy}{dt} = 2\omega \sin(\omega t + \phi_0)$ , the dimensional formula for  $(\omega t + \phi_0)$  is -  
(A) M L T (B) M L T<sup>0</sup> (C) M L<sup>0</sup> T<sup>0</sup> (D) M<sup>0</sup> L<sup>0</sup> T<sup>0</sup>

**Q.2** If displacement of a particle is zero, the distance covered  
(A) must be zero (B) may or may not be zero  
(C) cannot be zero (D) depends upon the particle

**Q.3** Calculate the kinetic energy of a body of mass 2kg moving with velocity of 0.2 m/sec.  
(A) 40 J (B) 0.4 J (C) 0.04 J (D) 4 J

**Q.4** A man carrying a bag of mass 25kg climbs up to a height of 10m in 50 seconds. Calculate the power delivered by him to the bag. ( $g = 9.8 \text{ m/s}^2$ )  
(A) 49 W (B) 59 W (C) 69 W (D) None of these

**Q.5** Two vessels A and B of cross sections as shown contain same liquid up to the same height. The liquid pressures at the bottom are –



- (A) more in A, less in B (B) more in B, less in A  
(C) equal in both A and B (D) can't say

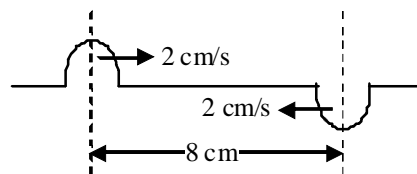
**Q.6** A frictionless sloping plank is 6m long. An oil drum of 300 N is raised up the sloping plank by an effort of 15N. Calculate the height to which the oil drum rises.  
(A) 2 m (B) 7 m (C) 3 m (D) 0.3 m

**Q.7** A pair of scissors is used to cut a cloth placed 2cm from the rivet. A force of 6 kgf is applied by the finger 5.5cm from the rivet. What is the resistance offered by the cloth?  
(A) 13 kgf (B) 15 kgf (C) 16.5 kgf (D) 19 kgf

**Q.8** A rectangular glass block of refractive index 1.5 is kept above a postage stamp. The image of the stamp is observed to be raised by 7mm. what is the thickness of the glass block ?  
(A) 31mm (B) 21mm (C) 27mm (D) None of these

**Q.9** A person having myopic eyes uses a concave lens of focal length 50 cm. What is the power of the lens?  
(A) – 2D (B) – 3D (C) – 5D (D) None of these

- Q.10** A person is standing between two vertical cliffs such that he is at a distance of 680 m from the nearest cliff. When he shouted he heard the first echo after 4 s and the second echo 3 s later . Calculate the distance between the cliffs.  
 (A) 1870 m (B) 2873 m (C) 2000 m (D) none of these
- Q.11** A cell of e. m. f 1.5v records a potential difference of 1.0V, When connected to an external resistance R. such the current flowing through the circuit is 0.5 A, Calculate the internal resistance of the cell.  
 (A) 1Ω (B) 2Ω (C) 3Ω (D) None of these
- Q.12** Two coils connected in series have a resistance of 18Ω and when connected in parallel have a resistances of 4Ω. find the value of individual resistance of the coils  
 (A) 12Ω or 6Ω (B) 14Ω or 4Ω (C) 10Ω or 8Ω (D) None of these
- Q.13** In a house, five 60W electric bulbs are lit for 5hours, a 1000 W electric heater is used for 3 hour daily calculate the electrical energy consumed in 30 days. Calculate the cost if the rate is 2.40 per unit  
 (A) Rs 500 (B) Rs 400 (C) Rs 324 (D) None of these
- Q.14** 2000 cal of heat is supplied to 200 g of water. Find the rise in temperature. Specific heat of water = 1 cal g<sup>-1</sup> °C<sup>-1</sup>  
 (A) 10°C (B) 20°C (C) 30°C (D) 40° C
- Q.15** Two mass object of 1g and 4 g are moving with equal kinetic energy. The ratio of the magnitude of their momentum is -  
 (A) 4 : 1 (B)  $\sqrt{2}$  : 1 (C) 1 : 2 (D) 1 : 16
- Q.16** A father racing his son has half the kinetic energy of the son, who has half the mass of the father. The father speeds up by 1m/sec. and then has the same kinetic energy as the son. What is original speed of father ?  
 (A) 2.4m/sec. (B) 5m/sec. (C) 3m/sec. (D) 4m/sec.
- Q.17** Two pulses in a stretched string whose centres are initially 8 cm apart are moving towards each other as shown in the figure. The speed of each pulse is 2 cm/s. After 2 second the total energy of the pulses will be—



