BT–MRE – VI – 06.16 – 0829 Reg. No. | | | | | | | | |

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B.Tech. Degree VI Semester Examination in Marine Engineering June 2016

MRE 1606 MACHINE DESIGN AND DRAWING

Time : 3 Hours Maximum Marks : 100

(5 × 20 = 100)

I. (a) What are the factors affecting design? Explain in detail. (8)
(b) Explain economic considerations in design. (12)

OR

II. (a) Explain the advantages of heat treatment. (8)
(b) What are the failure criteria in design? (12)

III. (a) Explain reliability associated with design of components. (8)
(b) A hot rolled steel rod is to be subjected to Torsional load that will vary from a -100.0 Nm to + 400.0 Nm. Determine the diameter of rod using a factor of safety of 1.75 for the material of the rod. Take f_{ut} = 489 MN/m^2; $f_{y\phi} = 315 MN/m^2$. (12)

OR

IV. (a) What are the points to be considered for the design of machine elements subjected to completely revised loads? (8)
(b) The stresses at a point in a body are $fx = 91 MN/m^2$; $fy = 21 MN/m^2$ and shear $fxy = 84 MN/m^2$; yield point stress = 280 MN/m^2. (12)
Find the factor of safety by:
(i) Maximum shear stress theory
(ii) The distortion energy theory.

V. (a) Discuss limit, fit and tolerance. (8)
(b) Sketch a flange coupling for 38 mm GI pipe. (12)

OR

VI. (a) Sketch any three types of nut locking arrangements. (8)
(b) What do you mean by the term efficiency of a riveted joint? (12)

VII. (a) What are the differences between a shaft and an axle? (8)
(b) A solid shaft is subjected to a bending moment of 3.46 kNm and torsional moment of 11.5 kNm. The shaft is made of C-45 steel, and factor of safety is 6. Determine the diameter of shaft. (12)

OR

VIII. (a) What is the function of a brake? How does its function differ from that of a clutch? (8)
(b) Design completely belt drive to drive a winch from an electric motor of 11 kW power. Speed of the motor shaft is 750 rev/min, speed ratio is 4, belt position is horizontal and there is considerable variation of load. (12)

IX. Sketch and name various types of gears. (20)

OR

X. Design a bevel gear drive between two shafts whose axes are at right angles Speed of the pinion is 240 rpm and that of gear is 120 rpm. Pinion is to have 21 teeth of involute profile with module 20 mm and pressure angle 20°. Power at gear shaft is 75 kW. (20)

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