KADI SARVA VISHWAVIDYALAYA
B.E. SEMESTER VII EXAMINATION (NOVEMBER-2016)

SUBJECT CODE: CV701   SUBJECT NAME: DESIGN OF STEEL STRUCTURE

DATE: 08/11/2016   TIME: 10:30 am to 1:30 pm   TOTAL MARKS: 70

Instructions:
1. Answer each section in separate Answer Sheet.
2. Use of scientific Calculator is permitted.
3. All questions are compulsory.
4. Indicate **clearly**, the options you attempted along with its respective question number.
5. Use the last page of main supplementary for rough work.
6. Make suitable assumptions wherever necessary.
7. Use of **IS: 800-2007** and **Steel Table** is permitted only.

Section-1

Q:1   (All Compulsory)

(A) Explain drawing neat sketches the terms: "Lacing" and "Battening".   05

(B) Determine area and thickness of base plate for a column ISHB 350 to carry a   05
factored axial load of 1200 kN.

(C) Design suitable fillet weld to connect base plate and column ISHB 350 for   05
Q-1 (B). Also design concrete block. Assume Fe 410 grade steel and M 25
grade concrete. Take SBC of soil as 200 kN/m². Provide necessary sketches.

OR

(C) Give difference between working stress method and limit state method.   05

Q:2   Answer the following Question.

(A) Explain Shear lag effect with neat sketches.   05

(B) Design a column to carry an axial factored load of 1200 kN. The actual   05
length of column is 6 m with both ends effectively held in position and
restrained against rotation. Select two channels back to back. Assume that
the column is laced and f_y = 250 MPa.

OR

(A) Design a tension member to carry a factored load of 230 kN. Use single   05
unequal angle with 4 mm fillet weld for the connection to gusset plate.
Length of member is 3 m. Take f_y = 250 MPa and f_u = 410 MPa.

(B) Calculate the compressive strength of a single angle strut ISA 100 X 75 X 10   05
mm with center to center length of 1.5 m. Angle is loaded through one leg
ends are fixed. Consider 1 bolt at the each end. Take f_y = 250 MPa.

Q:3   Answer the following Question.

(A) Explain: Web Buckling and Web Crippling.   05

(B) Calculate the moment carrying capacity of a 3 m long ISMB 350 beam which   05
has full torsional restraint and no warping restraint at ends only. Beam is
laterally unrestrained.

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OR

(A) Design a simply supported beam of span 7 m carrying RCC slab capable of providing lateral restraint to the top compression flange. The beam is subjected to total UDL of 100 kN dead load excluding self-weight plus 150 kN imposed load. In addition, the beam carries a point load at mid span made up of 50 kN dead load and 50 kN live load.   10

Section-2

Q:4 (All Compulsory)

(A) What do you understand by bolt of property class 4.6? Also write advantages of HSFG bolts.   05

(B) A tie member consisting of ISMC 225 is connected to either side of the gusset plate of 12 mm thickness. Design the welded joint to develop full strength of the tie if the overlap is limited to 400 mm. Provide necessary sketches.   05

(C) An ISA 100 X 65 X 8 mm is carrying an axial tension of 125 kN with longer leg connected to G.P. 10 mm thick. Design the joint using 20 mm diameter 4.6 grade bolts. Assume f_u of plate as 410 MPa.   05

OR

(C) Write IS code provisions for following properties of fillet weld.   05
   1) Size of weld
   2) Effective throat thickness
   3) End returns
   4) Overlap
   5) Effective length

Q:5 Answer the following Question.

(A) A T-section is attached to flange of column by 6 bolts of 16 mm diameter of 4.6 grade as shown in **Fig.1**. Assume that the T section and column are capable of resisting the load. Check the adequacy of bolts.   05

(B) A cantilever beam of span 3 m is subjected to a load of 40 kN at an eccentricity of 30 mm. Design of beam.   05

OR

(A) Two plates of thickness 12 mm and 10 mm are to be joined by a groove weld. The joint is subjected to a factored tensile force of 200 kN. Assuming effective length of 120 mm, check the safety of the joint for,   05
   1) Single V-groove weld joint
   2) Double V-groove weld joint

(B) A simply supported beam of 8 m span is subjected to dead load 6 kN/m, live load 20 kN/m in addition to its self-weight. The load is applied at an eccentricity of 100 mm from the center of the web. Design suitable beam. Assume the ends of the beam have torsional simple supports.   05

Q:6 Answer the following Question.

