



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY ELECTRICAL AND ELECTRONIC ENGINEERING

TEE 4417 INDUSTRIAL ENGINEERING MANAGEMENT

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: JULY 2025

TIME: 2 HOURS

DATE: July 2025

Question ONE

- (a) (i) Discuss the THREE levels of production management.
(ii) State the benefits derived from higher productivity in an organisation (10 marks)
- (b) State the advantages and disadvantages of decentralization. (10 marks)
- (c) Describe the FIVE functions of management (10 marks)

Question TWO

- (a) Describe in detail **FOUR** systems of rating, the performance of a job operator (12 marks)
- (b) Explain the concept of normal performance. (8 marks)

Question THREE

- (a) State the contribution of the Hawthorne experiment to the concept of meeting employee subjective requirements. (7 marks)
- (b) Describe the two-step approach to understanding employee motivation and satisfaction to developed by Fredrick Herzberg. (10 marks)
- (c) With the aid of a diagram describe Maslow Hierarchy Needs. (5 marks)

Question FOUR

- (a) Outline the key feature of systems approach to management. (10 marks)

- (b) (i) Outline the contributions of system approach to management.
- (ii) Outline the limitations of system approach.

(10 marks)

Question FIVE

- (a) (i) Define the term work measurement.
- (ii) State any **FIVE** application areas of start time estimation.

(7 marks)

- (b) Outline the steps in time study procedure.

(7 marks)

- (c) Describe the use of any **THREE** methods and equipment in time study.

(6 marks)

(15 marks)

(a) Use a typical block diagram to show the relationship between various variables in the antennae azimuth position control (system). **(5 marks)**

(b) Distinguish between an open loop and closed loop control system. **(10 marks)**

Question TWO

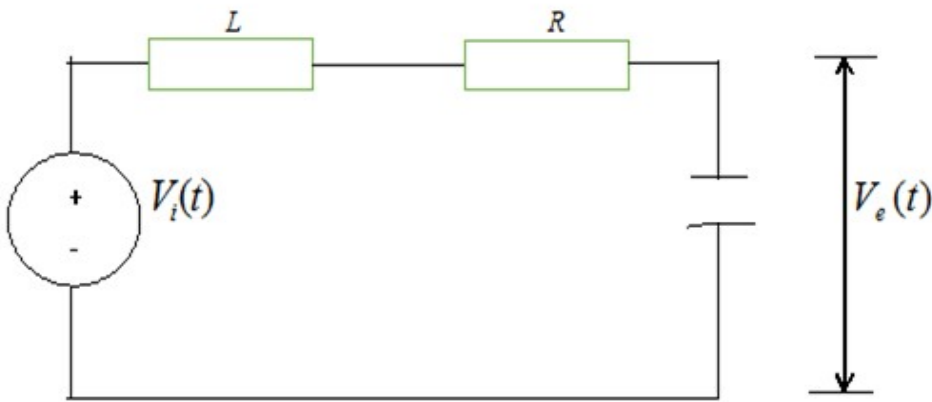
(a) A system is represented by the following transfer function:

$$\frac{d^2 y}{dt^2} + \frac{12 dy}{dt} + 32 y = 32 \mu(t)$$

Determine it's Laplace transform.

(6 marks)

(b) (i) An RQ series RLC circuit is as shown:



determine the transfer function.

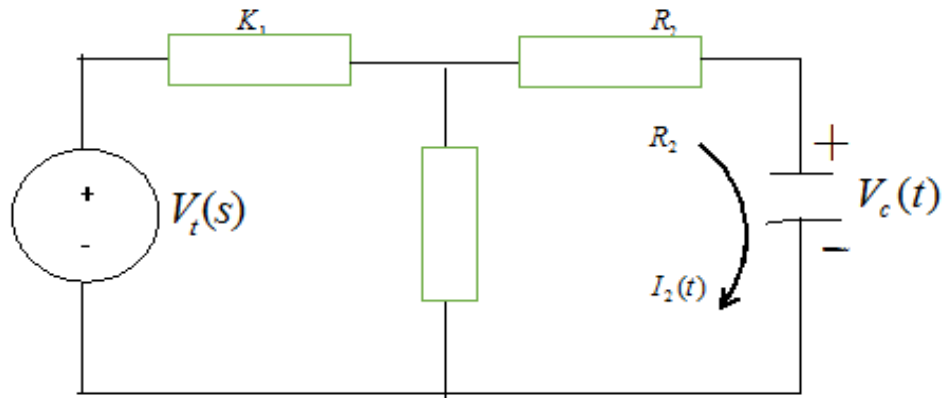
$$\frac{V_c(s)}{V(s)}$$

(6 marks)

(ii) For the circuit shown determine the transfer function.