- (A) zero (B) purely kinetic  
 (C) purely potential (D) partly kinetic and partly potential
- Q.18** Rays of light strike a horizontal plane mirror at an angle of 45° A second plane mirror is arranged at an angle  $\theta$  with it. If the ray after reflection from the second mirror goes horizontal parallel to the first mirror, then  $\theta$  is-  
 (A) 50° (B) 40° (C) 30° (D) 67.50°
- Q.19** A stone is dropped into a well 44.1m deep. The sound of splash is heard 3.13 seconds after the stone is dropped. Calculate the velocity of sound in air-  
 (A) 339.2m/sec (B) 350 m/sec (C) 354 m/sec (D) None of these
- Q.20** The unit of quantity on which loudness of sound depends is-  
 (A) metre (B) Hertz (C) metre /second (D) second

- Q.21** If the distance between two masses be doubled then the force between them will become-
- (A)  $\frac{1}{4}$  times                      (B) 4 times                      (C)  $\frac{1}{2}$  times                      (D) 2times
- Q.22** A lens of power +2 dioptries is placed in contact with a lens of power -1 dioptre. The combination will behave like-
- (A) Convergent lens of focal length 50 cm                      (B) Convergent lens of focal length 100 cm  
(C) divergent lens of focal length 50 cm                      (D) divergent lens of focal length 100 cm
- Q.23** The " Refractive index of glass is 1.5". The velocity of light in glass will be:-
- (A) Velocity of light in glass (in which refraction takes places) is  $\frac{2}{3}$  of the velocity of light in air.  
(B) Velocity of light in air is  $\frac{2}{3}$  of the velocity of light in glass  
(C) Both above  
(D) None of above
- Q.24** A body freely falling from rest has a velocity V after it falls through a height h. The distance it has to fall further for its velocity, to become double is-
- (A) 3h                      (B) 6h                      (C) 8h                      (D) 10h
- Q.25** A bullet of mass 10gm moving with velocity of 100 m/sec hits a wooden log and penetrates it upto thickness of 5 cm. The resistance force of the log is-
- (A) 2000N                      (B) 500N                      (C) 1000N                      (D) 600N
- Q.26** Two media are separated by a plane surface. Speed of light in one medium is  $2.0 \times 10^{10}$  cm/sec and in the other the speed it is  $2.4 \times 10^{10}$  cm/sec. The critical angle for a ray going from the first medium into the second will be-
- (A)  $\sin^{-1} \frac{1}{2}$                       (B)  $\sin^{-1} \left( \frac{5}{6} \right)$                       (C)  $\sin^{-1} \frac{5}{12}$                       (D)  $\sin^{-1} \left( \frac{1}{\sqrt{2}} \right)$
- Q.27** Calculate the density of a block of wood that floats in water with 10% of it above the surface. Density of water =  $10^3$  kg/m<sup>3</sup>.
- (A)  $0.9 \times 10^1$  kg/m<sup>3</sup>                      (B)  $0.9 \times 10^3$  kg/m<sup>3</sup>                      (C)  $0.7 \times 10^2$  kg/ m<sup>3</sup>                      (D) none of these
- Q.28** Two lenses of power + 12D and -2D are put in contact. What is their equivalent focal length?
- (A) 10 cm                      (B) 12.5 cm                      (C) 16.6 cm                      (D) 8.33 cm
- Q.29** Which of the following lens is used to minimize hypermetropia ?
- (A) convex lens                      (B) concave lens                      (C) cylindrical lens                      (D) none of these
- Q.30** The coil of a heater is cut into two equal halves and only one of them is used in the heater. The ratio of the heat produced by this half of the coil to that produced by the original coil is-
- (A) 2 : 1                      (B) 4 : 1                      (C) 1 : 2                      (D) 1 : 4
- Q.31** By inserting a soft iron piece into a solenoid, strength of the magnetic field
- (A) increases                      (B) decreases  
(C) first increases then decreases                      (D) remains unchanged
- Q.32** The food cooks faster in pressure cooker since
- (A) the pressure exerted by water vapour enclosed in the cooker increases the boiling point of water  
(B) the pressure exerted by the water vapour enclosed in the cooker decreases the boiling point of water  
(C) the water vapour pressure does not influence the boiling point of the water  
(D) there is no loss of heat to the surrounding as the pressure cooker is airtight.