(A) Define the following terms.   05
   1) Plastic section modulus

2

    2) Shape factor
    3) Plastic hinge
    4) Load Factor
    5) Collapse Load

(B) Design a uniform section for moment and shear capacity of two spans   05
simply supported continuous beam ABC. Span AB is of 4 m length and
carries a central point load of 150 kN and span BC is of 6 m length and
carries a central point load of 200 kN. Assume the beam is to be laterally
supported. Adopt plastic design procedure. Take shape factor = 1.14 and
F.O.S = 1.5

OR

(A) Determine shape factor for a beam of a circular and rectangular section.   05
(B) Determine collapse load for propped cantilever beam subjected to UDL on   05
entire span with neat sketch.
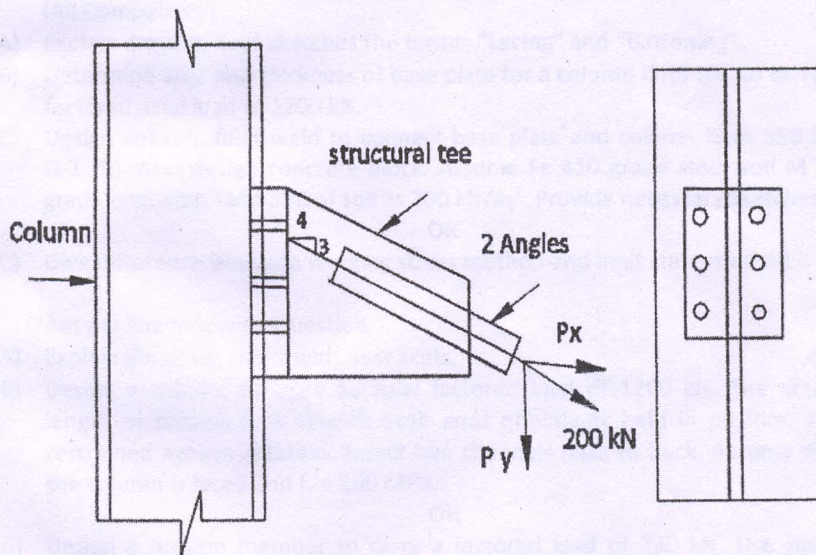
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Fig.-1

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KADI SARVA VISHWAVIDYALAYA

B.E. (Civil) Semester-VII Examination, November 2015

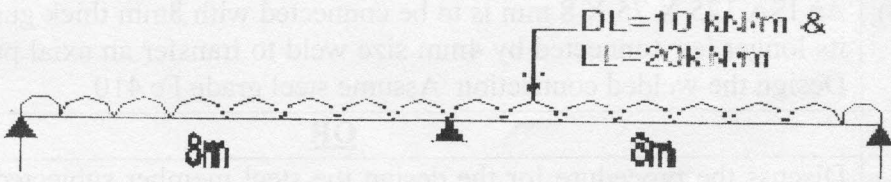Subject Code: CV-701   Subject: Design of Steel Structure

Date: 20/11/2015   Time: 10:30 am to 1:30 pm   Total Marks: 70

Instructions:

(1) Answer each section in separate answer sheet.
(2) All questions are Compulsory.
(3) Use of IS:800-2007 and Steel Table are permitted, assume other required data.
(4) Indicate **clearly**, the options you attempt along with its respective questions number.
(5) Use the last page of main supplementary for **rough work**