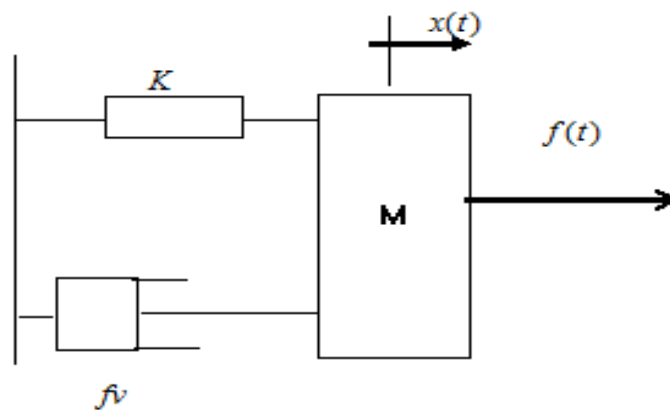
(8 marks)

$$V(s)/I_2(s)$$



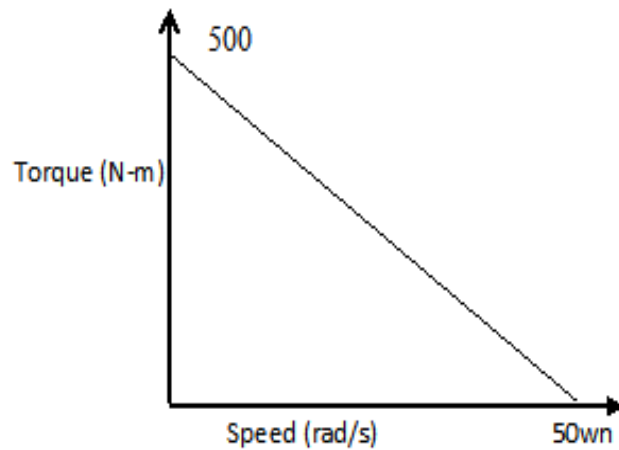
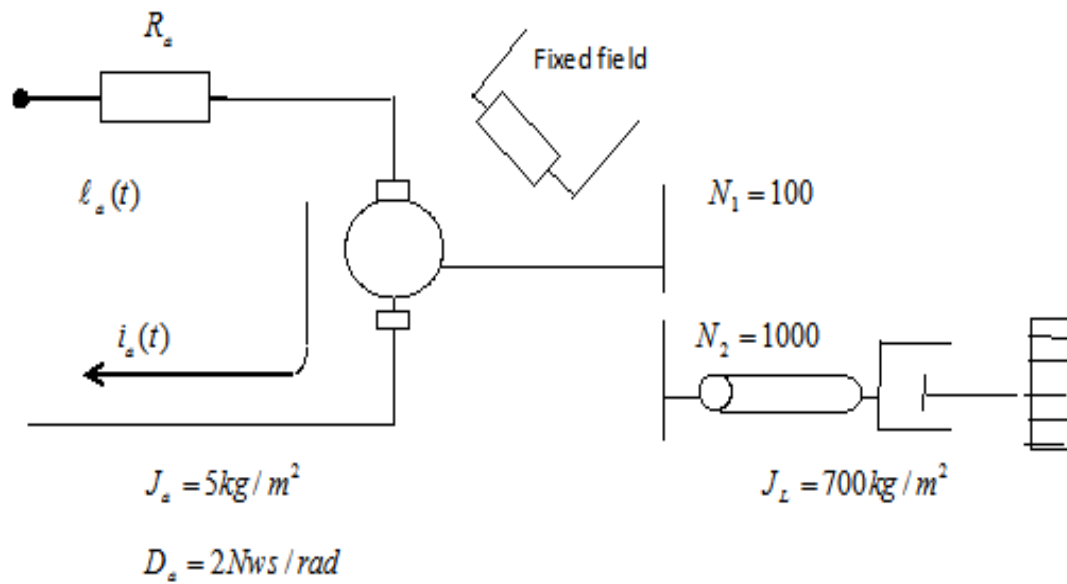
Question THREE

(a) Determine the transfer function $X(s)/F(s)$ of a mechanical system shown. (8 marks)



(b) Given the torque speed curve of the system shown.

