Zahira College
EXAMINATIONS DIVISION

E M

First Term Examination 2020

GRADE - 13 | Physics I | 2 Hours

Admission No. :.....Class :.....

01. Dimension of sound intensity is

(1) ML^4T^{-2} (2) ML^2T^{-3} (3) ML^0T^{-3} (4) $ML^{-2}T^{-3}$ (5) Dimensionless

02. The velocity of sound is greatest in

(1) air (2) Vacuum (3) steel (4) water (5) kerosene

03. An elastic string with spring constant 12 K is cut into three equal parts of equal length. The spring constant of one part is

(1) 4 K (2) 12 K (3) 24 K (4) 36 K (5) 48 K

04. Consider the following statement made about vibrating air column inside a tube closed at one end.

(A) The frequency of the first overtone is thrice that of the fundamental.
(B) The maximum pressure occurs at the closed end of the tube.
(C) The wave length of the air column change with temperature.
Of the above statements.

(1) Only A true (2) Only A and B are true (3) Only B and C are true
(4) A and C are true (5) All are true

05. Fifty identical machines produce a certain sound intensity level at a given point. In order to decrease the sound intensity level by 10 dB, the number of machines that has to be turned off is.

(1) 49 (2) 45 (3) 40 (4) 25 (5)

06. What is the increasing order of the energy of following electromagnetic waves?

(A) Visible (B) γ rays (C) microwaves (D) Ultra violet

(1) A,C, D, B (2) C,A,B,D (3) B, D, A, C (4) C, A, D, B (5) D, C, A, B

07. Which one of the following summarizes the changes occur when water waves travels deeper region to shallow region?

	Frequency	Speed	Wave length
(1)	remain same	increase	increase
(2)	remain same	decrease	decrease
(3)	remian same	remain same	remain same
(4)	increasing	remain same	decreasing
(5)	decreasing	remain same	increasing

08. Consider the following statements made regarding a monochromatic light ray refracting through an ***air*** prism placed in glass.

(A) The speed of the light ray inside the prism is lower than outside the prism.
(B) The light ray bends toward the normal inside the prism.
(C) The wave length of the light ray inside the prism is greater than that outside the prism.
Of the above statements

(1) Only A is true (2) Only B is true (3) Only C is true
(4) Only A and B are true (5) Only B and C are true

09. A monochromatic ray of light undergoes minimum deviation after passing through a prism. If the angle of deviation produced by second surface of the prism surface is 10°, the angle of minimum deviation of the ray is

(1) 5° (2) 10° (3) 20° (4) 40° (5) Insufficient data

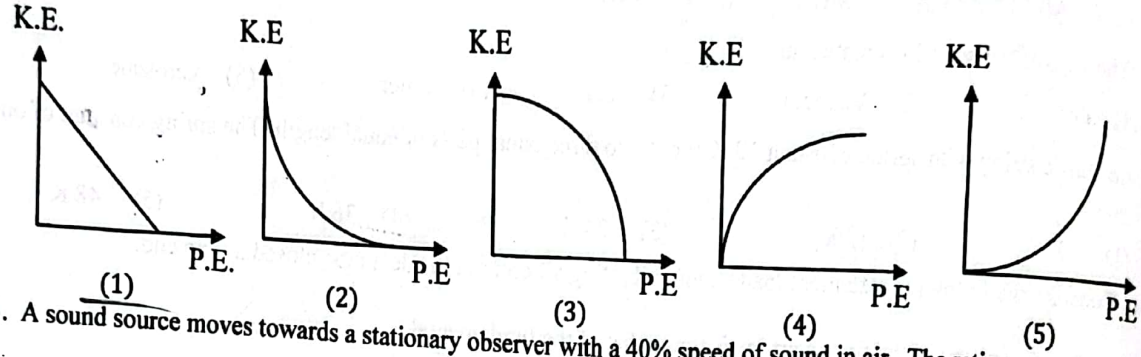
10. A defective eye of a person has a near point at 0.5 m. The magnitude of the power of the lens that the person has to in order to bring the near point to 0.20 m is

(1) 1 D (2) 1.5 D (3) 2 D (4) 2.5 D (5) 3 D

11. A telescope having a magnifying power of 20 has objective piece of power 2.5 diopeters. The length of the telescop when it is in the normal adjustment is

(1) 36 cm (2) 39 cm (3) 42 cm (4) 45 cm (5) 48 cm

12. Which of the following sketches best represents the relation between the kinetic energy (K.E) of a body executing simple harmonic motion and the potential energy (P.E) of the body from its equilibrium position?

