

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

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

SUBJECT: ADVANCE DESIGN OF STEEL STRUCTURES [CIE 4013] **REVISED CREDIT SYSTEM**

(29/04/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

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

1.	Design a welded plate girder 24m in span and laterally restrained throughout. It has to support a uniform service load 100kN/m throughout the span exclusive of self-weight. Design the girder without intermediate transverse stiffeners. Use Fe 410 and yield stress of steel is 250MPa . Design the cross section, end load bearing stiffener. Check for bending strength, shear capacity, buckling of stiffener, bearing capacity of stiffener.	10
2.	Design a gantry girder to' be used in an industrial building carrying a manually operated overhead travelling crane, for the following data: Crane capacity 250 kN, self-weight of the crane girder excluding trolley 180kN, self-weight of trolley 30 kN, Approximate minimum approach of the crane hook to the gantry girder 1.2m, wheel base 3.4m, c/c distance between gantry rails 15m, c/c distance between columns 8m, self-weight of rail section 300N/m, diameter of the crane wheels 150mm, steel grade Fe 410, self-weight of girder 2kN/m. Check for combined local capacity (γ_{mo} =1.1, γ_{mw} =1.5, γ_{m1} =1.5).	10
3A.	Check the fatigue strength for gantry girder designed, for the following data: The crane operates for 200 days per year, the working hours 9 am to 5 pm, maximum number of trips per hour 3, design life 60 years (Intermittent weld is used for I and Channel section). The max moment 500 kN-m, max shear force 300 kN, section modulus 3764.98 x 10 ³ mm ³ . Use section ISWB 600 @ 133.7 kg/m and ISMC $300@35.6$ kg/m γ_{mft} =1.15.	05
3B.	Design laterally unsupported beam for the given loads Live load 0.9kN/m and Dead load 1.5kN/m steel grade Fe 410 refer Fig. l, Fy= 250N/mm ² .	05
4.	Design a Biaxial industrial column of unsupported length 5m height subjected to following loads and moments: Factored axial load 600kN , Factored moment Mz @ top 30 kN-m , Factored moment Mz @bottom 50 kN-m , Factored moment My @ top 4 kN-m , Factored moment My @ bottom 8 kN-m . Assume effective length of column as 0.8L , use Fe410 steel grade (Fy = 250 N/mm²).	10

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5A.	Explain briefly about post buckling strength of Light gauge steel members. 04			
5B.	Explain briefly about effective width calculations for un stiffened, stiffened and stiffened elements.			

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