

Part I

- Answer all the questions.
- Select the most suitable answer and underline it.

01. Which of the following element, is available in the human body with the highest percentage in weight?

- (1) Carbon (3) Oxygen
(2) Hydrogen (4) Nitrogen

02. Which of the following carbohydrate is available in human liver and in muscles?

- (1) Cellulose (3) Lactose
(2) Starch (4) glycogen

03. Which of the following material is hydrolized to supply two glucose molecules?

- (1) Lactose (3) Sucrose
(2) Maltose (4) Fructose

04. Deficiency of which of the following element creates weakness in teeth and bones?

- (1) Mg (2) Fe (3) Ca (4) K

05. The international unit for measuring weight is,

- (1) N (2) Kg (3) J (4) Pa

06. Which of the following quantity of a vehicle that travels in a uniform velocity is increasing uniformly?

- (1) Acceleration (3) Deceleration
(2) Displacement (4) Momentum

07. Which of the following is equal in the atoms ${}^{40}_{18}\text{Ar}$, ${}^{40}_{19}\text{K}$?

- (1) Number of protons (3) Number of neutrons
(2) Number of electrons (4) Mass number

08. In the sodium ion (Na^+)

- (1) There are 11 protons
(2) There are 11 electrons
(3) There are 12 protons
(4) There are 12 electrons

09. The velocity of an object which moved 50 m away along a straight line in 5s is,

- (1) 250 m s^{-1} (3) 45 m s^{-1}
(2) 55 m s^{-1} (4) 10 m s^{-1}

10. The maximum height that an object travels which is projected vertically upwards with an initial velocity of 10 m s^{-1} is, ($g = 10 \text{ m s}^{-2}$)

- (1) 5m (3) 15m
(2) 10m (4) 20m

11. Which of the following element is used to make nano structures?

(4) C

(1) H

(2) Si

(3) S

12. When which of the following value takes the velocity of an object with the mass 20 kg to have the momentum of 100 N m

(1) 80 m s^{-1}

(3) 5 m s^{-1}

(2) 50 m s^{-1}

(4) 2.5 m s^{-1}

13. Four oxides of elements in the third period are shown below. What is the weak acidic oxide out of them?

(1) Na_2O

(2) MgO

(3) P_2O_5

(4) Cl_2O_7

14. P, Q, R and S show four places where a horizontal force that can apply to push an almirah. What is the most suitable place through which the force can be applied?

(1) P

(2) Q

(3) R

(4) S



15. An object obtains an acceleration of 2 m s^{-1} when a force of 8 N is applied on it. The mass of the object is,

(1) 6 kg

(2) 4 kg

(3) 2 kg

(4) 1 kg

16. Which of the following statement is incorrect?

(1) The acceleration of an object is directly proportional to the unbalanced force act on it.

(2) The acceleration of an object is indirectly propotional to the mass of the object.

(3) An external unbalanced force does not act on an object which is at rest.

(4) There is an external unbalanced force to the direction of motion on an object that moves with a uniform velocity.

17. Which of the following instance needs the friction?

(1) Wearing of machine parts.

(3) Making coires using coconut fibre.

(2) Heating of machines

(4) Motion of a yacht.

18. Which of the following helps to maintain water balance and rigidity in plant cells?

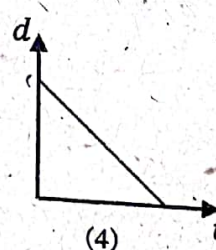
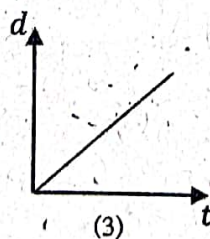
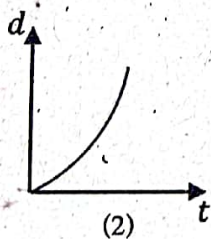
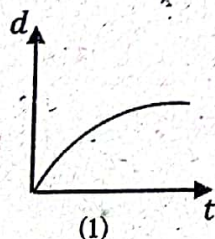
(1) Mitochondria

(3) Rhibosomes

(2) Vacuoles

(4) Golgi complex

19. Which of the following graphs shows the motion of an object with a deceleration?



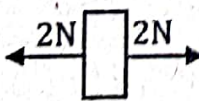
20. Which of the following instance does not use mitosis?

(1) Body growth of multicellular organisms

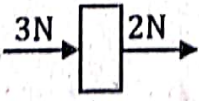
(2) Healing of wounds.

