2008

HUMAN PHYSIOLOGY

PAPER—II

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

Write the answers question of each Unit in separate books

UNIT—03

Answer any *two* questions of the following

1. (*a*) Explain why laminar flow is silent, whereas turbulent flow is noisy.

   (*b*) Does viscosity play any role in the maintenance of laminar flow ?

(*c*) What does Poiseuille's equation indicate ?

(*d*) What do you mean by poise ? $2 + 3 + 4 + 1$

2. (*a*) What is the mechanical power of the heart ? How do you calculate it if the mean blood pressure is 100 mm Hg, cardiac output is 6 L and heart rate is 75 BPM ?

(*b*) Explain why the resistance to flow in kidney is too high compared to the total peripheral resistance of the body. $(1 + 4) + 5$

3. (*a*) What do you mean by acoustic impedance and acoustic lens ?

(*b*) What is the attenuation of sound intensity by 1 cm of bone at 1·2 MHz (HVT is 0·21 at 1·2 MHz) ?

(*c*) Discuss about the basic principle of ultrasound therapy. $(1\frac{1}{2} + 1\frac{1}{2}) + 3 + 4$

4. (*a*) What do you understand by radio-isotopes and stable isotopes ?

(*b*) Write down the nuclear reaction of positron emission.

(*c*) What do you mean by decay constant and half-life?

(*d*) K^{40} ($t_{1/2} = 1{\cdot}3 \times 10^9$ yr) constitutes 0·012% of the potassium in nature. The human body contains about 0·35% potassium by weight. Calculate the total radioactivity resulting from K^{40} decay in a 75 kg human.

$1\frac{1}{2}+1\frac{1}{2}+(1\frac{1}{2}+1\frac{1}{2})+4$

UNIT—04

Answer any *two* questions of the following

1. (*a*) State the principle of design of biotelemetry system.

(*b*) What is transformer voltage of a electro-magnetic blood flow transducer. Mention how the transformer voltage is rejected in a electro-magnetic blood flow meter. 4 + 6

2. (*a*) Give a brief account of the different types of transducers used for the measurement of body temperature.

(*b*) Mention the working principle of a non-metallic temperature transducer. 6 + 4

3. (*a*) What do you mean by activity co-efficient? What will be the pH of 10^{-7} M HCl solution?

(*b*) Discuss the principle of measuring blood pH by potentiometric method. (1 + 4) + 5

4. (*a*) Describe the principle of ultrasound imaging by B-scan.

(*b*) Briefly discuss about the pulse transducer.

(*c*) Discuss why quenching agent is essential for G.M. counter. $5 + 2\frac{1}{2} + 2\frac{1}{2}$