

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER EXAMINATIONS, APRIL/MAY 2017

SUBJECT: ADVANCE DESIGN OF STEEL STRUCTURE (CIE-4013)

REVISED CREDIT SYSTEM

(/ /2017)

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- ♦ Usage of IS :800 -2007 and SP-6 is permitted

1.	A plate girder 20m in span and laterally restrained throughout. It has to support a uniform service load 35kN/m throughout the span. Design the girder using intermediate stiffeners. Use Fe 410 and yield stress of steel is 250N/mm² . Check for shear, end panel design and buckling resistance of intermediate stiffener.	10
2.	Design a simply supported gantry girder to be used in an industrial building carrying a electric overhead travelling crane, for the following data: Crane capacity 250 kN , self-weight of the crane girder excluding trolley 200KN , self-weight of trolley 50 kN , Approximate minimum approach of the crane hook to the gantry girder 1.0m , wheel base 3.5m , c/c distance between gantry rails 16m , c/c distance between columns 6.5 , self-weight of rail section 300N/m , diameter of the crane wheels 150mm , steel grade Fe 410 . Check for Lateral torsional buckling and check for deflection (γ_{mo} =1.1, γ_{mw} =1.5, γ_{m1} =1.5).	10
3A.	Check the fatigue strength for cantilever beam of span 2.5m carrying 150kN concentrated load at the end, for the following data: The crane operates for 150 days per year, the working hours 9 am to 3 pm, maximum number of trips per hour 2, design life 50 years (Intermittent weld is used for I and Channel section). The section modulus 3000 x 10 ³ mm ³ .Use section ISWB 500 @ 95.2kg/m and ISMC 300@35.6 kg/m γ_{mft} =1.15.	06
3B.	Explain with neat sketch why end posts are required in plate girder	04
4.	Design a uniaxial industrial column of unsupported length 4m height subjected to following loads and moments: Factored axial load 500kN, Factored moment Mz @ top 20 kN-m, Factored moment Mz @bottom 40 kN-m,. Assume effective length of column as 0.8L, use Fe410 steel grade (Fy = 250 N/mm ²).	10
5A.	Explain briefly about axially loaded compression members of Light gauge steel members.	04
5B.	Explain with neat sketch Laterally supported beams in light gauge steel members.	06