B.Tech. Degree VIII Semester Examination in Marine Engineering July 2018

MRE 1806 (C) FLUID CIRCUITS AND CONTROL
(2013 Scheme)

Time: 3 Hours   Maximum Marks: 100

$(5 \times 20 = 100)$

I.   (a)   Explain different types of valves which permit free flow in one direction and prevent any flow in opposite direction.   (8)

     (b)   Explain the following with the aid of suitable diagram and graphic symbols.   (12)

           (i)   Three way direction control valve
           (ii)   Solenoid Actuated valve
           (iii)   Four way direction control valve

OR

II.   (a)   Explain different types of actuators and the working.   (12)

     (b)   Write short notes on: (8)

           (i)   Thermostat
           (ii)   Seal and packing

III.   (a)   Distinguish between hydraulic and pneumatic system with advantage, disadvantage and applications.   (15)

   (b)   Derive an expression for the transfer function of pneumatic system.   (5)

OR

IV.   (a)   Explain the advantages of fluid circuits.   (5)

     (b)   Explain hydraulic reservoir with neat diagram.   (10)

     (c)   Explain the properties of air used as fluid medium in pneumatic system.   (5)

V.   (a)   Explain the following: (10)

           (i)   Reciprocating pump
           (ii)   Vane pump

     (b)   Compare Weight loaded Accumulator and Gas loaded Accumulator.   (10)

OR

VI.   (a)   Explain Positive displacement pumps.   (15)

     (b)   Explain Pressure intensifiers.   (5)

VII.   (a)   Determine the overall transfer function for the system shown.   (8)
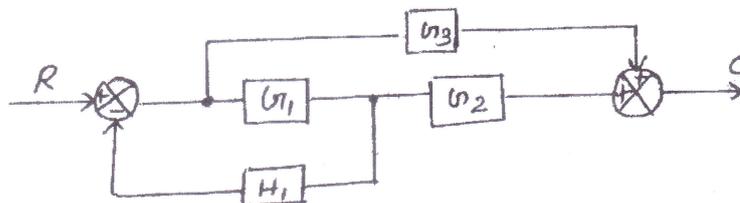
     (b)   Explain Open loop and Closed loop control system with examples.   (6)

     (c)   Derive transfer function of Thermal system.   (6)

OR

(P.T.O.)

VIII. (a) Write the differential equation governing the mechanical system shown in figure. Draw the force voltage and force current electrical analogues circuit and verify by writing mesh and node equation. (15)
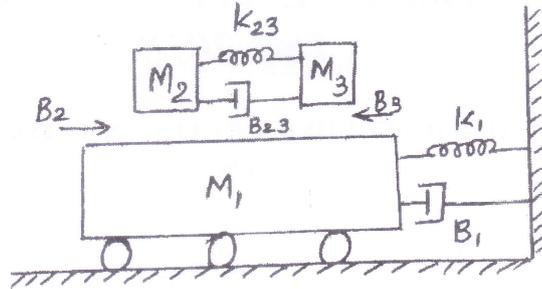
(b) Explain the closed loop transfer function and the characteristic equation of a control system. (5)

IX. (a) Open loop transfer function of a unity feedback control system is $G(s) = \dfrac{2.5}{s(s+5)(0.1s+1)}$. By applying Routh Criterion, discuss the stability of the closed loop system as a function of K. Determine the value of K which will cause sustained oscillation in the closed loop system. What are the corresponding oscillating frequencies? (12)

(b) Sketch and describe the working of Hydraulic lift. (8)

OR

X. (a) A unity feedback control system has an open loop transfer function, $G(s) = \dfrac{k}{s(s^2+4s+13)}$. Sketch the Root locus. (12)

(b) Explain two application of Hydraulic system. (8)

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