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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Eighth Semester, B.E. - Civil Engineering

Semester End Examination; June - 2016

Design and Drawing of Steel structure

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **ONE** full question from **PART - A** and **ONE** full question from **PART - B**.*
ii) Use of IS-800-2007 and steel table is permitted.

PART - A

1. a. A stiffened seat connection connecting a beam to column flange has following details :

i) Beam ISMB 350 @ 514 N/m ii) Column ISHB 300 @ 576.8 N/m

iii) Seat plate 160 mm x 16 mm iv) Stiffener plate 300x16 mm

v) Cleat angle 100x100x6 mm connected with 5 mm size fillet weld. 16

vi) 11 mm size fillet weld is used to connect stiffener plate and seat plate to the column.

Draw to a suitable scale, i) Front view ii) Side view.

b. A stanchion ISHB 300@ 618 N/m in the lower storey of building is to be jointed to a stanchion ISHB 200 @ 392.4 N/m of the next upper storey. The joint has the following details :

i) Bearing plate 300 x 250 x 50 mm.

ii) Splice plates 6 mm thick, 250 mm width at bottom column and 200 mm width at top column.

iii) The splice plate is connected to the flange of the lower storey column 4 member of 24 mm diameter both on each side arranged in two vertical rows. 14

v) The splice plate is connected to the flange of the upper storey column through 10 number of 24 mm dia bolt arranged in two vertical rows.

vi) Web cleat angles of 60 mm x 60 mm x 6 mm, 4 numbers. They are connected to the web of the columns through 2 numbers of 24 mm diameter bolts and to the bearing plate also through 2 numbers of 24 mm diameter bolts. Draw to a suitable scale,

via) Front view vib) Side view.

2 a. A bolted gusset base has the following details :

i) Concrete pedernel – M20 grade

ii) Bose plate – 620 x 410 x16 mm

iii) Gusset angle – 150 x 115 x 15 mm

iv) Gusset plote – 410 x 288 x 16 mm

v) Column – ISHB 350 @ 661.2 N/mm

vi) Foundation bolts – 4 Number 24 mm diameter bolts

viii) Web cleat angle – 75 x 75 x 6 mm

Contd…2

Connection details

i) Gusset angle – Gusset plate and column

two horizontal rows of 6 bolt in each row, 24 mm diameter.

ii) Gusset plate – Flange of Column

two vertical rows of 2 bolts in each row, 24 mm diameter

iii) Web cleat angle

two bolts of 24 mm diameter for each leg.

Draw to a suitable scale, 7

i) Plan 12

ii) Front view 11

iii) Side view.

PART - B

3 a. Design a gantry girder to be used in an industrial building carrying a manually operated over head travelling crane, for the following data : 40

i) Crane Capacity - 200 kN

ii) Self weight of crane excluding trolley - 200 kN

iii) Self weight of the trolley, electric motor hook - 40 kN

iv) Minimum approach of the crane hook to the gantry girder - 1.2 m.

v) Wheel base - 3.5 m between

vi) C/C distance between gantry rails - 16 m.

vii) C/C distance between columns - 8 m

viii) Self weight of rail section - 300 N/m

ix) Diameter of Crane wheels - 150 mm

x) Steel is of grade Fe 410

Design also the field welded connection if required. The support bracket connection need not be designed.

Draw to a suitable scale showing details,

i) Top view 10

ii) Front view 10

iii) Section of gantry girder to an enlarged scale. 10

4 a. The forces in the members of a Fink roof truss shown in Fig (1) due to DL, LL and WL are tabulated in table (1). Design Rafter ($L_0 – u_1$), main fie (L_0 - L_1) and main sling (u_4 - m_1) members and bolted joints for this truss use M20 bolts of grade 4.6. Draw to a suitable scale the following, assuming ISA 50 x 50 x 6 mm for the members not designed. 35

i) Half Elevation, 20

ii) Connection details of joins L_0 and u_2. 15

Contd…3

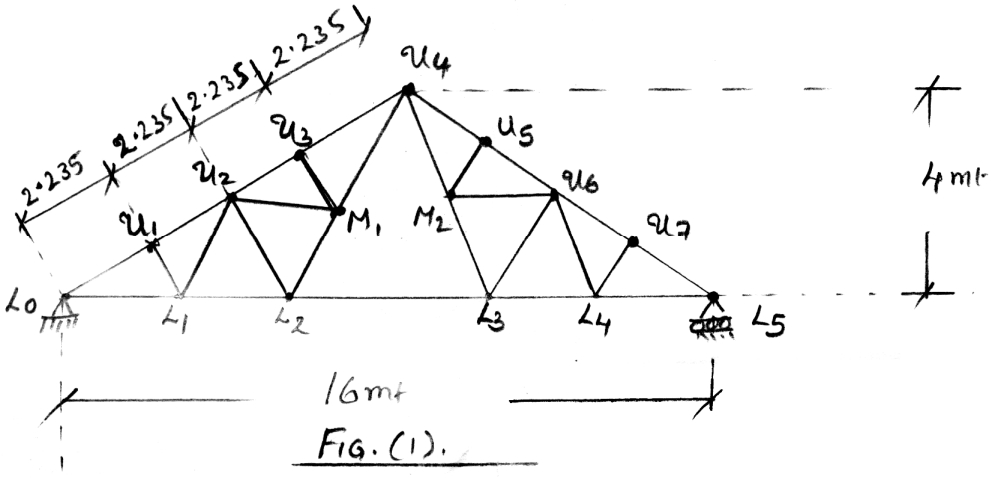

FIG. (1).

TABLE – (1)				
MEMBER	DL (KN)	LL (KN)	WL (KN)	
L_0 - u_1	- 58	- 52.5	+ 95.6	
u_1 - u_2	- 55.6	- 50.3	+ 95.6	
u_2 - u_3	- 51.4	- 46.5	+ 95.6	
u_3 - u_4	- 48.0	- 43.5	+ 95.6	Main Rafter
u_4 - u_5	- 48.0	- 43.5	+ 111.6	
u_5 - u_6	- 51.4	- 46.5	+ 111.6	
u_6 - u_7	- 55.6	- 50.3	+ 111.6	
u_7 - u_5	- 58.0	- 52.5	+ 111.6	
L_0 - L_1	+ 52.0	+ 47.0	- 76.0	
L_1 - L_2	+ 45.0	+ 40.7	- 64.0	Main tie
L_2 - L_3	+ 31.1	+ 28.2	- 39.8	
L_3 - L_4	+ 45.0	+ 40.7	- 81.8	
L_4 - L_5	+ 52.0	+ 47.0	- 102.4	
u_4 - M_1	+ 20.3	+ 18.4	- 36.3	Main sling
L_2 - M_1	+ 13.8	+ 12.5	- 24.2	
u_4 - M_2	+ 20.3	+ 18.4	- 63.0	
L_3 - M_2	+ 13.8	+ 12.5	- 42.0	

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