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



**End Semester Examination – Nov/Dec - 2017**

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| **Code :** | **15EI2006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOCONTROL 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. | Compare the features of engineering and physiological control systems with examples. | CO1 | 10 |
| b. | Determine the overall transfer function of the system C(s)/R(s). | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Derive the transfer function for armature controlled DC motor. | CO1 | 10 |
| b. | Using Mason’s gain formula, determine the overall gain of the system shown below.  sub3.png | CO1 | 10 |
| 3. | a. | A unity feedback system is characterized by the open-loop transfer function .Determine the steady state errors for unit-step, unit-ramp and unit-acceleration inputs. | CO2 | 10 |
|  | b. | A closed loop servo is represented by the differential equation d2c/dt2+8dc/dt=64e where c is the displacement of the output shaft, r is the displacement of the input shaft and e = r-c. Determine undamped natural frequency, damping ratio and percentage maximum overshoot for unit step input. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Obtain the response of first order system when subjected to unit step input. | CO2 | 10 |
|  | b. | Explain the concept of ventilation regulation with mathematical model. | CO3 | 10 |
| 5. |  | A Unity feedback control system has an open loop transfer function sketch the Root Locus. | CO3 | 20 |
| (OR) | | | | |
| 6. | a. | Determine the range of ‘K’ for stability of unity feedback system whose open loop transfer function is G(s) = K / s(s+1) (s+2). | CO3 | 10 |
|  | b. | Determine the stability of the system whose characteristic equation is given by s5 + 4s4 + 8s3 + 8s2 + 7s +4=0 | CO3 | 10 |
| 7. |  | The open loop transfer function of a system is given by G(s)=1/s2(1+s)(1+2s).Sketch the polar plot and determine gain margin and phase margin. | CO2 | 20 |
| (OR) | | | | |
| 8. |  | Sketch the bode plot for the following transfer function.  G(s) = ks2/(1 + 0.2s)(1 + 0.02s). | CO2 | 20 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the concept of stretch reflex with respect to control system concept**.** | CO3 | 10 |
|  | b. | Obtain the mathematical model for the regulation of cardiac output**.** | CO3 | 10 |

ALL THE BEST