(3) Gamete formation

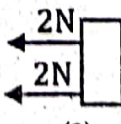
(4) Asexual reproduction of lower organisms.

21. The relative atomic masses of Mg and S respectively are 24 and 32. What mass of S contains the number of atoms present in 6g of g ?
- (1) 16 g (2) 8 g (3) 4 g (4) 2 g
22. Which of the following gas makes a colour change when it is sent through lime water?
- (1) H_2 (2) N_2 (3) CO_2 (4) CH_4
23. Which of the following microorganism uses flagella for its locomotion?
- (1) amoeba (2) euglena (3) paramecium (4) yeast
24. Which of the following organism's cells don't contain an organized nucleus?
- (1) Rhizobium (2) Chlamidomonas (3) amoeba (4) paramecium
25. Which of the following definition is most suitable for the word stimulus?
- (1) Maintaining the internal environment of the body constant.
 (2) A change in the internal or external environment.
 (3) A change in the internal or external environment which is strong enough to bring about a response.
 (4) Maintaining the coordination between organs in responding.
26. Which of the following plants makes seeds.
- (1) Cycas (2) Sellaginella (3) Marchantia (4) Beanduru
27. Which of the following compound shows the features shown below.
- Conducts electricity through aqueous solutions.
 - A solid crystalline compound.
- (1) CH_4 (2) NH_3 (3) $NaCl$ (4) CO_2
28. Which of the following instance applies a couple of forces?
- (1) Closing a door which is open (2) Removing a nut using a spanor.
 (3) Drawing water using a pulley. (4) Untying a lid which has threads.
29. In which of the following instance has the maximum resultant force on the object?
- 

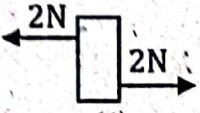
(1)



(2)



(3)



(4)
30. Which of the following statement is correct regarding the epididymis of humans?
- (1) It forms sperms.
 (2) It transports sperms.
 (3) It stores sperms temporarily.
 (4) It secrets the fluid needed to transport sperms.

31. A, B, C and D are four statements regarding the equilibrium of three inclined forces.
- A- The lines of action of the three forces meet at a common point.
 - B- The resultant of any two of the forces is equal to the third force in magnitude and opposite in direction.
 - C- The three forces are coplanar
 - D- The magnitude of the three forces is equal always.

The correct statements out of them are,

- (1) Only A and B
- (2) Only A and C

- (3) Only A, B and C
- (4) Only A, C and D

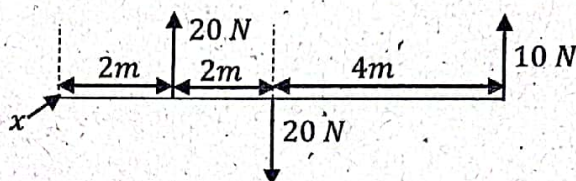
32. Which of the following answers shows the unit of momentum when expressed using fundamental units?

- (1) $kg\ m\ s^{-1}$
- (2) $kg\ m\ s^{-2}$

- (3) $kg\ m^{-1}\ s^{-2}$
- (4) $kg\ m^2\ s^{-2}$

33. The diagram below shows how forces act on a light rod. Which of the following answer shows the moment of forces around the point?

- (1) $20\ N\ m$, anticlock wise.
- (2) $40\ N\ m$, anticlock wise.
- (3) $80\ N\ m$, anticlock wise.
- (4) $120\ N\ m$, anticlock wise.



34. The new plant obtained by grafting,

- (1) shows only the features of the scion.
- (2) shows only the features of the stock.
- (3) shows both features of the scion and the stock.
- (4) doesn't show any feature of the scion and the stock.

35. Which of the following organisms is heterotrophic?

- (1) Chlamidomonas
- (2) Marchantia

- (3) Grass plant
- (4) Mucor

36. The relative atomic mass of carbon is 12. Which of the following answer shows the mass of one atom of Carbon?

- (1) $12\ g$
- (2) $6.022 \times 10^{23} \times 12\ g$

- (3) $\frac{12}{6.022 \times 10^{23}}\ g$
- (4) $\frac{6.022 \times 10^{23}}{12}\ g$

37. The velocity of an object with the mass m increases from V_1 to V_2 within time t . Which of the following answers shows the rate of changing the momentum of the object?