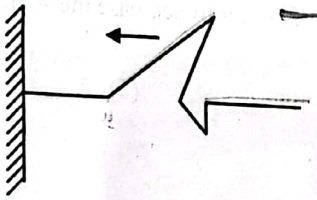


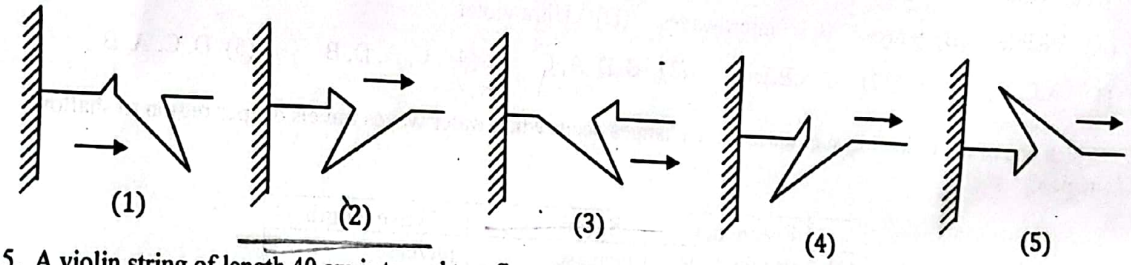
13. A sound source moves towards a stationary observer with a 40% speed of sound in air. The ratio,

$$\frac{\textbf{Frequency emitted by source}}{\textbf{Apparent frequency heard by the observer}}$$ is

(1) $5/7$ (2) 0.6 (3) 1.4 (4) $5/3$ (5) 1.5

14. A transverse pulse is travelling on a stretched string as shown in the figure. The left end of the string is tied to rigid boundary. The best reflected pulse is represented by





15. A violin string of length 40 cm is turned to a first overtone frequency of 960 Hz. By how much the string must be shortened to raise the fundamental frequency to 640 Hz?

(1) 10 cm (2) 8 cm (3) 6 cm (4) 4 cm (5) 2 cm

16. Which of the following could not influence speed of sound in air.

(A) Frequency of sound wave
(B) Temperature of air
(C) Pressure of air
(D) Humidity of air

(1) Only A (2) Only C (3) Only A and C (4) Only A, C and D (5) Only A and D

17. The frequencies of two consecutive overtones in the stretched string are 100 Hz and 200 Hz respectively then 2nd ovetone of string is

(1) 100 Hz (2) 200 Hz (3) 300 Hz (4) 300 Hz (5) 600 Hz

18. The intensity level of the healthy person at a distance r from the source is 80 dB. When the person moves 90m from that point, the new intensity level of the person is 100 dB. The distance r is

(1) 0.10 m (2) 1 m (3) 10 m (4) 100 m (5) 1000 m

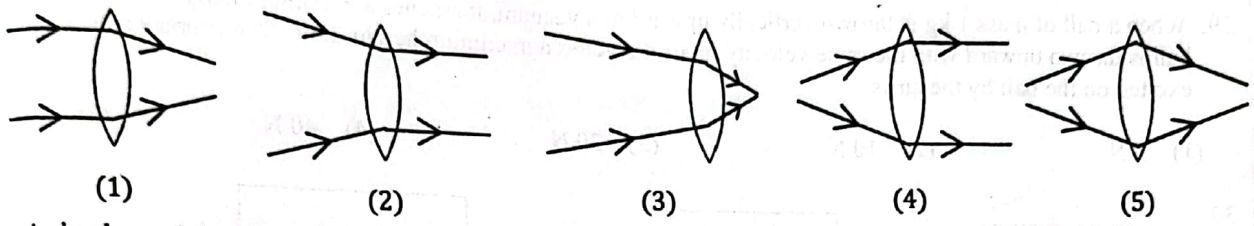
19. The refractive indices of materials A and B are 1.5 and 2 respectively. The refractive index of material A relative to B is

(1) 0.5 (2) 0.75 (3) 4/3 (4) 8/3 (5) 2/3

20. Refractive index and the prism angle of prism are 2 and A° respectively. What is correct relationship of A in order to gets the incident light ray totally internal reflected by the second surface of prism?

