2017

M.Sc.

1st Semester Examination

HUMAN PHYSIOLOGY

PAPER—PHY-102

Subject Code—30

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

(Unit—03)

Answer *all* questions from the following :

1. (a) Discuss briefly the differences between Newtonian and Non-Newtonian fluids.

(b) Define Reynold's number.

(c) In what conditons laminar flow of blood is converted to turbulent flow in cardiovascular system. 2+1+2

Or

(a) Derive the Poiscuille's equation for fluids through rigid tubes.

(b) What is capacitance verseles ?

(c) A patient receives a blood transfusion through a needle of radius 0.2 mm and length 2 cm. The bottle supplying the blood is 0.5 mm. above the patient's arm. The density of blood is 1050 Kg lm^3. What is the rate of flow through the needle ? 2+1+2

[Coefficient of viscosity of blood = 2.7×10^{-3} N&lm^2]

2. (a) Shortly discribe the different phases of glottal cycle during phonation.

(b) The aerodynamic theory is based on the "Bernocilli's energy law"— Justify the statement.

(c) What do you mean by articulation ? 2+2+1

Or

(a) Critically write the wave and particle model of light properties.

(b) What is Snell's law ?

(c) Write the application of reduced eye ? 2+1+2

3. (a) Discuss the difference between living and non-living systems in relation to thermodynamic-system.

(b) Cite the characteristics of living system according to the laws of thermodynamics.

(c) What is a adiabatic process ? 2+2+1

Or

(a) What is bioluminescence ?

(b) Enumerat the chemical reaction of bioluminescence.

(c) Specifically discuss the role of Calcium (Ca^{2+}) ion during bioluiminescence reaction. 1+1+3

4. (a) What is ultra-sound ?

(b) How can you calculate the speed or velocity of ultra-sound ?

(c) Describe the non-thermal effects of therapeutic ultra-sound. 1+1+3

Or

(a) What is ferroelectricity ?

(b) Classify and describe ferroelectricity on the polarization.

(c) Write the biomedical application of ferroelectric materials. 1+3+1

(Unit—04)

Answer *all* questions from the following :

1. (a) Write the principle of Laser Doppler blood flow meter.

(b) Write the advantages of square wave electromagnetic blood flow meter.

(c) Explain the time domain velocity measurement concept of ultrasonic blood flow meter. 1+2+2

Or

(a) What is half cell potential ?

(b) With a suitable diagram describe the basic components of a microprocessor based ECG machine.

(c) What do you mean by contact impedance ? 1+3+1

2. (a) Write the working principle of stow-severinghaus PCo_2 sensor with suitable diagram.

(b) What do you mean by pulse oxymetry ?

(c) Write a short note on capnography. 2½+1+1½

Or

(a) What do you understand by condenser of microscope ?

(b) Define refractive index ?

(c) Calulate the angular resolution (θ) of compound microscope. Co-relate this resolution with spatial resolution (Δl). 1+1+(1+2)

3. (a) Describe the signaling process of telemetry system with special references to Time-Division Multiplexing (TDM).

(b) Classify different types of modulation during telemetry signal processing.

(c) Draw and identify the miniaturized telemetry capasule. 2+2+1

Or

(a) Write the classification and features of different types of MRI ?

(b) Describe the working principle of MRI.

(c) What type of contrasting agent used during MRI processing. 2+1+2

4. (a) Describe the different components of transducer with suitable diagram.

(b) What do you mean by transducer Q factor.

(c) Write the application of differential pressure sensor. 3+1+1

Or

(a) Describe the instrumental design and functions of audiometer.

(b) What is Short Increment sensitivity Index (SISI) test ?

(c) Write a short note on audiogram. 2½+1+1½