- (1) $m(V_2 - V_1)$
- (2) $\frac{m(V_2 - V_1)}{t}$

- (3) $m(V_2 - V_1)t$
- (4) $\frac{m(V_2 + V_1)}{t}$

38. The organism that belongs to the phylum Echinodermata is,

- (1) Starfish
- (2) Sea horse

- (3) Sea cobra
- (4) Sea cucumber

39. This causes due to the deficiency of iron and vitamin B

- (1) anaemia
- (2) tuberculosis
- (3) haemophilia
- (4) goiter

40. Which of the following is the direct effect due to controlling the usage of fuel consumption?

- (1) decreases the water foot print
- (2) decreases the carbon foot print
- (3) increases the water foot print
- (4) increases the carbon foot print

Extra reading time is 10 minits

- (vi) Existence of butterflies is important for the survival of flowering plants. Do you agree with this statement. Explain it,

.....
.....

(B) An organic cultivation and drop water management could be seen in this eco system.

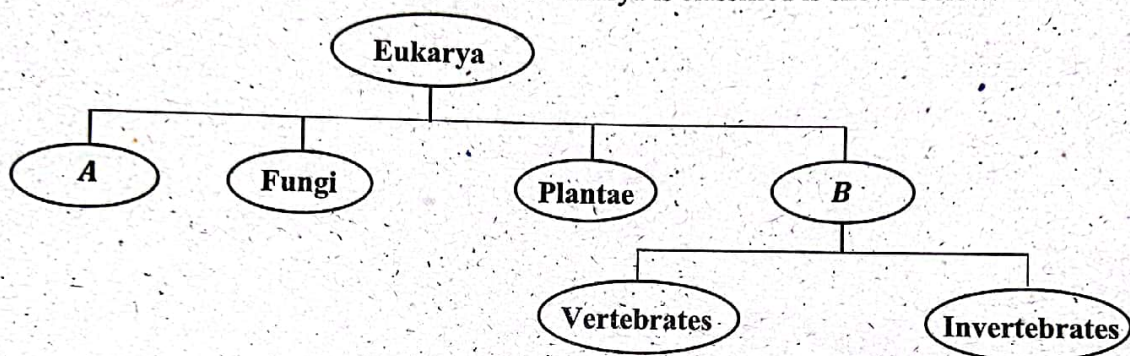
- (i) Mention two ways how organic cultivation helps for the well being of the soil.

.....
.....

- (ii) Mention the strategy used in this eco system to decrease the water foot print.

.....

02. (A) A rough diagram that shows how the domain eukarya is classified is shown below.



Answer the questions given below using the diagram given above.

- (i) Name the kingdoms shown as A and B in the above diagram.

A - B -

- (ii) Out of the four kingdoms above, name the two kingdoms that autotrophic organisms can be observed.

A - B -

- (iii) To which kingdom does the amoeba belong?

.....

- (iv) Do organisms shown in the diagram sensitive or not sensitive to antibiotics?

.....

(B) A tiger attacked a herd of deer which were grazing grass in a grassland. One of a deer was caught by the tiger while the other deers ran away.

- (i) Mention two characteristics that could be observed in living matter related to the above phenomena.

(a)

(b)

- (ii) Flesh of deer contains lipids and proteins.
 (a) Name the three elements that both these bio molecules contain.

 (b) What is the element that can be seen only in proteins?

 (iii) Mention two features that can be observed in the group mammalia from the deer and tiger.

 (iv) Mention the bio chemical reaction related to the nutrition of the grass plant.

03. The symbols belong to the elements in the third period are shown below.

Na	Mg	Al	Si	P	S	Cl	Ar
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- (i) Select the symbol of the element from the above chart relevant to each and every question below and write it on the dotted line.
 (a) The element which shows the least reactivity
 (b) The element which shows the maximum electronegativity
 (c) An amphoteric element
 (d) The element which makes a positive ion by removing an electron easily
 (e) The element that exists as a diatomic molecule
 (ii) Select the element which has chemical properties very similar to the chemical properties of the element Ne. Write the reason for it.