(1) $A \geq 15°$ (2) $A \geq 30°$ (3) $A \leq 30°$ (4) $A \geq 60°$ (5) $A \leq 60°$

21. Which of the following ray diagram is in correct?



(1) (2) (3) (4) (5)

22. A simple pendulum hung from the ceiling of an elevator has a period T when the elevator is moving constant speed to the upward direction. After that it moves deceleration of 5 ms^{-2}, the new time period will be

(1) $\sqrt{2}\,T$ (2) $\frac{1}{\sqrt{2}}T$ (3) $\sqrt{\frac{3}{T}}\,T$ (4) $\sqrt{\frac{2}{3}}\,T$ (5) $2\,T$

23. Consider the following statements made about microscope and telescopes.

(A) The focal length of eyepiece of microscope is greater than the focal length of the objective piece.
(B) The magnifying power of a compound microscope become maximum in the special adjustment.
(C) The magnifying power of an astronomical telescope becomes maximum when the final image formed at the near point of the eye.

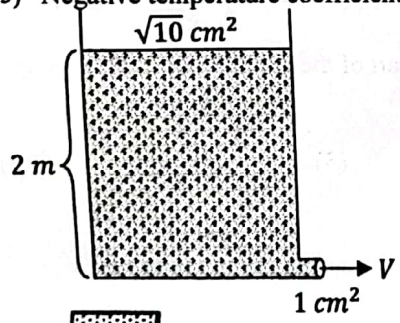
Of the above statements.

(1) Only A is true (2) Only A and B are true (3) Only A and C are true
(4) Only B and C are true (5) All are true.

24. Thermister is device like resistance thermometers rely on their change of electrical resistance with temperature as a mean of measuring temperature. It has special property compare to the other resistance thermometers. The property is

(1) Range is high
(2) Positive temperature coefficients of resistance
(3) Negative coefficient of linear expansion
(4) Negative coefficient of surface tension
(5) Negative temperature coefficient of resistance

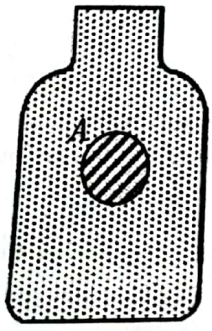
25.



Water drain through an opening of area 1 cm^2, in a container of cross-sectional area $\sqrt{10}$ cm^2 as shown in the figure. If the motion of the water surface in the container is not ignored the speed V at the water drain is given by

(1) $\frac{10}{3}$ ms^{-1} (2) $\frac{20}{3}$ ms^{-1} (3) 10 ms^{-1} (4) 20 ms^{-1} (5) 25 ms^{-1}

26.



When an object A is floated inside the liquid container as shown figure. When the container falls freely, then with respect to the container the object A

(1) Will move down with an acceleration g
(2) Will move up with an acceleration g
(3) Will move down with a deceleration
(4) Will move up with a declaration
(5) Will remain stationary

27. A car of mass 600 kg motor tires a circular bend of radius curvature 100 m in a horizontal that road with a speed U ms^{-1}. If the car moves safely, then the maximum speed of car can goes through circular bend in safely is, (coefficie of friction between road and tyre is 0.4)

(1) 10 ms^{-1} (2) 20 ms^{-1} (3) 30 ms^{-1} (4) 40 ms^{-1} (5) 80 ms^{-1}

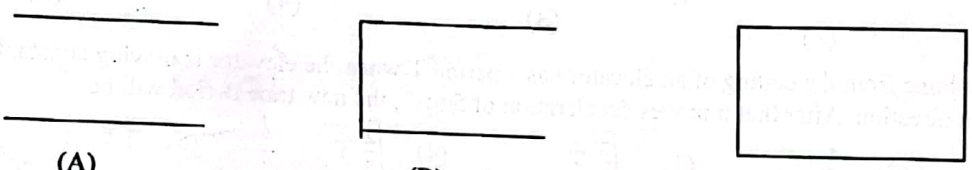
28. The moment of inertia of a dancer has dropped in ¼ of initial value due to folding the arms. The ratio of $\frac{\textit{new rotational kinetic energy of dancer}}{\textit{initial rotational kinetic energy of dancer}}$ is equal to

(1) $\frac{1}{8}$ (2) $\frac{1}{4}$ (3) 4 (4) 8 (5) 16

29. When a ball of mass 1 kg is thrown vertically upward in a vacuum, it reaches a maximum height of 60 m. When the ball is thrown upward with the same velocity in air it reaches a maximum height 20m. The average resistive force exerted on the ball by the air is

(1) 5 N (2) 10 N (3) 20 N (4) 40 N (5) 80 N

30.



