

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF MEDICINE

MEDICAL SCHOOL

BACHELOR OF MEDICINE AND BACHELOR OF SURGERY DEGREE
PART 1 SUPPLEMENTARY EXAMINATIONS

(MHO 1101) : PHYSICS AND PHYSIOLOGICAL MEASUREMENTS

DATE : JANUARY 2006

TIME : 3 HOURS

Instructions to Candidates

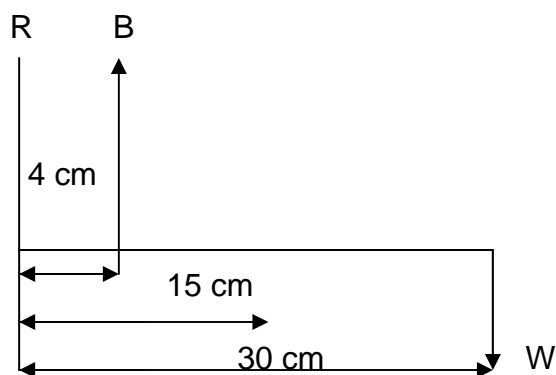
1) Answer all questions

- 1 Describe the role of second messengers in hormone action. (20)
- 2 How does insulin exert its effects in the liver and skeletal muscles in order to maintain near constant glucose levels in the body? (20)
- 3 Briefly explain the following terms:
 - a) hypoxia (4)
 - b) dehydration (4)
 - c) frost bite (4)
 - d) heat exhaustion (4)
 - e) glomerular filtration rate. (4)
4. Write short notes on the following:
 - a) fever (4)
 - b) functions of the pineal gland. (3)
5. Name three sources of ionizing radiation. (3)
6. What are the biological effects of radiation on DNA? (3)
7. Name two defects of vision. The near point of a certain eye is 100 cm

in front of the eye. What lens should be used to see clearly an object 25cm in front of the eye? (4)

8. Calculate the Nernst potential for a resting cell at room temperature (20°C) when the concentration of potassium inside the cell ($[\text{K}^+]_i$) is 125mM (millimolar) and the concentration outside ($[\text{K}^+]_o$) is 8mM. R , the universal gas constant is equal to 8.314 J/Kmol. (4)

9. What do you understand by moment of a force? Figure 1 below is schematic diagram of a forearm holding a weight W of 25 N. R is the reaction force at the elbow, B is the muscle force for the biceps and $G = 20$ N is the weight of the forearm. Calculate B and R . (6)



10. Distinguish between heat and temperature. Why is the process of heat transfer important in temperature measurement? (6)
11. What is diffusion rate? (4)
12. Show that the relative diffusion rate for two different molecular species is given by: (5)

$$\frac{\text{diffusion rate of A}}{\text{diffusion rate of B}} = \sqrt{\frac{m_B}{m_A}}$$

END OF EXAMINATION