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)* What are the advantages and disadvantages of bolted connections ? Discuss briefly the different modes of failure of a bolted connection. How is the strength of a bolted connection determined ? 10

(b) The plates of a $6mm$ thick tank are connected by a single bolted lap joint with $20mm$ diameter bolts at $60mm$ pitch. Calculate the efficiency of the joint. Take f_u of plate as $410MPa$ and assume 4·6 grade bolts. 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 of line of an ISHB 300@ 0·588*kN/m* as shown in *figure 1*. 20

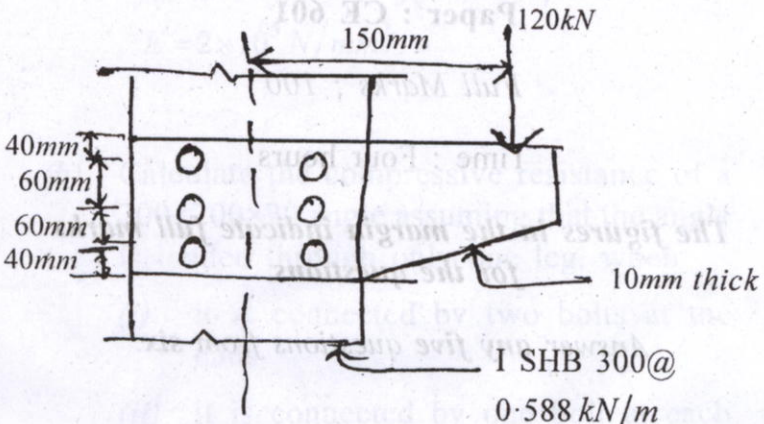

figure 1

3. *(a)* What do you mean by butt and fillet welt ? Define single '*V*' and double '*V*' butt weld with diagrams. Discuss standard fillet weld with neat sketches. 8

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

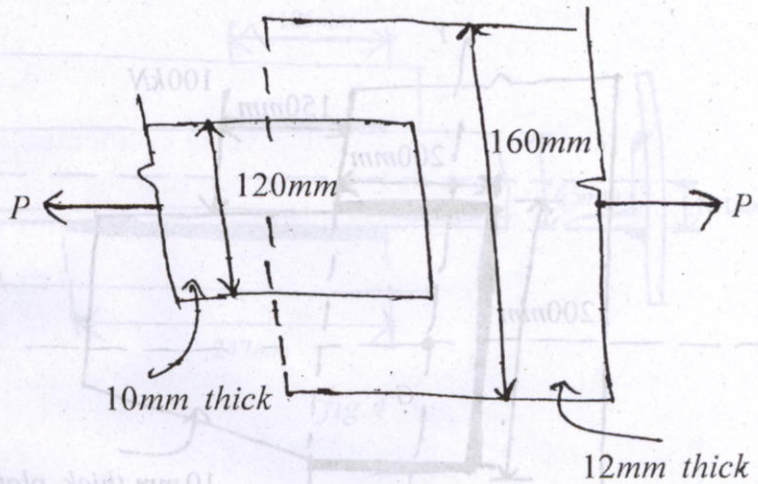

figure 2

4. *(a)* A 10*mm* thick plate has been connected with the flanges of an I-section by applying 8*mm* fillet weld as shown in *fig.3*. A load of 100*kN* is placed eccentrically at a distance of 150*mm* from the flange. Check the safety of the joint. 12

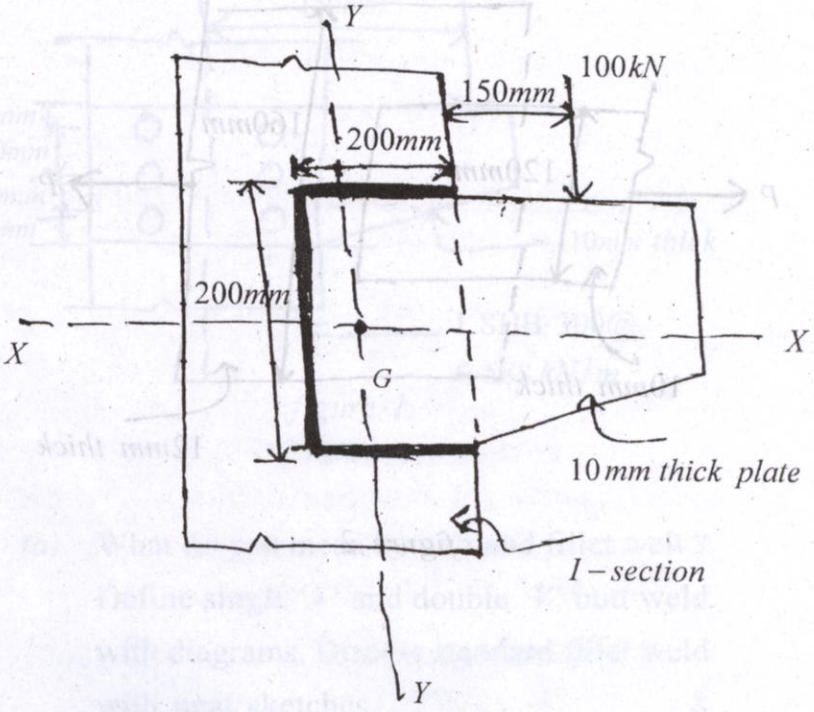

fig. 3

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

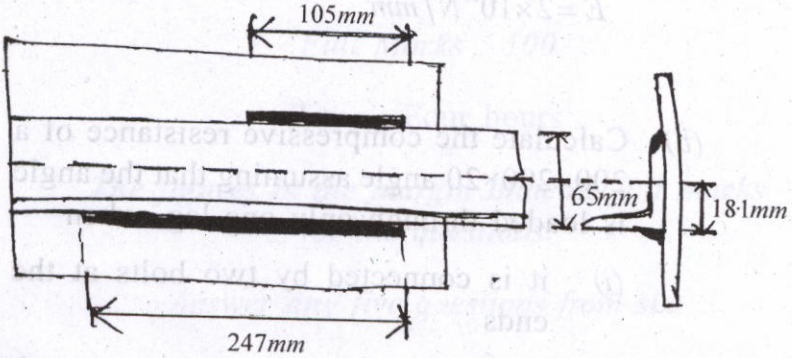

fig.4

5. The single angle ISA 1007510 is used as a tension member. It is connected to a 8*mm* gusset plate and arrange 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 20

(*i*) the long leg ; take $g = 60mm$

(*ii*) the short leg ; $g = 40mm$

6. *(a)* Determine the design axial load on the column section ISMB 350, given that the height of column is $3{\cdot}0m$ and that it is pin-ended. Also assume the following : 10

$f_y = 250\,N/mm^2$, $f_u = 410\,N/mm^2$,
$E = 2\times10^5\,N/mm^2$.

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

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

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