MAR ATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM

(GOVERNMENT AIDED AUTONOMOUS ENGINEERING COLLEGE)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Second Sessional Examination - October 2026

B24EE3T01 Linear Control System - S5 EA & EB

Time: 1.5 Hrs. Max Marks: 40

Answer all questions from Part A and Part B

Part A [4*3 =12 marks]

1. Using the Routh-Hurwitz stability criterion, determine the stability of the feedback system whose characteristic equation is $s^4+2s^3+3s^2+6s+5=0$. **(CO 3)**
2. Explain the effect of adding open-loop poles on the root locus. **(CO 3)**
3. Define the resonant frequency and resonant peak. **(CO 4)**
4. Sketch the frequency response of a system with transfer function $G(s)=\frac{10}{s}$. **(CO 4)**

Part B [2*14 = 28 marks]

5. Sketch the root locus of the system whose open-loop transfer function is **(CO 3)**

$$G(s)=\frac{K}{s(s+2)(s+4)}$$

Find the value of K so that the damping ratio of the closed-loop system is 0.5.

6. The open-loop transfer function of a unity feedback system is given by **(CO 4)**

$$G(s)=\frac{4}{s(0.5s+1)}$$

Sketch the Bode plot and determine the gain margin and phase margin, and comment on the stability of the system.

CO 3: *Students will be able to apply Routh-Hurwitz and root locus methods to analyse the stability of linear time-invariant systems.*
CO 4: *Students will be able to understand the frequency-domain specifications and analyse the frequency response using Bode, polar, and Nyquist plots to determine the stability of the systems.*

VISION

Endeavour to Ensure Excellence

MISSION

Mould technically competent and morally strong Engineers

Achieve dynamic leadership through quality Education

Cater the needs of industry and community through Emulation

Empower the students to serve the nation with Dedication