



Answer sheet

Final exam. 1st attempt

Part one: MCQ questions

Q1) Choose the most appropriate answer:

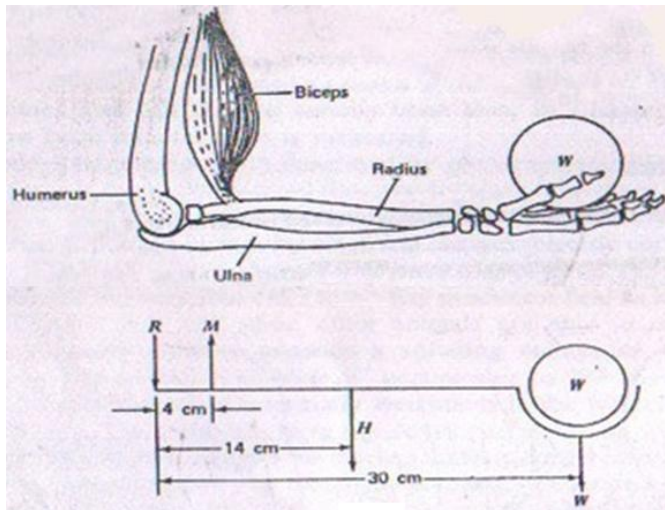
1. Regarding X-ray, one of the following is true:
 - a) It is a beam of electrons.
 - b) It travels at speed of light.**
 - c) It has a negative charge.
 - d) It can be focused by magnets.
2. Regarding the production of Bremsstrahlung radiation of X-ray, one of the following is false:
 - a) In diagnostic radiography, only a small portion of the x-rays are bremsstrahlung x-rays.**
 - b) It can be produced at any projectile electron energy.
 - c) The projectile electron misses all of the orbital electrons and comes close to the nucleus and slows down.
 - d) It is also called braking radiation.
3. When a beam of X-rays passes through a body tissue, an energy is given to the tissue. Ionization of the tissue's atoms occurs when:
 - a) An electron is raised to a higher energy level within the atom.
 - b) An electron is removed from the atom.**
 - c) An electron is dropped to a lower energy level within the atom.
 - d) None of the above.
4. The pressure resulting from applying a normal force of 2000 N on an area of 2 m² is:
 - a) 2000 Pascal.
 - b) 1000 Pascal.**
 - c) 500 Pascal.
 - d) 100 Pascal.

5. What height of water will produce the same pressure as 100 mm Hg? Consider the density of water is 1 g/cm^3 , density of mercury is 13.6 g/cm^3 and the acceleration of gravity is 980 cm/sec^2 .
- a) 125 cm H_2O .
 - b) 136 cm H_2O .**
 - c) 166 cm H_2O .
 - a) 150 cm H_2O .
6. When you measured the body temperature of a patient, it was 35°C . This is equal to:
- a) 85°F .
 - b) 90°F .
 - c) 95°F .**
 - d) 100°F .
7. A thermistor is:
- a) A resistor that changes its resistance rapidly with change in temperature.**
 - b) A resistor that changes its resistance with change in incident light intensity.
 - c) A resistor that changes its resistance with change in stain applied on it.
 - d) A constant resistor that doesn't change with change in temperature.
8. The amount of energy (per Kcal) that is released after combustion of 20 gm of fat and 50 gm of carbohydrate is: (Consider that each 1 g of fat releases 9 Kcal and each 1 g of carbohydrate releases 4 Kcal.)
- a) 230 Kcal
 - b) 280 Kcal**
 - c) 320 Kcal
 - d) 390 Kcal
9. What is the physiological change that occurs after an increase in the 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.
10. During resting membrane potential:
- a) The inside of the cell is more positive than outside.
 - b) The outside of the cell is more negative than inside.
 - c) The inside of the cell is more negative than outside.**
 - d) None of the above

11. One of the important medical effects of gravitational force is:
- a) **The formation of varicose veins in the legs.**
 - b) Heart failure.
 - c) Losing bone minerals due the heavy weight of our bodies.
 - d) Muscle contraction.
12. In the centrifuge, the sedimentation velocity of the small particles is increased because:
- a) **The acceleration is artificially increased.**
 - b) The viscosity of the liquid through which the small particles are passing is decreased.
 - c) The density of the liquid through which the small particles are passing is decreased.
 - d) The density of the small particles is increased.
13. During the process of diffusion, the molecules move:
- a) From the area of low concentration to the area of high concentration.
 - b) **From the area of high concentration to the area of low concentration.**
 - c) Between the areas of the same concentrations.
 - d) None of the above.
14. Consider a closed liter container of dry air at atmospheric pressure (760 mm Hg) that contains 78% N₂, 20% O₂, 1% CO₂ and 1% of other gases. The partial pressure of O₂ is equal to:
- a) 100 mm Hg.
 - b) **150 mm Hg.**
 - c) 200 mm Hg.
 - d) 250 mm Hg.
15. The amount of gas dissolve in liquid is directly proportional to the partial pressure of the gas. This law is called:
- a) **Henry's law.**
 - b) Boyle's law.
 - c) Charles' law.
 - d) Dalton's law.

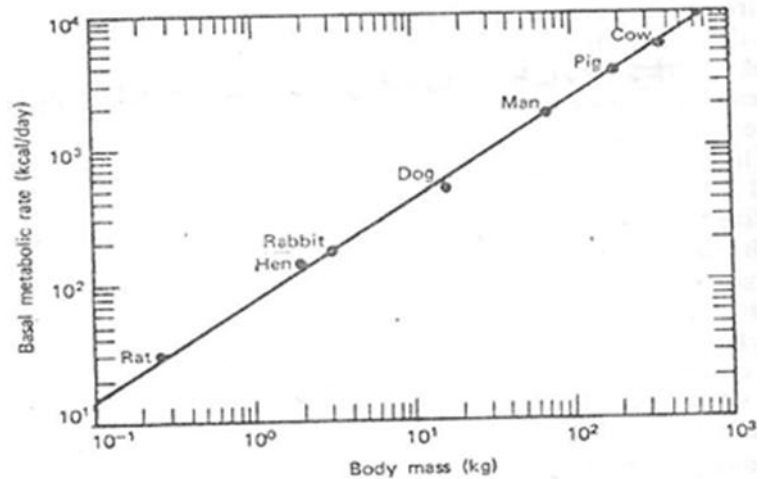
Part two: short assay questions

Q2) Find the equation of net torques about the joint R: (see Fig. below)



Q3) For a hypothetical animal that has a mass of 700 Kg:

- Use Fig. below to estimate the basal metabolism rate.
- Assuming 5Kcal /g of food, estimate the minimum amount of food needed each day.



Q4) What is negative pressure? Mention one place in human body where the pressure is negative.

Q5) Why can arteries with small diameter have thinner walls than arteries with large diameters carrying blood at the same pressure?

Q6) Calculate the velocity of blood in an artery of 0.8 cm in diameter? consider:

- i. η = viscosity of blood = 3×10^{-3} to 4×10^{-3} pas.
- ii. ρ = density of blood = $1.04 \times 10^3 \text{ kgm/m}^3 = 1.04 \text{ gm/cm}^3$
- iii. r = Radius of blood vessels.
- iv. K = Renold No. = 1000

Q7) In x-ray absorption by living cell molecules, list three Forms of X-ray Interactions that are Important for Diagnostic X-ray.

Q8) What are the two types of electrical potentials of the nerves? Numerate them only.