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



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

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17BM2007** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOCONTROL SYSTEMS** | **Max. Marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Differentiate between open loop and closed loop system with examples. | CO1 | 5 |
| b. | Determine the transfer function of the given signal flow graph. | CO1 | 15 |
| **(OR)** | | | | |
| 2. | a. | Write down any four rules for determining the transfer function of the system by reducing the blocks using the block diagram algebra. | CO1 | 8 |
| b. | Derive the transfer function of the following mechanical translation system. | CO1 | 12 |
|  |  |  |  |  |
| 3. | a. | Derive the mathematical model of lung mechanics. | CO2 | 15 |
| b. | Describe the concept of physiological control system with an example. | CO6 | 5 |
| **(OR)** | | | | |
| 4. | a. | Determine the model of chemical regulation of ventilation. | CO2 | 15 |
| b. | List out the features of physiological control systems. | CO6 | 5 |
|  |  |  |  |  |
| 5. | a. | Obtain the response of the first order system for an unit step input. | CO3 | 8 |
| b. | Find the roots of the second order system for various damping systems. | CO3 | 6 |
| c. | Illustrate the various time domain specifications with a neat sketch. | CO3 | 6 |
| **(OR)** | | | | |
| 6. | a. | Describe the various test signals with graphical representations. | CO3 | 5 |
| b. | Obtain the position, velocity and acceleration error constants for a unity feedback control system and determine the steady state error when the input is R(s), where | CO3 | 15 |
|  |  |  |  |  |
| 7. | a. | Discuss about the poles and zero location in the stability analysis. | CO5 | 5 |
| b. | The open loop transfer function of a unity feedback system is given by . Sketch the polar plot and determine the Gain Margin and Phase margin. | CO4 | 15 |
| **(OR)** | | | | |
| 8. | a. | Plot the Bode diagram for the following transfer function  and determine its Gain Margin and Phase margin. | CO4 | 15 |
| b. | Discuss in detail the frequency domain analysis. | CO4 | 5 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Determine the location of roots on s-plane and hence comment on the stability of a control system whose characteristic equation is given by, | CO5 | 15 |
| b. | Explain the procedure for constructing root locus. | CO5 | 5 |