**Code No****.PC406EE**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY**

**(An Autonomous Institution)**

**B.E. (EEE) IV-Semester (AICTE) Regular Examination, AUGUST-2023**

**Subject: CONTROL SYSTEMS**

**Time: 3 hours Max.Marks:60**

**Note: Missing data, if any, maybe suitably assumed.**

**PART-A**

**Answer All the questions.(10X2M=20M)**

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| --- | --- | --- | --- | --- |
| **Q.No.** | **Questions** | **Marks** | **CO** | **BTL** |
| **1.a** | Compare open loop and closed loop control systems. | **2** | **1** | **2** |
| **b** | State and explain the Mason’s gain formula. | **2** | **1** | **1** |
| **c** | Distinguish between type and order of a system. | **2** | **2** | **2** |
| **d** | A unity feedback system has an open loop transfer function G(s)=10/(s+1)(s+2). Determine the steady state error for unit step input. | **2** | **2** | **3** |
| **e** | What is Nyquist stability criterion? | **2** | **3** | **2** |
| **f** | Write the necessary condition for stability. | **2** | **3** | **2** |
| **g** | What are frequency domain specifications? | **2** | **4** | **2** |
| **h** | Draw the locations of poles and zeroes in the s-plane for a leadcompensator. | **2** | **4** | **3** |
| **i**  **j** | Define the controllability & observability of the system.  List the advantages of state variable analysis**.** | **2**  **2** | **5**  **5 1** | **2** |
|  |  |  |  |  |

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**Code No.4PC406EE**

**PART-B**

**Answer Any Five questions**.**(5X8M=40M)**

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| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| **2.** | **a** | Using block diagram reduction techniques, determine transfer function  C/Rof thesystem shown in figure. | **6** | **1** | **3** |
| **b** | Why negative feedback is preferred over positive feedback? | **2** | **1** | **1** |
| **3.** | **a** | Considering the response of a second order under damped system to a step input,derive the following: (i) Peak time (tp) (ii) Rise time (tr). | **5** | **2** | **1** |
| **b** | For a unity feedback system whose open loop transfer function is  G(s) = 4/s(s+5).Find ωn and ξ. | **3** | **2** | **2** |
| **4.** | **a** | Using Routh’s stability criterion, determine the stability of the system represented by characteristic equation s4+8s3+18s2+16s+5=0. | **6** | **3** | **3** |
| **b** | What are break away and break in point? How to determine them? | 2 | **3** | **2** |
| **5.** |  | Sketch the Bode plot for the following transfer function and obtain the gain and cross over frequencies.  G(s) = 10/s(1+0.4s)(1+0.1s) | **8** | **4** | **3** |
| **6.** | **a** | Obtain the state model for the system represented by | **5** | **5** | **3** |
| **b** | What are the properties of state transition matrix? | **3** | **5** | **2** |
| **7.** | **a** | With neat diagram, explain the operation of synchro transmitter-receiver pair. | **6** | **1** | **2** |
| **b** | Sketch the response of a second order under damped system. | **2** | **2** | **2** |
| **8.** | **a** | Sketch the root locus of the system whose open loop transfer function is | **5** | **3** | **3** |
| **b** | Sketch the polar plot of G(s) = 1/(1+sT1)(1+sT2). | **3** | **4** | **2** |
| **9.** |  | Determine the transfer function for following system given below: | **8** | **5** | **3** |
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