- Q.33** Which one of the following statements is INCORRECT?  
 (A) If the net force on a body is zero, its velocity is constant or zero  
 (B) If the net force on a body is zero, its acceleration is constant and nonzero  
 (C) If the velocity of a body is constant, its acceleration is zero  
 (D) A body may have a varying velocity yet a constant speed
- Q.34** A convex lens  $L_1$  forms an image of the same size as that of the object at a distance of 24 cm. If the lens  $L_1$  is replaced by another convex lens  $L_2$ , the image formed is magnified and inverted. Therefore, the focal length of  $L_2$  is  
 (A) less than 12 cm (B) 12 cm  
 (C) between 12 cm and 24 cm (D) more than 24 cm
- Q.35** A converging beam of light falls on a convex mirror of radius of curvature 20 cm, the point of convergence being 10 cm behind the mirror. The image is -  
 (A) virtual and formed 10 cm in front of the mirror (B) real and formed in front of the mirror  
 (C) formed at infinity (D) virtual and formed 10 cm behind the mirror
- Q.36** In the absence of atmospheric refraction  
 (A) both the sunrise and the sunset would be delayed  
 (B) both the moonrise and the sunset would occur earlier  
 (C) the sunrise would be delayed and the sunset would occur earlier  
 (D) the sunrise would occur earlier and the sunset would be delayed
- Q.37** A light ray falls on a mirror and deviates by  $60^\circ$  then the angle of reflection will be  
 (A)  $30^\circ$  (B)  $90^\circ$  (C)  $60^\circ$  (D)  $180^\circ$
- Q.38** A stone dropped from the edge of a roof, passes a window 1.5 m high in 0.05 sec. How far is the roof above the top of the window? [take  $g = 9.8 \text{ m/s}^2$ ]  
 (A) 45.23 m (B) 40 m (C) 44.23 m (D) None of these
- Q.39** A ball thrown vertically upward rises to a height of 44.1 m. Calculate the initial velocity of the ball. (take  $g = 9.8 \text{ m/s}^2$ )  
 (A) 49.4 m/sec (B) 39.4 m/sec (C) 29.4 m/sec (D) None of these
- Q.40** Magnitude of magnetic field intensity at a point around carrying conductor is B. If the strength of current in the conductor becomes double. Then the magnitude field intensity, at the point around the conductor is :-  
 (A)  $B/2$  (B) B (C)  $B/4$  (D)  $2B$
- Q.41** If a number of forces act on a body and the body is in static or dynamics equilibrium, then  
 (A) work done by any individual force must be zero (B) net work done by all the forces is +ve  
 (C) net work done by all the forces is - ve (D) net work done by all the forces is zero
- Q.42** A variable force F acts along the X-axis given by  $F = (3x^2 - 2x + 1)\text{N}$ . The work done by the force when a particle of mass 100 g moves from  $x = 50 \text{ cm}$  to  $x = 100 \text{ cm}$  is  
 (A) 0.625 J (B) 6.25 J (C) 0.0625 J (D) 62.5 J
- Q.43** An electric motor creates a tension of 4500 N in hoisting a cable and reels it at the rate of 2 m/s. The power of the electric motor is  
 (A) 15 kW (B) 9 kW (C) 225 W (D) 9000 H.P.
- Q.44** A shell explodes and many pieces fly off in different directions. Which of the following is conserved?  
 (A) Kinetic energy (B) Momentum