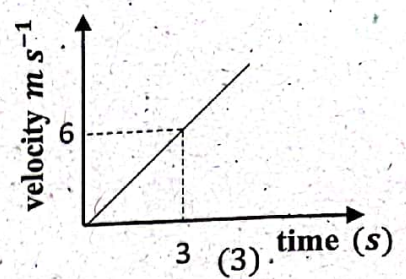
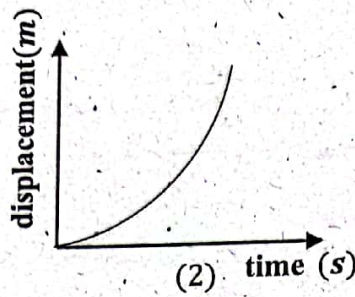
 (iii) Mention the symbols of the two elements out of the above eight elements that have the valency one.

 (iv) Mention,
 (a) the formula
 (b) a feature that can be seen
 in the compound made by combining Mg and Cl
 (v) A molecule is made by combining C and Cl.
 (a) How many covalent bonds are there in it?
 (b) How many lone pairs are there in it?

(1), (2) and (3)

displacement (m)

(1) time (s)



- (i) Name the two graphs that show objects moved with an acceleration.
- (ii) (a) What is the physical quantity described by the gradient of the graph (1)?
- (b) Find the displacement done by the object in 5 seconds, if the gradient of the graph (1) is 10 m s^{-1} .
- (iii) Find the rate of change of velocity of the object using the data shown by graph (3).

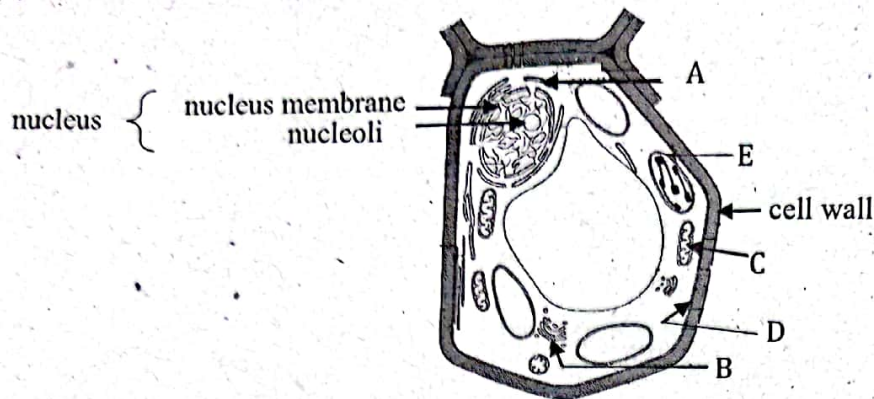
The diagram shows a beam balance with two pans, A and B, supported by a horizontal beam. A rod is placed across the beam, with its left end at point P and its right end at point Q. The distance between P and Q is labeled as 2.0 m. A cylinder is placed on pan A, with its center at a distance x from point P. A downward arrow labeled W represents the weight of the cylinder. The rod is labeled 'rod' and has a point y on its right end. The beam is supported by two circular bases, A and B, which are shown with arrows indicating they can rotate.

- (i) What are the forces act to balance the rod?
.....
- (ii) The reaction of the rod through the point x is P and through the point Y is Q . Find them.
 $P =$ $Q =$
- (iii) What is the weight (W) of the rod?.....
- (iv) The resultant moment through the point x due to W and Q forces is zero. So find the distance to the center of gravity of the rod from x .

Part B - Essay

- Answer only three questions out of questions no; 5,6,7,8,9

05. (A) The diagram below shows an electron microscopic diagram of a typical plant cell.



- Name A, C and D in the diagram.
- E does photosynthesis.
 - What organelle is represented by E?
 - What substance present in E absorbs light energy needed for it?
- Mention two functions done by the nucleus.
- What part shown in the diagram is built up of cellulose?
- The action taken place in C is shown by the incomplete reaction below.

$$C_6H_{12}O_6 + P \longrightarrow \text{energy} + Q + \text{water}$$
 Name P and Q.
- Name the component present mostly in the cell sap?
- Name a structure or an organelle present in the diagram that cannot be seen in a typical animal cell.

