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***B.Tech. Degree VIII Semester Special Supplementary Examination in  
Marine Engineering February 2017***

**MRE 805 ELECTIVE – FLUID CIRCUITS AND CONTROL**

Time: 3 Hours

Maximum Marks: 100

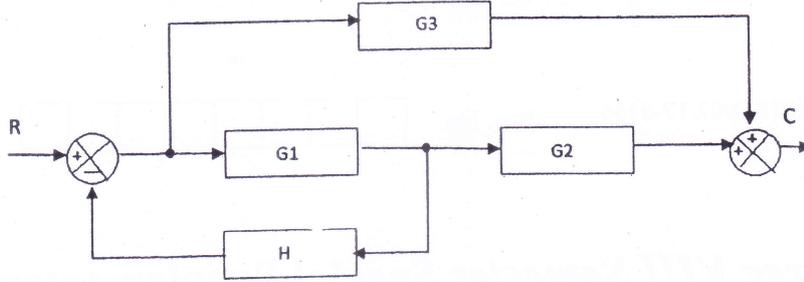
(4 × 25 = 100)

- I. (a) Explain different electrical control elements used in hydraulic systems with diagrams. (10)
- (b) Explain the working of pressure reducing control valve with a neat diagram and its symbol. Discuss its application also. (10)
- (c) Write a note on sealing and packing. (5)
- OR**
- II. (a) Explain any five types of direction control valves with diagram, symbol and working for each (20)
- (b) Discuss on the design and construction features of Hydraulic reservoir and its sizing requirements. (5)
- III. (a) Compare hydraulic and pneumatic system. (8)
- (b) Derive the transfer function of a typical pneumatic system. (9)
- (c) Explain the properties of liquid for hydraulic control. (8)
- OR**
- IV. (a) Derive the transfer function of a typical hydraulic system. (12)
- (b) What is fluid power? Discuss its advantages and disadvantages. (6)
- (c) Explain the properties of air for pneumatic control. (7)
- V. (a) Explain: (10)
- (i) Reciprocating pumps.
- (ii) External gear pumps
- (b) Define accumulator. Describe the different types of accumulators with neat diagrams for each. (10)
- (c) Compare positive and non positive displacement pumps. (5)

**OR**

(P.T.O.)

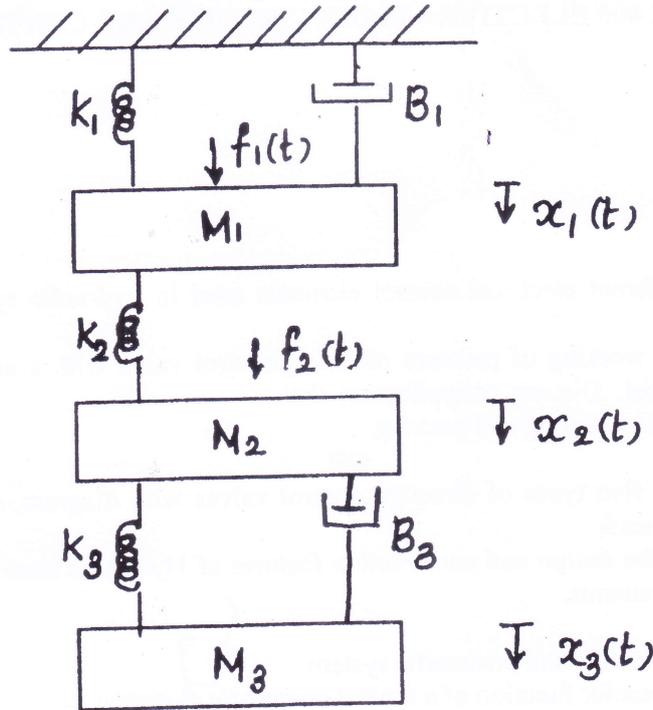
VI. (a) Reduce the block diagram. (4)



(b) Derive the transfer function of a thermal system. (5)

(c) Find the electrical analogous circuit for the mechanical system and find the transfer function. (10)

Draw the circuit using voltage source and show the F-V relations.



(d) Compare open loop system and closed loop system with examples. (6)

VII. (a) Explain the importance of poles and zeroes for finding the stability of a system. (5)

(b) Define: (8)

- (i) Absolute stability
- (ii) Relative stability
- (iii) Angle of departure
- (iv) Break away/in point

(c) Using Routh Hurwitz criteria find the location of roots on the s plane and the stability of a unity feedback system having characteristic equation as  $s^7 + 9s^6 + 24s^5 + 24s^4 + 24s^3 + 24s^2 + 23s + 15 = 0$ . (12)

OR

VIII. (a) Sketch the root locus for the unity feedback system with open loop transfer function  $\frac{K}{s(s+4)(s^2+4s+20)}$ . Find the limiting value of K for which the system is stable. (20)

(b) Explain the working principle of Hydraulic lift. (5)