53 (CE 601) DGST

2014

DESIGN OF STRUCTURE-II

Paper : CE 601

Full Marks : 100

Time : Four hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions from* ***six.***

1. *(a)* The plates of a 6*mm* thick tank are connected by a single bolted lap joint with 20*mm* diameter bolts at 60*mm* pitch. Calculate the efficiency of the joint. Take *fu* of plate as 410*MPa* and assume 4·6 grade bolts. 10

(b) Two plates 10*mm* and 18*mm* thick are to be jointed by a double cover butt joint. Assuming cover plates of 8*mm* thickness, design the joint to transmit a factored load of 500*kN*. Assume Fe 410 plate and grade 4·6 bolt. 10

2. Design a bolted connection for a bracket carrying an eccentric load of 120*kN* at a distance of 150*mm* from the centre line of an *ISHB* 300@0·588 *kN/m* as shown in *Fig. 1*. 20

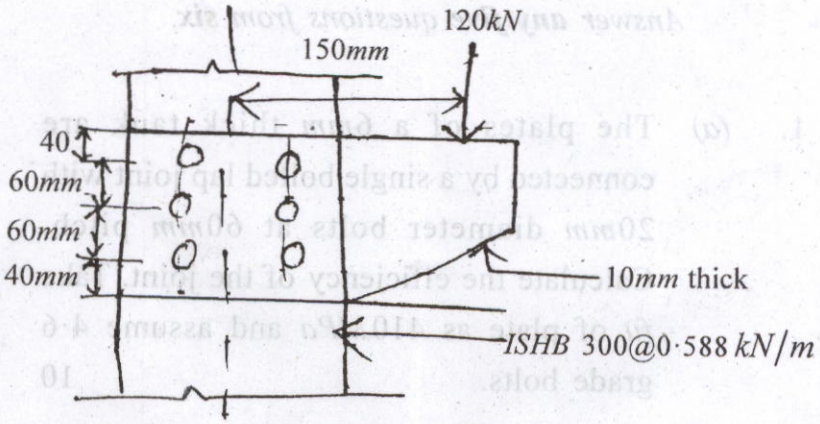

Fig. 1

3. *(a)* Design a longitudinal and transverse fillet weld to connect two plates as shown in *Fig. 2* to transmit a pull equal to the full strength of the thinner plate. 12

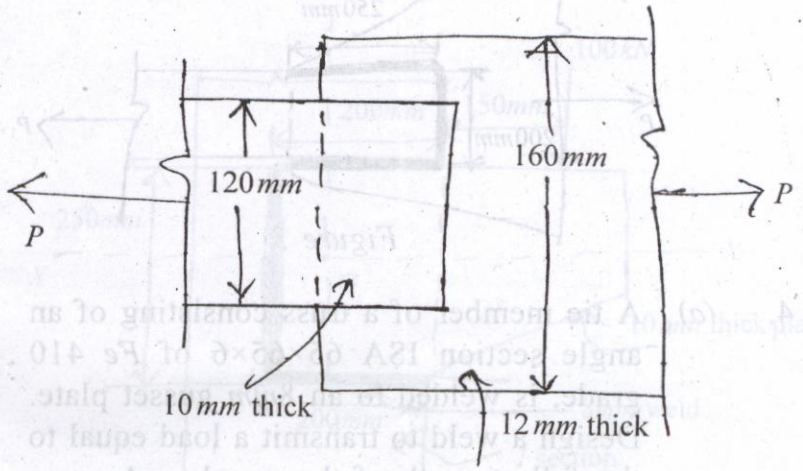

Fig. 2

(b) In a bridge truss a tie member is connected to a gusset plate as shown in *Figure 3*. Calculate the strength of the member. What should be the overlap length if the load on joint is $400kN$? Size of the weld = $6mm$. 8