(A) (B) (C)

Three tubes of A, B and C having equal length and resonate with their fundamental frequency. If the end correction is neglected, the ratio of fundamental frequencies will be

(1) 1 : 1 : 1 (2) 1 : 2 : 1 (3) 2 : 1 : 2 (4) 2 : 2 : 1 (5) 3 : 1 : 2

31. The height at which the value of acceleration due to gravity become 50% of its value on the surface of the earth is (R is the radius of the earth)

(1) $(\sqrt{2}-1)R$ (2) $\sqrt{2}$ R (3) 2R (4) $\left(\frac{\sqrt{2}}{\sqrt{2}+1}\right)$ R (5) $\sqrt{5}$ R

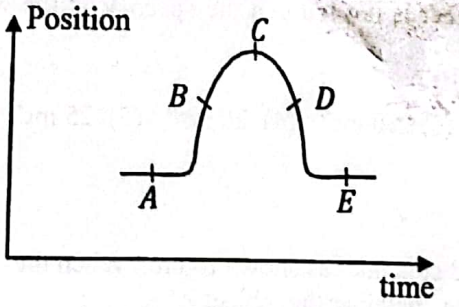
32. The period of revolution of satellite A around the earth is 8 times that of B. The distance of A from centre earth is how many times greater than that of B

(1) 2 (2) 4 (3) 8 (4) 16 (5) 32

33. A particle is projected away from the earth with a speed 3V, where the V is the escape velocity from the earth. The speed of the particle at infinity will be

(1) $V/2$ (2) $\sqrt{2}$ V (3) 2V (4) $2\sqrt{2}$ V (5) $4\sqrt{2}$ V

34. A position of a particle changes with time as shown in the graph. Which part of the graph shows that velocity is positive and acceleration is negative.

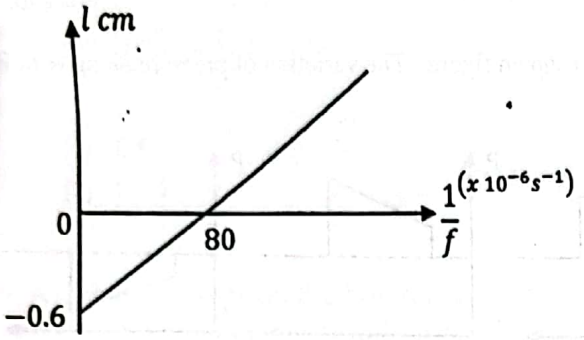


(1) A (2) B (3) C (4) D (5) E

35. A sound source, which emitted sound with frequency lkHz, moves with 10 ms^{-1} constant velocity along a straight path. A stationary observer sat closer to the straight path. The difference between higher wave length and lower wave length is

(1) $\frac{1}{10}$ m (2) $\frac{1}{20}$ m (3) $\frac{1}{25}$ m (4) $\frac{1}{50}$ m (5) $\frac{1}{100}$ m

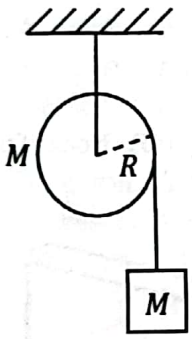
36. The graph shows how the fundamental resonance length ℓ changes with $^1/_f$ where f is the fundamental resonance frequency. The velocity of sound in air and the error correction is given respectively.



(1) 300 ms^{-1}, 0.15 cm (2) 330 ms^{-1}, 0.3 cm (3) 300 ms^{-1}, 0.6 cm
(4) 330 ms^{-1}, 0.6 cm (5) 330 ms^{-1}, 0.4 cm

37. A particle of mass 1 kg starts from rest and accelerates uniformly and reach 1 ms^{-1} in 10s. The time required to reach the energy $\frac{2}{25}$ J is

(1) 1 s (2) 2 s (3) 4 s (4) 8 s (5) 12 s

38. 

