

KATHMANDU UNIVERSITY

End Semester Examination

January/February 2024

Level : B.E.

Year : III

Time : 2 hrs. 30mins.

Course : MEEG 315

Semester : I

F. M. : 55

SECTION "B"

[5Q × 11 = 55 marks]

Attempt ALL questions. Use of Data Book is ALLOWED for this examination. Assume suitable data if not.

1. a. Elaborate on the concept of "Design by Experience" in mechanical engineering, explaining how hands-on experience contributes to the design process. Provide a suitable example that showcases the significant role practical knowledge plays in developing engineering solutions and influencing successful design outcomes. [3]
- b. How do experimental methods contribute to stress concentration analysis? Discuss the limitations and advantages of simulation and modeling tools compared to experimental approaches in stress concentration analysis. [3]
- c. A machined stepped shaft is experiencing reversed bending with no torsional loading. As illustrated in **Figure 1**, the critical point on the shaft is at a diameter change from d (40 mm) to D (50 mm) with a full fillet. Estimate the modified endurance limit. Assume that the shaft is made of 'Typical Carbon and Alloy Steel, S.A.E 1095, annealed', and Reliability is 98 %, and a maximum operating temperature is 400 °C. [5]

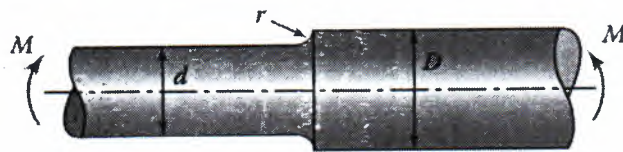


Figure 1

2. a. Why are rivet joints preferred in the aircraft industry over welded ones? Explain. [2]
- b. A bracket needs to be attached to a vertical column, as illustrated in **Figure 2**, and will be subjected to an eccentric load of 20 kN. Assuming both the bracket and rivet is constructed from S.A.E. 1045 annealed carbon steel, calculate the rivet diameter for a Factor of Safety of 2. [3]

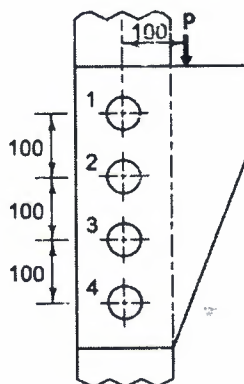


Figure 2