

**2016**

**M.Sc.**

**3rd Semester Examination**

**HUMAN PHYSIOLOGY**

**PAPER—PHY-301**

*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—25 )**

Answer all questions from the following :

1. (a) Write the importance of Nernst equation. How do you deduce Nernst equation. 1+4

*(Turn Over)*

Or

"The resting membrane potential is close to the value predicted by the Nernst equation of potassium but not exactly the same"— Explain with experimental evidence. Mention the approximate value of ' $E_{Na}$ '.

4+1

2. Describe the ultrastructure of an ion channel. What is the gating mechanism of  $Na^+$  Channel? 3+2

Or

Discuss the general mechanism of transduction of a receptor. 5

3. Explain briefly the dipole hypothesis for the generation of ECG potential.

Or

State electrocardiographic manifestations during myocardial infarction (MI).

What do you mean by first degree heart block?

4. Discuss EEG changes during different stages of sleep.

5

Or

What is motor unit action potential? State the role of tissue filtering, muscle fiber length and muscle temperature in modifying motor unit action potential.

2+3

**( Unit—26 )**

Answer all questions from the following :

1. (a) Classify and state the functions of tactile receptors in the skin with suitable labeled diagram.
- (b) "Modality of sensation is encoded by a labeled line Code"— Explain it.
- (c) What do you mean by receptor field?

(1+2)+1+1

Or

- (a) Write the name and functions of peripheral somatosensory axons.
- (b) Briefly describe the vascular organisation (blood supply) of thalamus.
- (c) Write the functions of intralaminar nuclei. . 2+2+1
2. (a) Give a brief account of retinal neural circuitry of human eye.
- (b) Mention the magnocellular distribution in LGN.

4+1

Or

- (a) What are primary and secondary Visual area of Cerebral Cortex? Write their importances.
- (b) Write briefly on the dorsal stream of transmission of visual signal. (1+2)+2
3. (a) Briefly discuss the Hermann Helmholtz "place theory" of hearing.

- (b) Write the biophysical significance of cochlear amplification.
- (c) What do you mean by pitch perception. 2+2+1

Or

- (a) Describe shortly the three levels of multipitch analysis.
- (b) With suitable labeled diagram mention the compartments of stria vascularis of inner ear.
- (c) Write the role P<sub>2</sub>Y Receptor during auditory signal transduction. 2+2+1
4. (a) Discuss the sensory transduction mechanism of sour and umami taste.
- (b) What do you understand by "labelled line" and "across fibre pattern" theory of taste quality.

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

Or

- (a) How can you study the odour responses in the olfactory bulb by radiolabelled 2-deoxyglucose uptake method.
- (b) What do you understand by combinational coding of specific odorants ?
- (c) Define olfactory acuity. 2+2+1