KEY - AU-5130 (MODEL)

STRUCTURAL ENGINEERING DESIGN - III

Section - A

i) It provides most of the flexural strength to a plate girder. It helps in dispersion of concentrated loads placed on top of the girder.

ii) To resist the bending induced by the tension field. It should be able to resist reaction and to prevent crushing of web under concentrated loads.

iii) Connections designed to transmit end moments in addition to the end shears are termed as rigid connections.

iv) Detail of a bracket in the plane of the flange of a column using fillet weld as shown in fig. 1.0

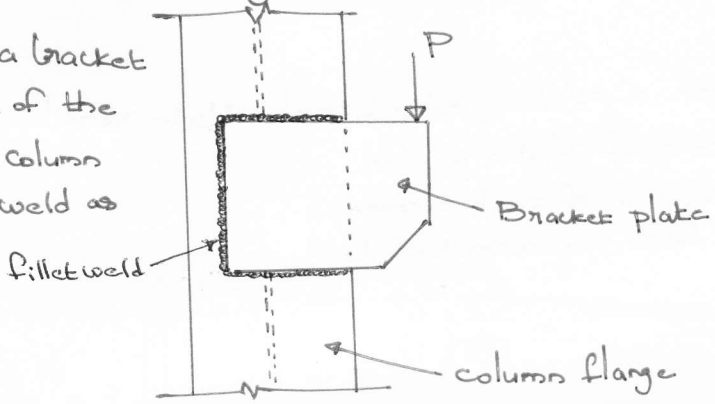

Fig. 1.0 Bracket connection.

v) This is an arc welding process and is extensively used for fixing stud shear connectors to beam in the composite construction.

vi) Angular distortion due to a single V butt weld is as shown in figure. 2.0

Figure 2.0 Angular distortion of butt weld.

vii) Fatigue effects of loads are to be accounted in design of a gantry girder as these carry moving loads.

viii) A Pratt truss is as shown in fig. 3.0 These are Provided for medium Pitch roofs.

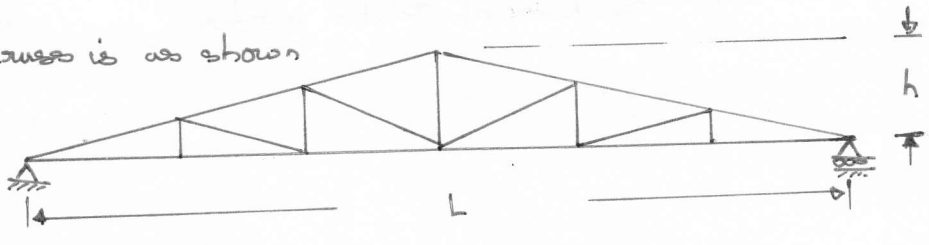

Fig. 3.0 Pratt truss

PTO

ix) The situations of suitability for a through type plate girder bridge are

- depth of the plate girder as well as upon the clearance available
- where a sufficient head room cannot be provided
- cost of additional embankment to raise the level of the rails is higher.

x) A bridge may be subjected to normal loads, occasional loads and extraordinary loads. in addition to the above temperature effects, Erection effects, Secondary effects, Deformation effects are also to be considered.

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Section-B (In the comprehensive answers following criteria is evaluated)

Unit-I

2. • A neat sketch of plate girder (preferably in pencil)
   • list of elements of plate girder
   • Give the resistance of each element.
   • Provisions to bear concentrated load.

(8M)

c/s of plate girder designed will be of the following c/s Properties.

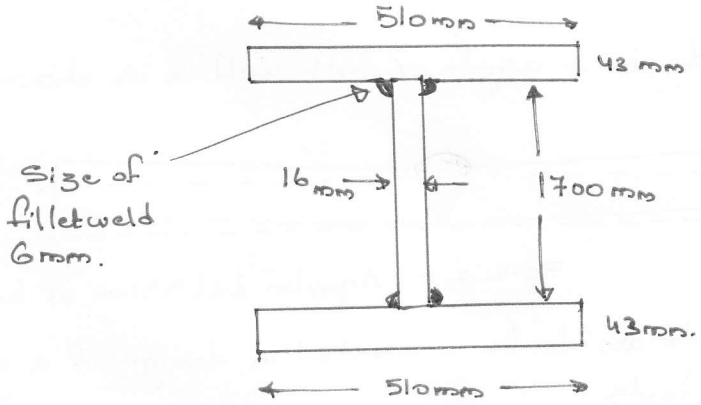

fig4. Design section of plate girder

Note:-
For detailed steps in design refer Annexure1.

