Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17BM2013** | **Duration :** | **3hrs** |
| **Sub. Name:** | **MODELLING OF PHYSIOLOGICAL SYSTEMS** | **Max. Marks:** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q.**  **No.** | **Sub**  **Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | With the block diagram of an open loop and closed loop control system, explain the concepts of modeling. | CO1 | 10 |
| b. | Outline the differences between Engineering and Physiological control systems. | CO2 | 10 |
| **(OR)** | | | | |
| 2. | a. | Give one example of a physiological control system. Explain its significance with illustration. | CO1 | 10 |
| b. | Elaborate on the mechanism of respiration with a neat illustration. | CO4 | 10 |
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| 3. | a. | Explain with any one example, a linear model of physiological system. | CO1 | 10 |
| b. | With the help of steady state model, explain the chemical regulation in ventilation. | CO1 | 10 |
| **(OR)** | | | | |
| 4. | a. | Explain the various approaches involved in modeling with examples. | CO1 | 10 |
| b. | Discuss the advantages of Physiological modeling. | CO6 | 10 |
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| 5. | a. | Discuss about a widely adopted model to measure insulin action from an intravenous glucose tolerance test (IVGTT). | CO6 | 10 |
| b. | Identify a suitable physiological model to study the neurological disorders. Describe about them. | CO6 | 10 |
| **(OR)** | | | | |
| 6. | a. | Differentiate lumped parameter and distributive parameter models. | CO1 | 10 |
| b. | Describe the fluid dynamic involved in the circulatory system with clinical applications. | CO2 | 10 |
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| 7. | a. | Describe the dynamics of obstructive sleep apnea using a mathematical model. | CO5 | 10 |
| b. | With an illustration, explain the mechanism of digestion. Describe the role of physiological modeling in gastro-intestinal system analysis. | CO3 | 10 |
| **(OR)** | | | | |
| 8. | a. | Elaborate three methods involved in heat transfer with necessary equations. | CO3 | 10 |
| b. | Explain the process of renal clearance using an appropriate mathematical model. | CO4 | 10 |
|  |  | **Compulsory:** |  |  |
| 9. | a. | Describe a mathematical model of the glucose-insulin control system that is to be used to examine dynamic effects both during meals and in normal daily life. | CO6 | 10 |
| b. | Explain the models of nonlinear dynamics to cardiovascular measurements. | CO2 | 10 |