(8 marks)

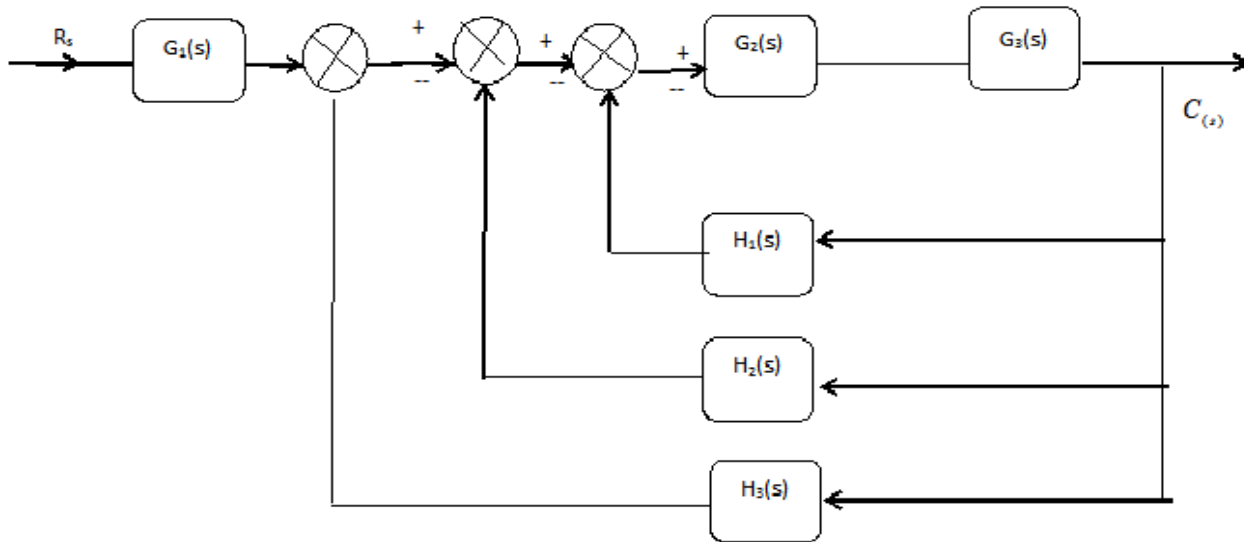


Determine the transfer function $\theta_{1(s)}/E_c(s)$

Question FOUR

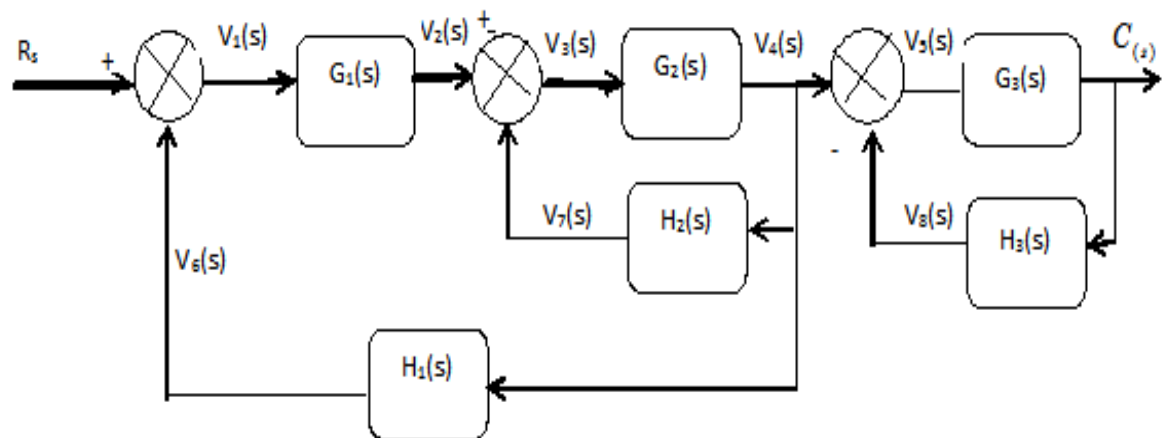
Reduce the following systems to a single transfer function.

(i)



(15 marks)

(ii)



(b) Convert the block diagrams in 4(a) to signal flow graphs.

(5 marks)

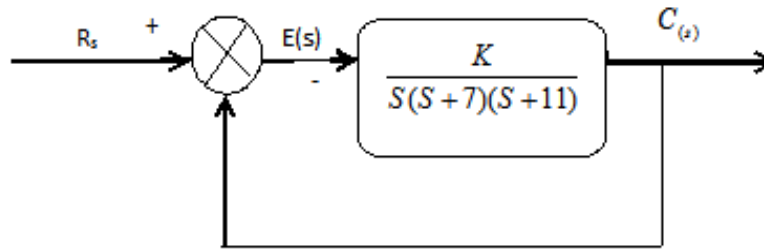
Question FIVE

(a) (i) Determine the stability of the closed loop system transfer function;

$$T(s) = \frac{10}{5s^5 + 2s^4 + 3s^3 + 6s^2 + 5s + 3}$$

Using Routh table.

(ii) Determine the range of gain k , for the system shown in figure:



(10 marks)

- (b) Draw the bode plot for the system represented by the transfer function:

$$G(s) = \frac{K(s+3)}{s(s+1)(s+2)}$$

(4 marks)

- (c) For $G(s) = \frac{K}{s(s+3)(s+5)}$

Determine the range of gain k for stability and frequency of oscillation. **(6 marks)**