(C) Neither momentum nor KE (D) Momentum and KE

**Q.45** A bomb of mass 12 kg at rest explodes into two pieces of masses 4 kg and 8 kg. The velocity of 8 kg mass is 6 m/s. The kinetic energy of the other mass is -

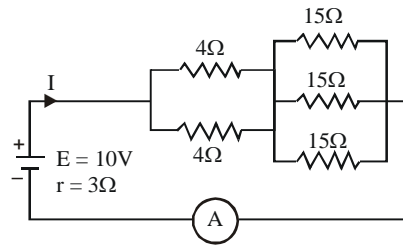
- (A) 48 J (B) 32 J (C) 24 J (D) 288 J

**Q.46** How will the image formed by a convex lens be affected, if the central portion of the lens is wrapped in black paper, as shown ?

- (A) No image will be formed  
 (B) Full image will be formed but it is less bright  
 (C) Full image will be formed but without the central portion  
 (D) Two images will be formed, one due to each exposed half



**Q.47** In the circuit shown in the figure, the current I has a value equal to -



- (A) 1A (B) 2A (C) 4A (D) 3.5 A

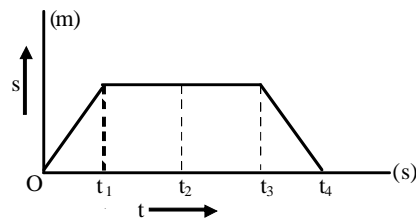
**Q.48** A charged particle moves along a circle under the action of possible constant electric and magnetic fields. Which of the following are possible ?

- (A)  $E = 0, B = 0$  (B)  $E = 0, B \neq 0$  (C)  $E \neq 0, B = 0$  (D)  $E \neq 0, B \neq 0$

**Q.49** A person travels along a straight road for the first half time with a velocity  $v_1$  and the second half time with a velocity  $v_2$ . Then the mean velocity  $\bar{v}$  is given by

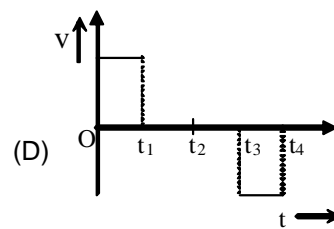
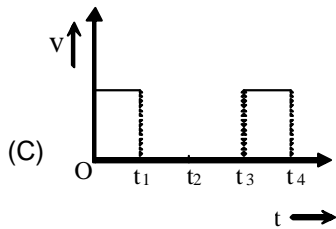
- (A)  $\bar{v} = \frac{v_1 + v_2}{2}$  (B)  $\frac{2}{\bar{v}} = \frac{1}{v_1} + \frac{1}{v_2}$  (C)  $\bar{v} = \sqrt{v_1 v_2}$  (D)  $\bar{v} = \sqrt{\frac{v_2}{v_1}}$

**Q.50** Displacement-time graph of a body is shown in the figure -

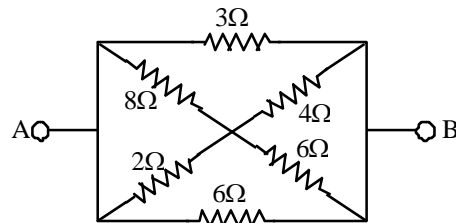


Velocity-time graph of the motion of the body will be -





**Q.51** The equivalent resistance between A and B in the network in the figure is -



- (A)  $\frac{4}{3} \Omega$                       (B)  $\frac{3}{2} \Omega$                       (C)  $3 \Omega$                       (D)  $2 \Omega$

