Hall Ticket Number :										

R-13

Code: 1G554

III B.Tech. I Semester Supplementary Examinations February 2021

Design of Machine Elements-I

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) Discuss, What are the factors to be considered for the selection of materials for the design of machine elements? 7M

   b) Discuss the BIS method of designation of steels with an example. 7M

2. A shaft, as shown in Fig.1, is subjected to a bending load of 3 kN, pure torque of 1000 N-m and an axial pulling force of 15 kN. Calculate the stresses at A and B.

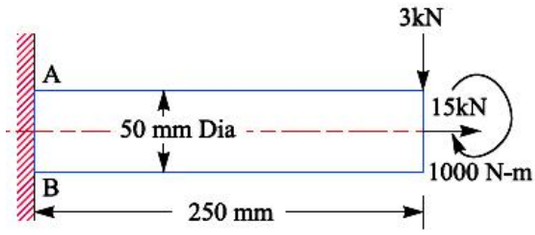

Fig.1 14M

3. a) What is stress concentration factor? What are the methods of reducing stress concentration? 7M

   b) Explain Goodman and soderburg lines with neat sketches. 7M

4. The cylinder head of a steam engine is subjected to a pressure of 1 N/mm^2. It is held in position by means of 12 bolts. The effective diameter of the cylinder is 300 mm. A soft copper gasket is used to make the joint leak proof. Determine the size of the bolts so that the stress in the bolts does not exceed 100 MPa. 14M

5. a) What are the advantages and disadvantages of welded joints? 4M

   b) A welded connection, as shown in Fig.3 is subjected to an eccentric force of 7.5 kN. Determine the size of the welds if the permissible shear stress for the weld is 100 N/mm^2. Assume static conditions.

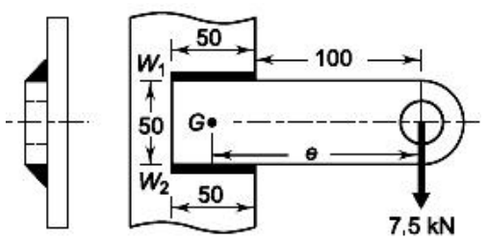

Fig.3 10M

6. Design a knuckle joint to transmit 120 KN, with permissible stresses in tension; shear and compression are 75 Mpa; 60 Mpa and 150 Mpa respectively. 14M

7. a) What are the causes of failure of shaft? What types of stresses are induced in shafts? 4M

   b) A shaft transmitting 100kW power is running at 180 r.p.m satisfying the following conditions; determine the size of the shaft. i. Shear stress should not exceed 50MPa. ii. Angle of twist should not be more than 1° on a length of 16 times the diameter. Take G=0.84x 10^{5}MPa. 10M

8. Design a cast iron protective flange coupling to connect two shafts in order to transmit 7.5 kW at 720 r.p.m. The following permissible stresses may be used: Permissible shear stress for shaft, bolt and key material = 33 MPa; Permissible crushing stress for bolt and key material = 60 MPa; Permissible shear stress for the cast iron = 15 MPa 14M

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