Code No. 5141 /S

FACULTY OF ENGINEERING

B.E. 3/4 (M/P/AE) I-Semester (Supplementary) Examination, June 2016

Subject : Design of Machine of Elements

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1	Define the terms strength, rigidity and toughness.	3
2	Mention suitable materials for the following machine parts. a) Crane hook b) Machine tool bed c) hexagonal headed bolt.	3
3	Why factor of safety is considered in design?	3
4	Where do you use cotter and knuckle joints.	3
5	What is the condition for self locking of a power screw?	3
6	What is the purpose of a coupling?	2
7	Sketch any 4 welded joints.	2
8	Define efficiency of a riveted joint.	2
9	What are bolts of uniform strength?	2
10	Name all types of stresses shaft is subjected to and show them by a sketch.	2

PART – B (50 Marks)

11 The load on a bolt consists of an axial pull of 12 KN together with a transverse shear force of 6 KN. Find the diameter of the bolt according to maximum principal stress theory and maximum shear stress theory.

12 Determine the size of a piston rod subjected to a total load having cyclic fluctuations from -150 KN to + 50 KN. The endurance limit is 360 MPa and yield strength is 400 MPa. Given, factor of safety = 1.5, surface finish factor = 0.88, theoretical stress concentration factor, $k_t = 2.25$.

13 Design a knuckle joint to connect two rods subjected to an axial load of 15 KN. Consider $\sigma_t = 65$ MPa, $\sigma_c = 80$ MPa, and $\tau = 50$ MPa.

14 Two plates of 7 mm thick are connected by a triple riveted lap joint of zig-zag pattern. Calculate the rivet diameter, rivet pitch, and distance between rows of rivets for the joint. Also state the mode of failure of the joint. The safe working stresses are as follows.

$\sigma_t = 90$ MPa, $\sigma_c = 120$ MPa, $\tau = 60$ MPa.

15 Design a flange coupling to transmit 60 KW at 350 rpm. Allowable shear stress may be taken as 30 MPa.

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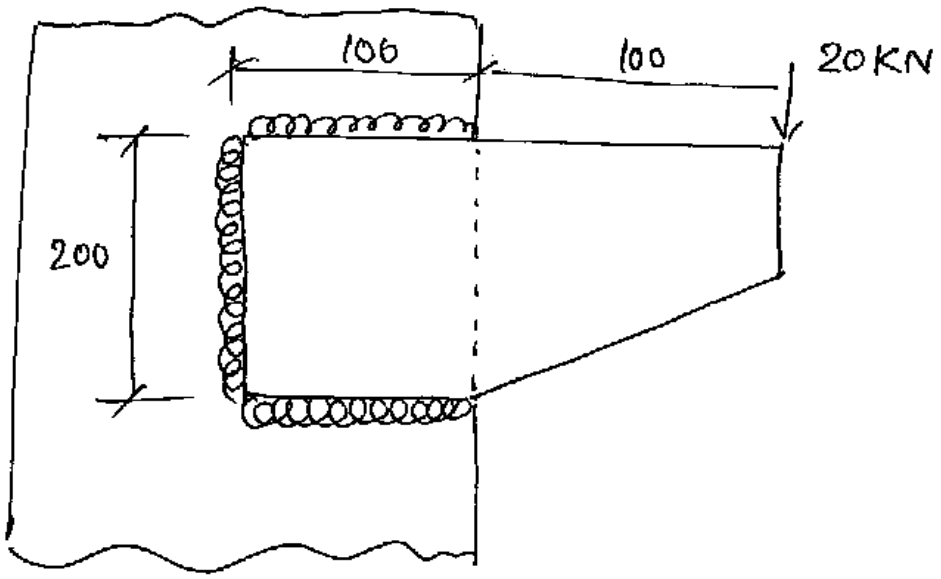
16 An unknown weight falls through 15 mm on a collar rigidly attached to the lower end of a vertical bar 3.2 m long and 6 cm^2 in section. If the maximum instantaneous extension is known to be 2.1 mm, what is the corresponding stress and the value of unknown weight. Given, E = 2 x 10^5 N/mm^2.

17 Determine the size of weld required for the joint shown in fig.1. Allowable stress for the weld material is 80 MPa.



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