Exam.Code:1016
Sub. Code: 7772

2021
M.E. (Mechanical Engineering)
Third Semester
MME-301: Advanced Machine Design

Time allowed: 3 Hours | Max. Marks: 50

NOTE: *Attempt five questions in all, selecting atleast two questions from each Unit. Assume any missing data, if any.*

x-x-x

UNIT – I

I. How computer can aid in the design process through CAD? List various merits and demerits of using CAD in design. (10)

II. Explain the procedure for creating an estimated S-N diagram for a steel bar and define its equations. How many cycles of life can be expected if the alternating stress is 100 MPa. The S_{ut} has been tested at 600 MPa. The bar is 150 mm square and has a hot-rolled finish. The operating temperature is 500°C maximum. Assumptions. (10)

a) The loading will be fully reversed bending.

b) Infinite life is required and is obtainable since this ductile steel will have an endurance limit

c) A reliability factor of 99.9% will be used. (10)

III. Discuss in detail the effect of roughness, velocity, rolling and lubricant on Friction. (10)

IV. Figure A shows the shaft assembly of a grinder, with an abrasive wheel at each end and a belt driven sheave at the center. While turning at 2400 rpm, the smaller abrasive wheel is accidentally jammed, causing it to stop "instantly". Estimate the resulting maximum torsional stress and deflection of the shaft. Consider the abrasive wheels as solid disks of density 2000 kg/m^3. The shaft is steel (G=79 GPa) and its weight may be neglected. (10)

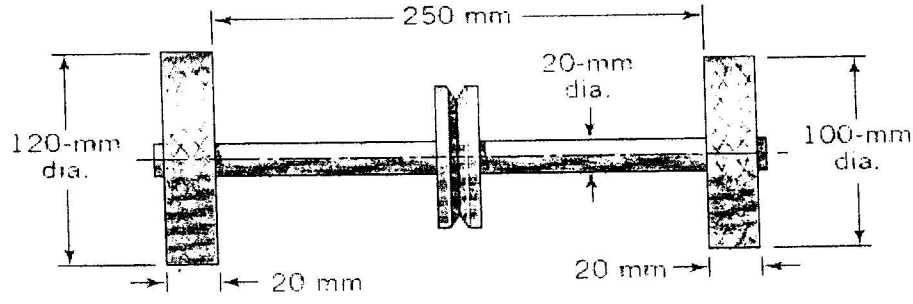

Fig. A.

P.T.O.

UNIT – II

V. Discuss in detail the Short-term and Long-term properties of materials on design.(10)

VI. a) What are the various techniques used for optimization. Explain any optimization technique in detail.

b) What do you understand by the terms:-

i) Design Constraints and

ii) Constraint surface (10)

VII. Explain the Exponential model and its applications in detail. (10)

VIII. Explain the vibration based design with the help of an industrial application. (10)

x-x-x