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Unit-II

3.0 The design section of seat connection is as shown in figures below.

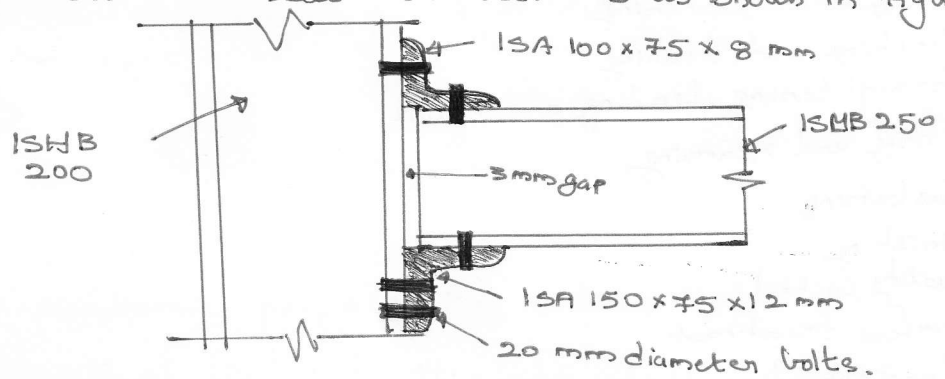
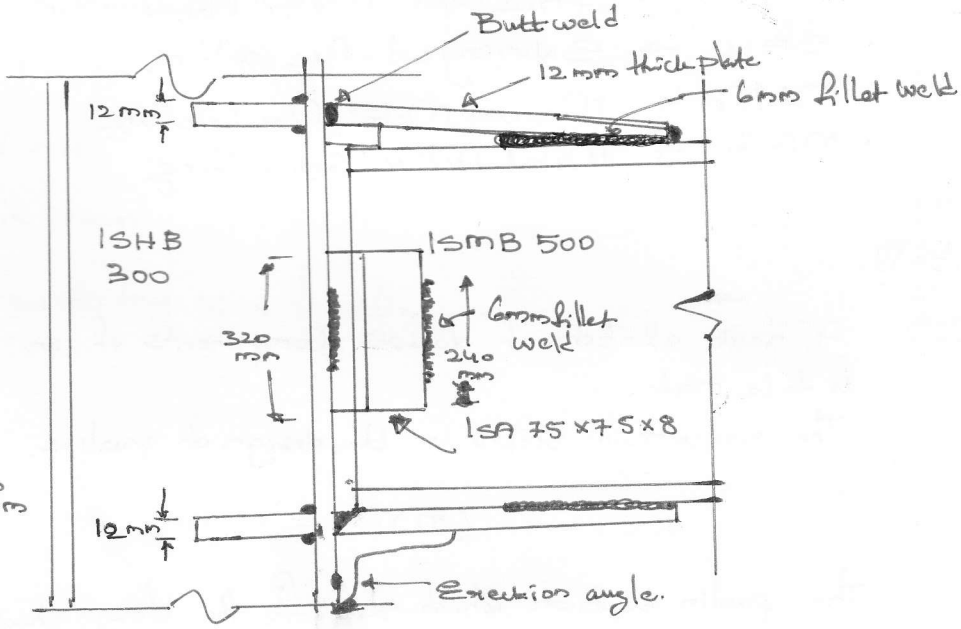


Fig. 5.0 Seat Connection



Top Plate
180 mm wide, tapered to 160 mm at the end.
thickness - 12 mm
weld size - 6 mm
Length of weld 560 mm
Side fillet weld - 200 mm
Unwelded portion of plate 180 mm
Length of top plate = 180 + 200
= 380 mm.

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Unit-III

4.0 Describe the activities in fabrication shops like

- Surface cleaning
- Cutting and machining
- Punching and drilling
- Straightening, bending and rolling
- Fitting and reaming
- Fastening
- Finishing
- Quality control
- Surface treatment
- Transportation.

(8M)

Description of the following weld processes

- SMAW → Shielded Metal Arc Welding
- SAW → Submerged-Arc welding
- MMA → Manual Metal-Arc Welding
- MAG → Metal-Active Gas Welding

Unit-IV

5.0 A neat sketch of various components of an industrial roof truss is to be made.
The sequencial steps in the design of purlins.

(8M)

The purlin section which satisfies the design checks are
ISWB150@166.77 N/m.

Having $M_{dz} = 28.83$ KNm

$M_{dy} = 6.477$ KNm

$$\therefore \frac{M_z}{M_{dz}} + \frac{M_y}{M_{dy}} = 0.733 < 1.$$

Deflection $\delta_{all} = \frac{l}{180} = 33.33$ mm

$$\delta = \frac{5}{384} \times \frac{wl^4}{EI} = 32.73 \text{ mm} < 33.33 \text{ mm}$$

OK

Unit-V

6.0 A neat sketch of through type truss girder bridge is to be made and various points of design required to be elaborated.

refer standard book
(3) Annexure II

(OR)

The economic proportions of a truss bridge for

i) depth of bridge truss girder should include the following
- span ratio as per is: 1915 - 1961
- minimum depth of truss
- For highway bridges and railway bridges
- min effective depth.

ii) general configuration should include the following
- span limits
- chord uses
- About K-truss
- Preference for long span deck bridges

refer standard book

— x —