

**M.Sc. 3rd Semester Examination, 2019**

**PHYSIOLOGY**

( *Human Physiology* )

PAPER —PHY-301

*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*

UNIT — PHY-301.1

[ *Marks : 20* ]

1. Answer any *two* questions from the following :  $2 \times 2$

- (a) Write the functions of middle ear during sound transmission. Eustachian tube act as an "equalizer" of sound transmission — Explain it briefly.

1 + 1

- (b) What are the functions of basal cells in olfactory epithelium ? Define short term desensitization of olfaction. 1 + 1
- (c) Explain the lead configuration of standard bipolar leads of ECG. What is ventricular activation time ? 1 + 1
- (d) What do you understand by gustatory cross-adaptation ? Mention the factors that affect taste sensitivity. 1 + 1

2. Answer any *two* questions from the following :  $4 \times 2$

- (a) Describe briefly the anatomical organization and functions of cochlear nucleus as a part of auditory pathway. 2 + 2
- (b) Describe the role of shearing forces created in between hair cells and tectorial membrane at the time of basilar membrane displacement. How is action potential, which is auto-rhythmic in nature, produced in SA nodal fibers. 3 + 1

(c) Write briefly about the transduction mechanism of sour and sweet taste. Describe in brief the neural coding in the taste system. 2 + 2

(d) Briefly discuss the mode of action of bipolar cells in retinal circuitry. What are horizontal cells ? 3 + 1

3. Answer any *one* question from the following :  $8 \times 1$

(a) Discuss the molecular basis of olfactory transduction. What are TAAR receptors ? Mention their functions. Write briefly about the etiology of olfactory dysfunction and classify different types of odor impairments. 2 + 2 + 1 + 1 + 1 + 1

(b) Briefly describe the role of stria vascularis in the maintenance of endolymphatic potential through  $K^+$  circulations. State the bio-physical significance of cochlear amplification on the basis of frequency theory. 4 + 4

UNIT – PHY-301.2

[ Marks : 20 ]

1. Answer any *two* questions from the following :  $2 \times 2$ 
  - (a) What are cardiopulmonary baroreceptors ? 2
  - (b) What are the hormones that regulate cardiovascular functions ? 2
  - (c) What is BALT ? 2
  - (d) Define mucociliary clearance rate (MCR). 2
  
2. Answer any *two* questions from the following :  $4 \times 2$ 
  - (a) What do you know about 'cell signalling pathway models' of system physiology ? How their analysis can be done ?  $2 + 2$
  - (b) Why diffusion is the most important process for transcapillary exchange ? How diffusion across the capillary wall can be measured ?  $2 + 2$
  - (c) Mention the factors that affect mucociliary clearance rate. Discuss the role of cilia in mucociliary clearance.  $2 + 2$

(d) What do you understand by peak expiratory flow rate (PEFR)? Mention the factors affecting airway resistance.  $2 + 2$

3. Answer any *one* question from the following :  $8 \times 1$

(a) What is 'Bainbridge reflex'? State diagrammatically how heart rate is controlled by Bainbridge and baroreceptor reflex? What do you know about respiratory sinus arrhythmia?  $3 + 3 + 2$

(b) Elaborate critically the synthesis of nitric oxide in the endothelium and describe its vasoactive role. Write a note on endothelin-1.  $(2 + 3) + 3$

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