Indian Maritime University

(A Central University, Govt. Of India)

M.Tech (Marine Engineering and Management)

Semester - I

End Semester Examination December 2019

Marine Machinery and Plant Design (PG13T1102)

Date: 09.12.2019 **Max Marks: 60**

Time: 3 Hours **Pass Marks: 30**

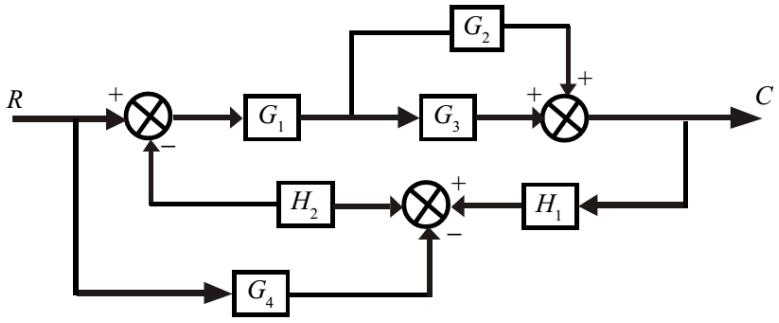
Note: Answer any five questions. All questions carry equal marks.

(5 x 12 Marks = 60 Marks)

1. Two rollers, 188.12mm & 183.78mm in diameter, are pressed together over a contact length of … by a force 1049 N. Find
   (i) Contact Width
   (ii) Maximum Pressure (P)
   (iii) Stress induced in Z axis
   (iv) Shear Stress [assume Young's modulus in MPa (E1 & E2) = 2 x 10^5 & Poisson's ratio (v) = 0.3 & length of contact 50mm].

[4x3 =12 marks]

2. Find the Closed loop transfer function of system shown in fig. below:



[12 marks]

3. Describe hybrid Scrubber system for removing SOx in a marine diesel engine plant. [12 marks]

4. Develop an equation for the service life of a diesel engine by cylinder pressure, where there is relationship between cylinder pressure and cylinder air leakage. [12 marks]

5.(a)Describe Process of condition monitoring by a flow chart, advantages of condition monitoring and types of sensor used, measurement process of metal temperature in condition monitoring.

(b) Describe the measurement process of metal temperature, piston ring measurement and fuel injection pressures.

(c) state how piston ring functions are monitored in condition monitoring

[7+3+2=12]

6. (a) NOx reduction methods (primary and seconday)

(b) A system consists of 4 components. If more than two of the components fail, the system fails. If the components have an exponential time to fail distribution with failure rate of 0.000388, what is the reliability of the system at time = 300? What is system mean time to fail? [6+6=12]

7. The chief Engineer found his ships' propulsion system is not producing sufficient thrust at full and at rated rpm. Use a suitable fault diagnostic technique to analyze the fault. [12]

8. Write short notes on any four of the following: [4x 3 = 12]

i) Hertz stress and its characteristics

ii)Factors affecting performance hydraulic and pneumatic systems

iii)Miller Cycle

iv) Key success factors of Wartsila diesel engine for optimizing life cycle

v) Exhaust gas recirculation (EGR)

vi) Compliant Fuel

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