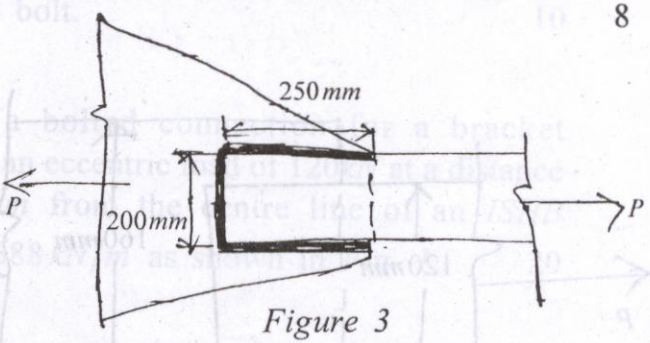

Figure 3

4. (a) A tie member of a truss consisting of an angle section ISA 65×65×6 of *Fe* 410 grade, is welded to an $8mm$ gusset plate. Design a weld to transmit a load equal to the full strength of the member. Assume shop welding. 10

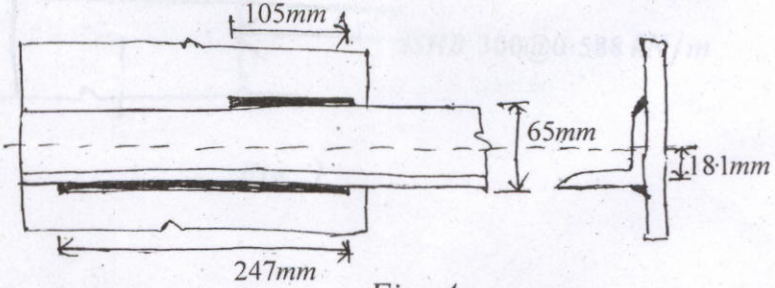

Fig. 4

(b) A 10*mm* thick plate has been connected with the flanges of an I-section by applying 8*mm* fillet weld as shown in *Figure 5*. A load of 100*kN* is placed eccentrically at a distance of 150*mm* from the flange. Check the safety of the joint. 10

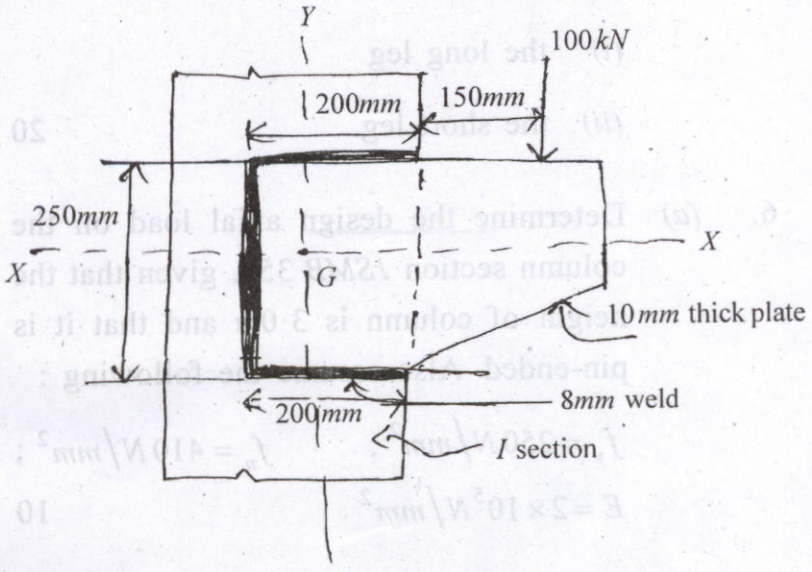

Figure 5

5. The single angle ISA 1007510 is used as a tension member. It is connected to a 8*mm* gusset plate and arranged with 6*nos.* of 16*mm* diameter bolts at a pitch of 50*mm* and end distance of 30*mm*. Calculate the strength of the angle when it is connected by

   (i) the long leg

   (ii) the short leg. 20

6. *(a)* Determine the design axial load on the column section *ISMB* 350, given that the height of column is 3·0*m* and that it is pin-ended. Also assume the following :

   $f_y = 250\,N/mm^2$, $f_u = 410\,N/mm^2$;

   $E = 2 \times 10^5\,N/mm^2$. 10

   (b) Calculate the compressive resistance of a 200×200×20 angle assuming that the angle is loaded through only one leg, when

   (a) it is connected by two bolts at the ends

(b) it is connected by one bolt at each end. 10