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

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**End Semester Examination – Nov/Dec– 2018**

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| **Code :** | **15EI2017** | **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. | Identify an example for a physiological control system. Justify your answer. | CO1 | 5 |
| b. | Summarize the key differences between Engineering and physiological control systems. | CO1 | 5 |
| c. | Derive the mathematical relationship that characterizes the input-output properties of any two physiological systems with suitable illustrations. | CO2 | 10 |
| (OR) | | | |  |
| 2. | a. | Describe the role of block diagram in designing a control system, with suitable illustrations and examples. | CO1 | 10 |
| b. | Explain the difference between distributed modeling and lumped parameter modeling with respect to physiological systems. | CO3 | 10 |
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| 3. | a. | With the help of simulink model, explain the control mechanism involved in cardiac output regulation. | CO2 | 10 |
| c. | Differentiate between negative feedback and positive feedback with respect to physiological control system. | CO2 | 10 |
| (OR) | | | |  |
| 4. | a. | Type 2 diabetes is referred as non-insulin dependent diabetes. Justify the answer. | CO1 | 5 |
| b. | Identify a negative feedback based physiological control system. Describe the process involved in the regulation of a negative feedback based physiological control system . | CO2 | 10 |
| c. | Suggests a thermoregulatory example that relates to open loop control system. Justify | CO3 | 5 |
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| 5. | a. | With the help of steady state model, explain the chemical regulation in ventilation. | CO2 | 10 |
| b. | Explain the rheological properties of blood. | CO1 | 10 |
| (OR) | | | |  |
| 6. | a. | Summarize the important physical & chemical properties of blood. | CO1 | 10 |
| b. | Propose a mathematical model for glomerular filtration rate estimation. | CO3 | 10 |
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| 7. | a. | Assume that capillary diameters are 8µm, the number of systemic capillaries in the body, n, is 109(1 billion), and cardiac output is 5 litres/min. What is the linear velocity of blood flow in the capillaries? | CO2 | 5 |
| b. | Identify a suitable physiological model used to study the neurological disorders. Describe about them. | CO3 | 10 |
| c. | Compare facilitated diffusion with active transport. | CO3 | 5 |
| (OR) | | | |  |
| 8. | a. | Elaborate on the processes involved in the transport of nutrients across the cell membrane. | CO3 | 10 |
| b. | Explain the gas transport mechanism of the lungs. | CO2 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Elaborate on the fluid dynamic of the circulatory system. | CO3 | 10 |
| b. | Discuss on the concepts of source of heat production and by the mechanism by which heat is transported internally from one region of the body to another. | CO1 | 10 |