		Section-I	
Q-1		**(All Compulsory)**	
	(A)	Discuss advantages and disadvantages of structural steel.	**[5]**
	(B)	A single bolted double cover butt joint is used to connect two plate of 6mm thickness. Considering the bolts of 20mm diameter at 5omm pitch, calculate the efficiency of the joint. Use 410 Mpa plates and 4.6 grade bolts.	**[5]**
	(C)	Draw neat and clean figures for beam to beam connection.(Any Two)	**[5]**
		OR	
	(C)	Draw neat and clean figures for beam to column connection.(Any Two)	**[5]**
Q-2		**Answer the following Questions**	
	(A)	Explain following for fillet weld. 1) Size of weld 2) Throat thickness. 3) Leg of weld.	**[5]**
	(B)	An ISA 125 X 75 X 8 mm is to be connected with 8mm thick gusset plate with its longer leg connected by 4mm size weld to transfer an axial pull of 100 kN. Design the welded connection. Assume steel grade Fe 410.	**[5]**
		OR	
	(A)	Discuss the procedure for the design the steel member subjected to combined axial and bending loading.	**[5]**
	(B)	Design a simply supported beam of span 6m carrying working loads of DL =20 kN/m and LL= 10 kN/m. Assume that the compression flange of the beam is laterally restrained throughout.	**[5]**
Q-3		**Answer the following Questions**	
	(A)	What is the difference between Mild steel and HYSD steel. Also state the few characteristics of both types of steel.	**[5]**
	(B)	Select suitable angle section to carry a factored tensile load of 210 kN assuming a single row of M 20 bolts and f_y = 250 N/ mm^2.	**[5]**
		OR	
	(A)	Design the slab base foundation for a column ISMB 350 to carry a factored axial load of 1200 kN. Assume Fe 410 grade of steel and M 25 concrete. Take safe bearing capacity of soil as 200 kN/ m^2.	**[5]**
	(B)	Design a steel column to carry factored axial load of 1500 kN. The length of column is 4 m. and hinged at both ends.	**[5]**
		Section-II	
Q-4		**(All Compulsory)**	
	(A)	Explain in brief : shear lag effect .	**[5]**

	(B)	An angle section 90 X 90 X 8 mm is to be connected to gusset plate by 6 mm fillet weld on sides at the end of the member. The member is carrying tensile load of 150 kN. Design the welded connection. Steel grade Fe 410 and Fillet welding.	[5]
	(C)	Calculate the moment carrying capacity of a 3 m long ISMB 350 beam which has full tensional restraint and no warping restraint at ends only. Assume beam is laterally unrestrained.	[5]
		OR	
	(C)	Write difference between Working stress and Limit state Method.	[5]
Q-5		**Answer the following Questions**	
	(A)	Describe what you understand by class 4.6 and class 8.8 bolts?	[5]
	(B)	Determine the axial load on the column section ISMB 350 having height of 3 m , hinged at both ends. Take $f_y = 250$ N/ mm^2.	[5]
		OR	
	(A)	Design a gusseted base for column ISMB 400 with cover plates 400 X 20 mm on each flange. The factored load on column is 4000 kN. Length of column is 5 m. The SBC of soil is 250 kN/ m^2. M 15 grade of concrete is used for pedestal.	[5]
	(B)	A simply support beam is laterally supported over the span of 6 m and loaded by a all inclusive factored udl of 30 kN/m over the entire span and 100 kN at center. The beam using ISMB section and check for all the safety.	[5]
Q-6		**Answer the following Questions**	
	(A)	State advantages and disadvantages of Welded and bolted connections.	[5]
	(B)	A two span continuous beam is loaded as in figure. Design the beam using plastic method. Take $f_y = 250$ N/ mm^2.	[5]

		OR	
	(A)	Design the slab base foundation for a built up column composed of 2 ISMC 300 @ 35.8 kg/m placed back to back clear spacing 200 mm. Axial load on column is 1500 kN. Assume Fe 410 grade of steel and M 20 concrete. Take safe bearing capacity of soil as 200 kN/ m2.	[5]
	(B)	A cantilever beam of span 3 m is subjected to load of 40 kN at an eccentricity of 30 mm. Design the beam (Make Torsion design).	[5]

*** All the Best ***