A load of mass M is supported by a string round a uniform cylinder of mass M and radius R as shown in the figure. If cylinder can freely rotate about its axis. What will be the acceleration of the load when it is released? (The moment of inertia of cylinder = ½ MR^2)

(1) $^g/_3$ (2) $^g/_2$ (3) $\frac{2}{3}$g (4) $\frac{3}{4}$ g (5) $\frac{5}{6}$ g

39. A satellite is moving around the earth in a circular orbit of radius 8R. If the radius of the earth is R, in order to just make it move infinity its velocity must be increased by about

(1) 50% (2) 100% (3) 200% (4) 300% (5) 400%

40. The equation of a wave is y = 6 Sin (4πt) where y and t in fundamental SI units The amplitude and frequency of the wave respectively

(1) 4m, 2Hz (2) 4m, 4Hz (3) 6m, 2Hz (4) 6m, 4Hz (5) 6m, 6Hz

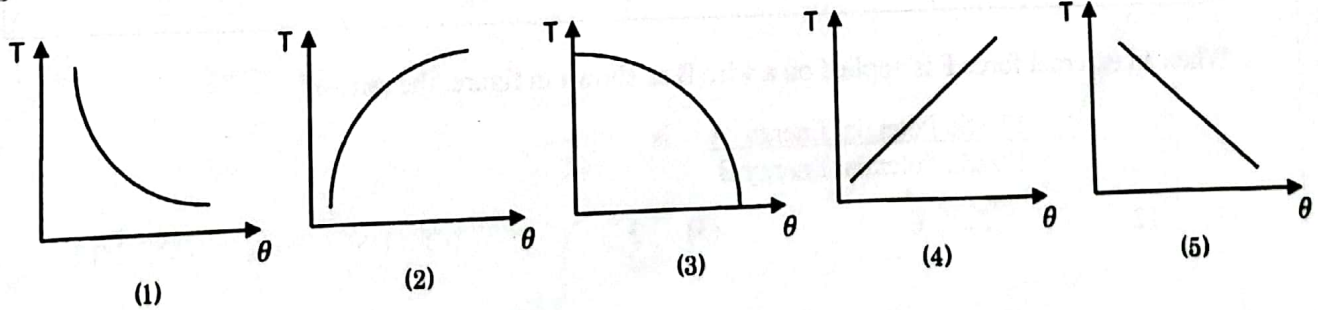
41. Two tuning fork of frequencies 240 Hz and 242 Hz are sounded together. The time interval between two consecutive maxima heard by an observer is

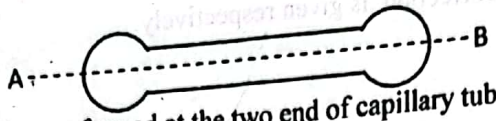
(1) 0.25 s (2) 0.5 s (3) 1 s (4) 2 s (5) 4 s

42. A tuning fork and a stretched wire give 5 beat/s in two situations when length of wire is 1 m and 1.05 m. The frequency of the fork is

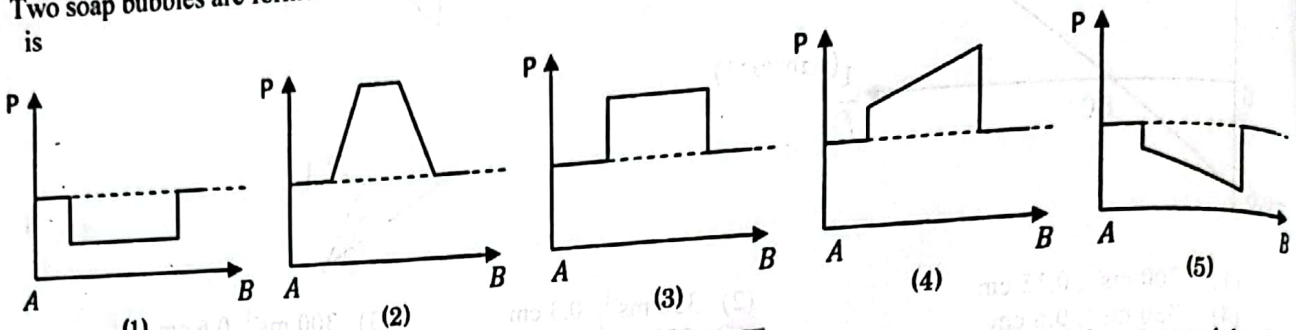
(1) 205 Hz (2) 210 Hz (3) 215 Hz (4) 215 Hz (5) 220 Hz

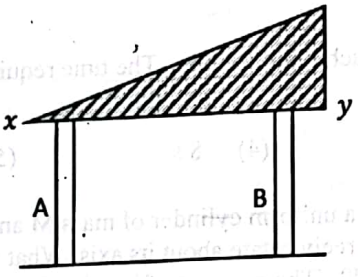
43. The variation of surface tension with temperature



44. 

