विद्या ददाति विनयम्
Knowledge is Discipline
BJNP
Learning with the Speed of Mumbai and the Tradition of Kota

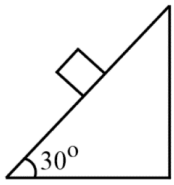
Max. Marks: 60 **Date: 25.09.2022**

JB 2 MR BATCH
PHYSICS : DCT
Topic: NLM + Work Energy Power

1. A body is at rest under the action of three forces, two of which are $\vec{F_1} = 4\hat{i}, \vec{F_2} = 6\hat{j}$. The third force is:

   (a) $4\hat{i} + 6\hat{j}$ (b) $4\hat{i} - 6\hat{j}$ (c) $-4\hat{i} + 6\hat{j}$ (d) $-4\hat{i} - 6\hat{j}$

2. The time taken by a block of wood, initially at rest to slide down a smooth inclined plane 9.8 m long (angle of inclination = 30°) is:

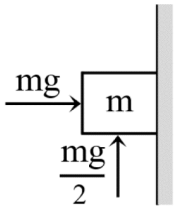


   (a) 1/2 s (b) 2 s (c) 4 s (d) 1 s

3. A wooden block is placed on an inclined plane. The block just begins to slide down when the angle of the inclination is increased to 45°. What is the coefficient of friction?

   (a) 0.25 (b) 0.75 (c) 1 (d) 0.5

4. A block pressed against a vertical wall is in equilibrium. The minimum coefficient of friction is:



   (a) 0.4 (b) 0.2 (c) 0.5 (d) 0.1

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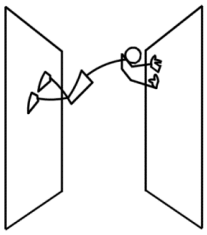
5. A man wants to remain in equilibrium by pushing his hands and feet against two vertical parallel walls as shown in the figure.

A. He must exert equal forces on both walls

B. The forces of friction at both walls must be equal

C. The coefficients of friction between man and wall must be the same at both ends

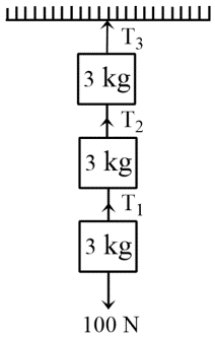
D. Friction must be present on both walls



(a) A and B are correct (b) A and C are correct

(c) A and D are correct (d) All correct

6. Three blocks of equal masses (each 3 kg) are suspended by weightless strings as shown. If the applied force is 100 N, then is equal to: ($g = 10\ m/s^2$)



(a) 130 N (b) 190 N (c) 100 N (d) 160 N

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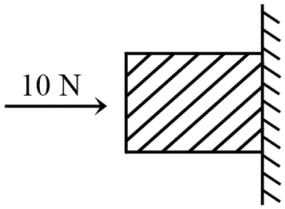
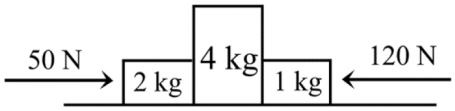
7. A horizontal force of 10 N is necessary to just hold a block stationary against a wall. The coefficient of friction between the block and the wall is 0.2 The weight of the block is



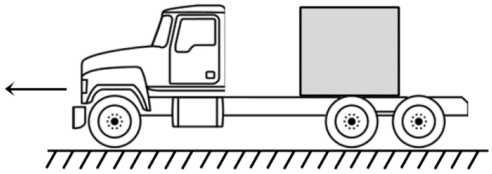
(a) 20N (b) 50N (c) 100N (d) 2N

8. Three blocks of masses 1 kg, 4 kg and 2 kg are placed on a smooth horizontal surface. If shown in the figure. Two horizontal forces 120 N and 50 N are applies on the system the acceleration of the system is