**Q.52** The earth (mass =  $10^{24}$  kg) revolves round the sun with angular velocity  $2 \times 10^{-7}$  rad  $s^{-1}$  in a circular orbit of radius  $1.5 \times 10^8$  km. The force exerted by the sun on the earth, in newtons, is

- (A)  $18 \times 10^{25}$                       (B) zero                      (C)  $27 \times 10^{39}$                       (D)  $6 \times 10^{21}$

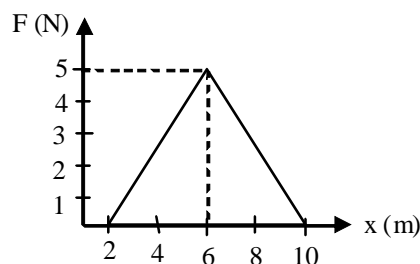
**Q.53** Electrons moving with different speeds enter a uniform magnetic field in a direction perpendicular to the field. They will move along circular paths

- (A) of the same radius  
 (B) with larger radii for the faster electrons  
 (C) with smaller radii for the faster electrons  
 (D) either (b) or (c) depending on the magnitude of the magnetic field

**Q.54** A monkey of mass 40 kg climbs on a massless rope of breaking strength 600 N. The rope will break if the monkey

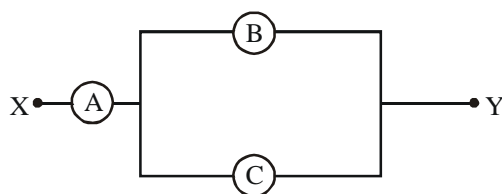
- (A) Climbs up with a uniform speed of 5 m/s                      (B) Climbs up with an acceleration of 5 m/s<sup>2</sup>  
 (C) Climbs down with an acceleration of 5 m/s<sup>2</sup>                      (D) Climbs down with a uniform speed of 5 m/s

**Q.55** A force shown in the F-x graph is applied to a 2 kg block horizontally as shown in the figure. The change in kinetic energy is -



- (A) 15 J                      (B) 20 J                      (C) 25 J                      (D) 30 J

**Q.56** A, B and C are voltmeters of resistance R, 1.5 R and 3R, respectively. When some potential difference is applied between X and Y, the voltmeter readings are  $V_A$ ,  $V_B$  and  $V_C$ , respectively.

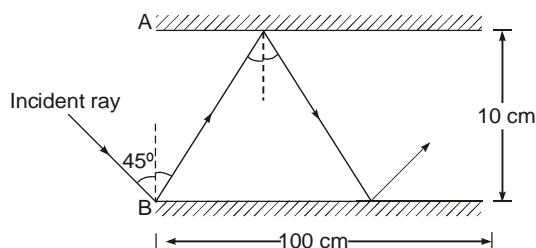


- (A)  $V_A = V_B = V_C$       (B)  $V_A \neq V_B = V_C$       (C)  $V_A = V_B \neq V_C$       (D)  $V_B \neq V_A = V_C$

**Q.57** A convex mirror has a focal length of 20 cm. A real object is placed at a distance of 20 cm in front of the mirror from the pole. The mirror produces an image at

- (A) infinity      (B) 20 cm      (C) 40 cm      (D) 10 cm

**Q.58** Two parallel plane mirrors A and B are placed at a separation 10 cm as shown in figure. A ray incident on the corner of mirror B at an angle of incidence  $45^\circ$ . Find the number of times this rays is reflected from mirror A :



- (A) 4      (B) 5      (C) 6      (D) 7

**Q.59** In a tug of war, both the teams A and B remain in equilibrium, then

- (A) work done by team A is positive      (B) work done by team B is positive  
(C) work done by both the team is negative      (D) work done by both the teams is zero

**Q.60** Under the action of a force, a 3 kg body moves such that  $x = t^2/2$  where position x is in meter and t is in second. The work done by the force in first 3 second is

- (A) 13.5 J      (B) 27 J      (C) 81 J      (D) 109 J

