



Part I (55 marks)

1-List six functions of bone in the body, What are the major components of bone?
(8 marks)

2- Assume a leg has a 1.2 m shaft of bone with an average cross-sectional area of 3 cm^2 ($3 \times 10^{-4} \text{ m}^2$) what is the amount of shortening when all of the body weight of 700 N is supported on this leg? Young's modulus of bone is ($1.8 \times 10^{10} \text{ N/m}^2$).
.....(8 marks)

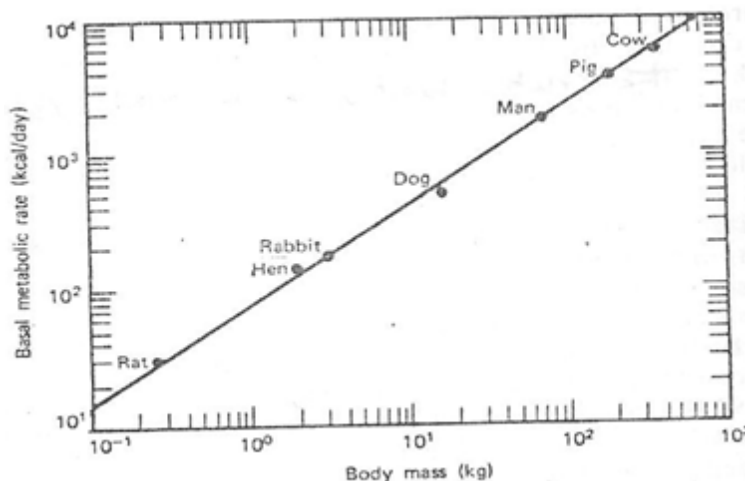
3- Calculate the pressure in millimeters of mercury equal to a pressure of 20 cm H_2O .
.....(8 marks)

4-Explain four Factors affecting BMR.(5 marks)

5- For a hypothetical animal that has a mass of 700 Kg.(10 marks)

a) Use Fig. below to estimate the basal metabolism rate.

b) Assuming 5Kcal /g of food, estimate the minimum amount of food needed each day.



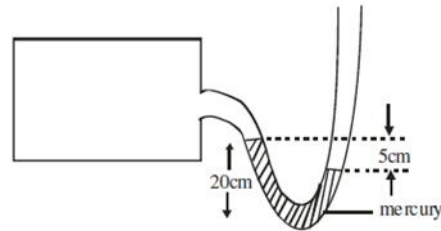
6-By what percent dose your metabolic rate increase if you have a fever 1.5°C above normal?
.....(8 marks)

7- Why can arteries with small diameter have thinner walls than arteries with large diameters carrying blood at the same pressure ?
.....(8 marks)

Part II (45 marks)

1. In the arrangement shown in the fig. below, the pressure inside the box is:
(atmospheric pressure = 76 cm of mercury)

- a) 82 cm of mercury
- b) 76 cm of mercury
- c) **71 cm of mercury**
- d) cannot be said definitely



2. When we say that this part of the body has a negative pressure, we mean that its pressure is:

- a) Above atmospheric pressure.
- b) **Below atmospheric pressure.**
- c) Equal to atmospheric pressure.
- d) None of the above.

3- At a fixed temperature, gas volume is inversely related to its pressure. This is called:

- a) Henry's law.
- b) **Boyle's law.**
- c) Dalton's law.
- d) Charles' law.

4- The lever of joint between the skull and the atlas vertebra represents

- a- First class.
- b- Second class .
- c- Third class.
- d- Non of the above.

5- Which one of the following forces has a medical effect in the formation of varicose veins in the legs

- a- Electrical force.
- b- Magnetic force.
- c- Nuclear force.
- d- Gravitational force .

6- Acceleration of the body produces a number of effects such as

- a- decrease in body weight.
- b- changes in internal hydrostatic pressure.
- c- distortion of the elastic tissues of the body.
- d- All of the above.

7- When the foot leaves the ground, the frictional component of force, F_H

- a- Prevents the foot from slipping forward.
- b- Provides the force to decelerate the body forward.
- c- Prevents the foot from slipping backward .
- d- Non of the above.

8-The amount of energy (per kcal) that is released after combustion of 20 g of fat and 50 g of carbohydrate is:

- a- 233 kcal
- b- 285 kcal
- c- 323 kcal
- d- 391 kcal

9- Suppose you wish to lose 4.54 kg. How long would you have to work at an activity of 15 kcal/min to lose 4.54 kg of fat?

- a- 27 hours
- b- 37 hours
- c- 47 hours
- d- 57 hours

10- Suppose that elevator is broken in the building in which you work and you have to climb 8 floors – a height of 20 m above ground level. How many calories will this work cost you if your mass is 70 kg and your body works at 14 % efficiency ?

Assume : $g = 10 \text{ m/sec}^2$, 1 Calorie = 4 joul

- a- 20 kcal
- b- 25 kcal
- c- 30 kcal
- d- 35 kcal

11- What is the physiological change that occur after increase in core temperature of the body ?

- a- Blood flow to skin increases, so the skin gets warm.
- b- Sweating is decreased, so the skin gets warm.
- c- The rate of breathing is decreased to prevent heat loss by the lungs.
- d- Decrease heart rate.

12- The value of the coefficient of friction between two surfaces is independent of

- a- The surface area of the two materials in contact.
- b- The two materials in contact.
- c- The normal force.
- d- The mass of the block.

13- The pressure generated by right ventricles (25 mm Hg) is 5 times less than of left ventricle (120 mm Hg) , both of them eject the same volume of blood (80 ml of blood) because of

- a- The resistance of cardiac system is less than the resistance of pulmonary system.
- b- The resistance of cardiac system is more than the resistance of pulmonary system.
- c- The resistance of cardiac system is equal to the resistance of pulmonary system.
- d- Non of above.

14- The blood pressure for a normal person is:

- a- 80 / 120 cm.Hg.
- b- 120 / 80 cm.Hg.
- c- 120 / 80 mm.Hg.
- d- 80 / 120 mm.Hg.

15- The more efficient muscle which produce high pressure in human heart is found in:

- a- Right atrium.
- b- Right ventricular.
- c- Left atrium.
- d- Left ventricular.