(a) 17.5 m/s^2 (b) 10 m/s^2 (c) 24.3 m/s^2 (d) 70 m/s^2

9. The rear side of a truck is open and a box of 40 kg mass is placed 5 m away from the open end as shown in the figure. The coefficient of friction between the box and the surface below itis 0.15. On a straight road the truck starts from rest and accelerates with 2 ms^{-2}. The distance travelled by the truck atthe time the box fall from it is (Ignore the size of the box)



(a) 20 m (b) 10 m (c) $\sqrt{20}$ m (d) 5 m

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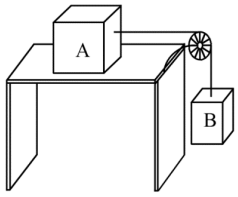
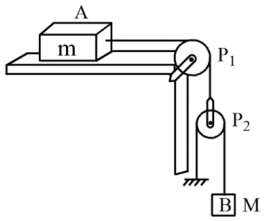
10. The blocks A and B are arranged as shown in the figure. The pulley is frictionless. The mass of A is 10 kg. The coefficient of friction of A with the horizontal surface is 0.20. The minimum mass of B to start the motion will be



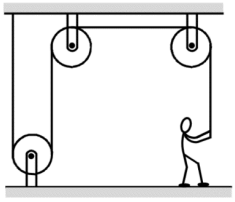
(a) 2 kg (b) 0.2 kg (c) 5 kg (d) 10 kg

11. The coefficient of static friction, between block A of mass 2kg and the table as shown in the figure is 0.2. What would be the maximum mass value of block B so that the two blocks do not move? The string and the pulley are assumed to be smooth and massless. ($g = 10\ m/s^2$)



(a) 2.0 kg (b) 4.0 kg (c) 0.2 kg (d) 0.4 kg

12. A 50 kg person stands on a 25 kg platform. He pulls on the rope which is attached to the platform via the frictionless pulleys as shown in the figure. The platform moves upward at a steady rate if the force with which the person pulls the rope is:



(a) 500 N (b) 250 N (c) 25 N (d) 50 N

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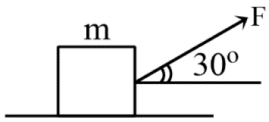
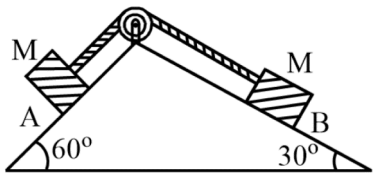
13. Mass m rests on a horizontal surface. The coefficient of friction between the mass and the surface is μ. If the mass is pulled by a force F as shown in the figure, the limiting friction between the mass and the surface will be:



(a) μ mg (b) $\mu[mg - (\sqrt{3}/2)F]$

(c) $\mu\,[mg - (F/2)]$ (d) $\mu\,[mg + (F/2)]$

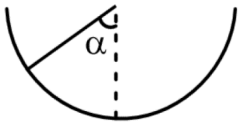
14. Two block each of mass M are resting on a frictionless inclined plane as shown in the figure. Then:



(a) The block A moves down the plane (b) The block B moves down the plane

(c) Both blocks remain at rest (d) Both the blocks move down the plane

15. An insect crawls up a hemispherical surface very slowly (seethe figure). The coefficient of friction between the insect and the surface is 1/3. If the line joining the centre of the hemispherical surface to the insect makes an angle with the vertical, the maximum possible value of α is given by



(a) $\cot\alpha = 3$ (b) $\tan\alpha = 3$ (c) $\sec\alpha = 3$ (d) $\operatorname{cosec}\alpha = 3$

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CHEMISTRY: DCT
Topic: Structure of Atoms + Periodic + Mole Concept

16. The number of nucleons in chlorine-37 is

(a) 17 (b) 20 (c) 54 (d) 37

17. What is the work function of the metal if the light of wavelength 4000 A generates photoelectrons of velocity $6 \times 10^5 ms^{-1}$ form it?
(Mass of electron = 9×10^{-31}kg, Velocity of light = $3 \times 10^8 ms^{-1}$, Planck's constant = 6.626×10^{-34}Js, Charge of electron = 1.6×10^{-19} JeV^{-1})