(B) The diagrams (1) and (2) below show two cyclic processes taken place simultaneously in the body of a woman who is not pregnant

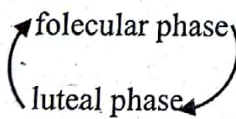


diagram (1)

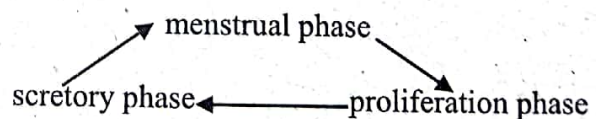
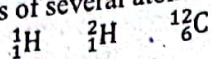


diagram (2)

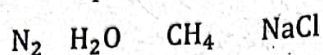
- Connected with what parts of the reproductive system of a woman do the processes shown by the diagrams (1) and (2) take place?
- Name the two hormones that control the process shown by diagram (1)
 - Name the endocrine gland that secretes them.
 - The concentration of what hormone (in the blood) given below will be in a relatively higher value in the secretory phase shown in the diagram (2)
 - Oestrogen
 - Progesterone
- How many days will be taken to complete a cycle described above?
 - After commencing the cycle (1), how long will it take to release ova completing the follicular phase?

06. (A) Three standard symbols of several atoms of elements are shown below.



- (i) Mention
 - (a) similarity (b) dissimilarity
 that can be seen in the two atoms ${}^1_1\text{H}$ and ${}^2_1\text{H}$
- (ii) What do you call the atoms ${}^1_1\text{H}$ and ${}^2_1\text{H}$?
- (iii) Answer the following questions regarding the atom ${}^{12}_6\text{C}$
 - (a) How many neutrons are there in this atom?
 - (b) How many electrons are there in the last energy level of this atom?
- (iv)
 - (a) 12.00 g of ${}^{12}_6\text{C}$ is measured correctly. How many atoms are there in it?
 - (b) In how many grams of the variety ${}^1_1\text{H}$ has the similar number of atoms of above?
 (The relative atomic masses of ${}^{12}_6\text{C}$ and ${}^1_1\text{H}$ are 12 and 1 respectively)

(B) Chemical formula of four compounds are shown below.



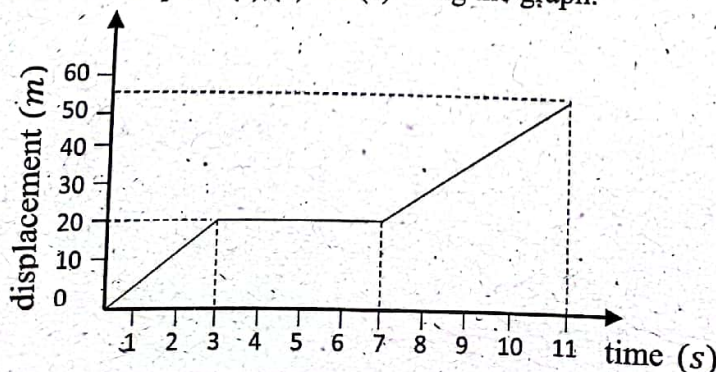
- (i) Of the above substances
 - (a) What is the element present with covalent bonds?
 - (b) What are the two compounds present with covalent bonds?
 - (c) What is the compound with ionic bonds?
- (ii) Draw the lewis structure of a molecule of the substance you mentioned in part (i), (a).
- (iii)
 - (a) Name the two kinds of ions present in a crystal of a substance you mentioned in part (i), (c)
 - (b) Mention the immediate noble gaseous configuration possessed by each and every above mentioned ions.
 - (c) Answer the following questions related to the two compounds NaNO_3 and $\text{Ca(NO}_3)_2$.
 - (i) Mention the valencies of the ions mentioned below.
 - (a) sodium ion
 - (b) calcium ion
 - (c) nitrate ion (the radical nitrate)
 - (ii) Mention the formula of aluminium nitrate if the valency of aluminium ion is 3.

07. (A) (i) Name the physical quantities mentioned below.

- (a) The distance travelled by an object in a unit time.
- (b) The rate of change of displacement of a moving object
- (c) The rate of change of velocity of a moving object.

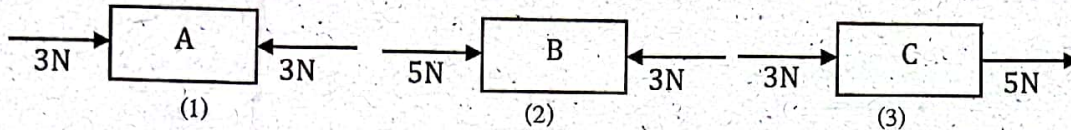
(ii) Mention the standard international unit of the physical quantity you mentioned in part (i) (C) above.

(iii) The graph below shows how the displacement of an object moving along a straight line varies with the time. Answer the parts (a), (b) and (c) using the graph.