Two soap bubbles are formed at the two end of capillary tube as shown figure. The variation of pressure along A to B is

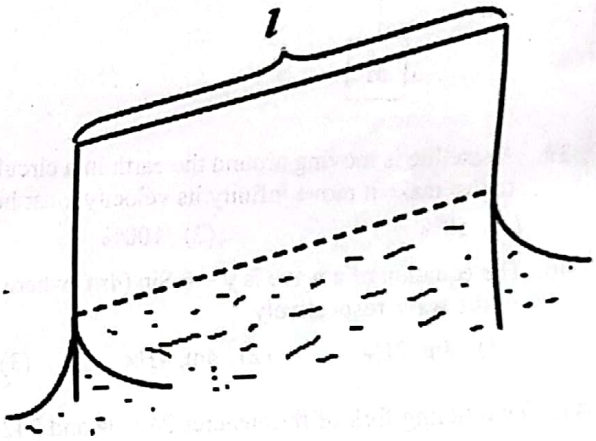


45. 

A uniform wedge is kept on two identical but by different material rods of A & B as shown in figure. If xy level is away maintained at same horizontal levels

(1) Young modulus of A & B are same
(2) Young modulus of A is greater than B
(3) Young modulus of B is greater than A
(4) The extension of A & B are not same
(5) None of these

46. A very thin glass strip of length l is partially immersed in a liquid of density p as shown in figure below. The mass of liquid come along the surface of glass strip is (surface tension of the liquid – T)



(1) $\frac{Tl}{2g}$ (2) $\frac{Tl}{g}$ (3) $\frac{2Tl}{g}$

(4) $\frac{4Tl}{g}$ (5) $\frac{6TL}{g}$

$F = Tl$

$mg = 2Tl$

$m = \frac{2Tl}{g}$

47. The wires of A and B are attached to a rigid support as shown figure below.

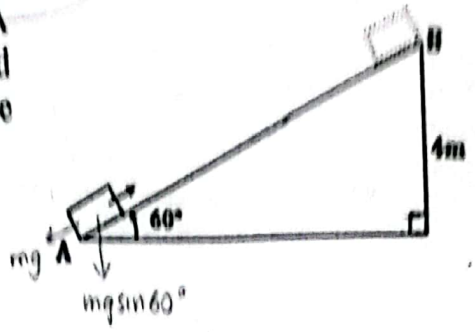
	Cross Sectional Area	Length	Young Modules
Wire A	2A	R	3Y
Wire B	A	2R	Y

When an external force F is applied on a wire B as shown in figure, the ratio of

$$\frac{\text{Elastic Potential Energy A}}{\text{Elastic Potential Energy B}}$$ is

(1) 12 (2) 6 (3) 3 (4) 1/6 (5) 1/12

48. An object of mass 10kg and kinetic energy 500J at A moves up along a rough inclined plane (slope 60°) and comes to a rest at B the coefficient of friction between the object and plane is,

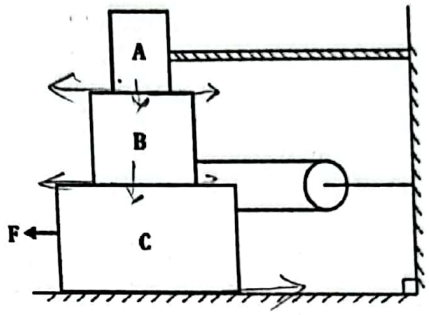


(1) 0.01
(2) 0.04
(3) 0.20
(4) 0.25
(5) 0.50

49. An object is kept on the horizontal wooden floor of a lorry which moves with a uniform velocity 8 ms^{-1}. The coefficient of static friction between the object and the wooden floor is 0.5 the minimum distance from which the lorry can be stopped without slipping the object on the wooden floor is,

(1) 3.2 m
(2) 6.4 m
(3) 9.6 m
(4) 12.8 m
(5) 16 m

50. As shown in the following diagram there objects A,B & C of mass 3kg, 4kg and 8kg are attached by inextensible Light string which passing through a smooth pulley. object A is attached to the wall by a light rod. A force F is applied on C and therefore C moves on the horizontal surface at constant velocity. What should be the value of F, if the coefficient of dynamic friction between any two surface is $1/4$



(1) 25N
(2) 36N
(3) 48N
(4) 80N
(5) 95N

$f_{r_A} = 3 \times \frac{1}{4} = \frac{3}{4}$

$f_{r_B} = 4 \times \frac{1}{4} = 1$

$15 \times \frac{1}{4} = \frac{15}{4}$