(a) 0.9 eV (b) 4.0 eV (c) 2.1eV (d) 3.1eV

18. The size of nucleus is of the order of

(a) 10^{-12}m (b) 10^{-8}m (c) 10^{-15}m (d) 10^{-10}m

19. The number of neutrons in the dipositive zinc ion (Mass no. of Zn=65)

(a) 35 (b) 33 (c) 65 (d) 67

20. A metal surface is exposed to solar radiations

(a) The emitted electrons have energy less than a maximum value of energy depending upon frequency of incident radiations
(b) The emitted electrons have energy less than maximum value of energy depending upon intensity of incident radiation
(c) The emitted electrons have zero energy
(d) The emitted electrons have energy equal to energy of photos of incident light

21. The number of unpaired electrons in the Fe^{3+} ion (atomic no. = 26) is

(a) 5 (b) 6 (c) 2 (d) 4

22. Uncertainty in the position of an electron (mass= 9.1×10^{-31}kg) moving with a velocity 300 m/s, accurate up to 0.001% will be: ($h = 6.63 \times 10^{-34}$ Js)

(a) 19.2×10^{-2} m (b) 5.76×10^{-2} m (c) 1.92×10^{-2} m (d) 3.84×10^{-2} m

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23. To which of the following is Bohr's theory applicable
(a) He^{+} (b) Li^{+2} (c) Tritium (d) Be^{+2}
The correct combination is
(a) III, IV (b) I,II,III,IV (c) I,II (d) I,II,III

24. Find the value of oxidation state of [Co in $Ag(Co(CO)_4]$:
(a) 1 (b) -1 (c) Zero (d) None of these

25. Which of the following reactions involve oxidation and reduction?
(a) $NaBr + HCl \rightarrow NaCl + HBr$ (b) $HBr + AgNO_3 \rightarrow AgBr + HNO_3$
(c) $H_2 + Br_2 \rightarrow 2\,HBr$ (d) $Na_2O + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

26. Manganese achieves its maximum oxidation state in its compound:
(a) MnO_2 (b) Mn_3O_4 (c) $KMnO_4$ (d) K_2MnO_4

27. Which statement is wrong?
(a) Oxidation number of oxygen is +1 in peroxides
(b) Oxidation number of oxygen is +2 in oxygen difluoride
(c) Oxidation number of oxygen is $-\frac{1}{2}$ in superoxides
(d) Oxidation number of oxygen is (-2) in most of its compounds

28. The incorrect order of decreasing oxidation number of S in compound is :
(a) $H_2S_2O_7 > Na_2S_4O_6 > Na_2S_2O_3 > S_8$
(b) $H_2SO_5 > H_2SO_3 > SCl_2 > H_2S$
(c) $SO_3 > SO_2 > S_8 > H_2S$
(d) $H_2SO_4 > SO_2 > H_2S > H_2S_2O_8$

29. The reaction $3ClO^{-}(aq) \rightarrow ClO_3^{-}(aq) + 2Cl^{-}(aq)$ is an example of :
(a) oxidation (b) reduction
(c) disproportionation (d) decomposition reaction

30. The oxidation number of an atom in a given species (molecule, ion or free atom) is the :
(a) actual charge of the atom
(b) valency of the atom
(c) formal charge of the atom
(d) actual charge of the atom if the atom exists as a monoatomic ion, or the hypothetical charge assigned to the atom in the species by simple rules.

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PHYSICS : DCT ANSWER KEY
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1.	(d)	2.	(b)	3.	(c)	4.	(c)	5.	(c)
6.	(a)	7.	(d)	8.	(b)	9.	(a)	10.	(a)
11.	(c)	12.	(b)	13.	(c)	14.	(a)	15.	(a)

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16.	(d)	17.	(c)	18.	(c)	19.	(a)	20.	(a)
21.	(a)	22.	(c)	23.	(d)	24.	(b)	25.	(c)
26.	(c)	27.	(a)	28.	(d)	29.	(c)	30.	(d)