- (a) What is the time that the object was at rest while moving?
- (b) (i) In which instance within the two-time durations given below is the velocity of the object higher?
 (1) $(0 - 3)s$ (2) $(7 - 11)s$
 (ii) Explain your answer using the graph.
- (c) Considering the whole motion,
 (i) Find the total displacement of the object.
 (ii) Find the normal velocity of the object.

(B) A, B and C show three objects on which two forces act on the same lines of action.



- (i) Mention the magnitude of the resultant forces act on the objects in the instances (1) and (3).
- (ii) In the instance (2), object moves. If so,
 (a) Mention the nature of the motion of the object.
 (b) If the mass of the object B is 1 kg, find the value of the physical quantity you mentioned in part (a)
 (c) Will the value of the physical quantity you mentioned in part (b) above increase or decrease, when the above mentioned system of forces apply on B keeping another 1kg extra mass on it?
- (iii) What is the object out of A, B, and C that behaves according of the newtons first law.

08. (A) It was observed two kinds of flowers as staminate flowers and pistilate flowers in a bottle gourd creeper. Number of staminate flowers was higher than the number of pistilate flowers.

- (i) Is the bottle gourd plant monocious or dioecious?
- (ii) (a) by self pollination or cross pollination is the bottlegourd flowers pollinated?
 (b) Write an observation that proves it using the paragraph.
- (iii) Mention the pollinating agent of the bottle gourd plant.
- (iv) Explain the advantage obtained by having more staminate flowers than pistilate flowers.
- (v) The rough diagrams of the two kinds of flowers are shown below.



diagram (1)



diagram (2)

- (a) Mention the number of the diagram that represents pistilate flowers and staminate flowers separately.
- (b) What is the specific process that should be taken place to convert ova into seeds in pistilate flowers after pollination?
- (c) After completing the process you mentioned in part (b) above, to what structure does the ovary of pistilate flower convert?

(B) An object which is projected vertically upwards with an initial velocity of 30 m s^{-1} , comes to the initial position after completing its motion. (acceleration due to gravity is $= 10 \text{ m s}^{-2}$)

- (i) Draw the velocity – time graph that represents the motion of the object.
- (ii) Find the things below using the graph you drew.
 - (a) What is the maximum height the object rises?
 - (b) What is the total distance that the object travels?
 - (c) What is the total displacement of the object?
- (iii) What is the correct statement out of (a) and (b) that represent the whole motion of the object.
 - (a) The object travels with an acceleration of 10 m s^{-2} during the whole time duration of motion.
 - (b) The object travels with an acceleration of -10 m s^{-2} during the whole time duration of motion.
- (iv) If the object was projected vertically upwards with an initial velocity of 40 m s^{-1} , what is the extra height that the object rises?

09. (A) Electronic configurations of four hypothetical elements are shown below. Answer the following questions using them.

A – 2, 1

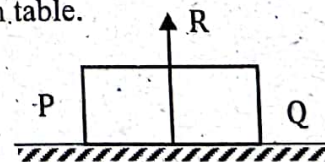
E – 2, 7

D – 2, 8, 1

G – 2, 8, 7

- (i) What is more electropositive element out of A and D?
- (ii) What is more electronegative element out of E and G?
- (iii) What are the two elements that should react together to make the compound with the most strong ionic bonds?
- (iv) The element G can be observed in the natural environment as molecules. Show in a dot-cross diagram the nature of bond structure of a molecule of G.
- (v) The mass number of D is 23.
 - (a) How many electrons are there in an atom of D?
 - (b) How many neutrons are there in an atom of D?
 - (c) Represent the element D in a standard way using the atomic number and mass number of it

(B) The diagram below shows a block of wood which is kept rest on a rough table.



- (i)
 - (a) Explain the force R.
 - (b) What is the value of R?
- (ii) The block of wood was further at rest in an instance of applying a force of 4N to the direction shown as Q.
 - (a) Mention the kind of frictional force act in this instance.
 - (b) What is the magnitude of it?
 - (c) What is the direction of it?
- (iii) When the force applied to the direction of Q is increasing, the block of wood begins to move in the instance when the force is 7N.
 - (a) What is magnitude of the frictional force act in this instance?
 - (b) What do you call it?
- (iv)
 - (a) What do you call the frictional force that act in the instance of moving the block of wood uniformly on the table to the direction of Q?
 - (b) Is the value of it high or low to the value of part (iii), (a) above?



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