BHAGWAN MAHAVIR COLLEGE OF ENGINEERING AND TECHNOLOGY, SURAT.

BRANCH : CIVIL

SUBJECT : DESIGN OF STEEL STRUCTURES

SUBJECT CODE : 2180610

FACULTY : KAMALSINH PADHIAR

Bhagwan Mahavir College of Engineering and Technology,

Surat.

ASSIGNMENT NO: 1

DESIGN OF PLATE GIRDERS

1. Design the welded plate girder of effective span 30m carrying uniformly distributed load 30KN/m with two concentrated load 150KN each at 10m from either ends. Assume that the top compressive strength is restraint laterally. Use Fe 415 grade steel. Design as an unstiffened plate girder with thick web.
2. Redesign the plate girder in 1st example with intermediate stiffners and not using tension field action.
3. Design a bolted plate girder for effective span of 21m to carry two concentrated factor loads 600KN each at 7m from ends along with factor u.d.l of 50KN/m.

   The girder is laterally supported.

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ASSIGNMENT NO: 2

DESIGN OF GANTRY GIRDERS

1. Design a gantry girder for the following data:

   Crane capacity = 200KN

   Span of gantry girder = 7.5m

   Span of crane girder = 15m

   Self weight of the crane girder excluding trolley = 200KN

   Self weight of trolley (crab) = 40KN

   Minimum hook approach = 1.2m

   Wheel base of crane = 3.5m

   Self weight of rail section = 300N/m

   Take yield stress of steel = 250MPa

   Assume no lateral restraint along the span.

2. Design a gantry girder to carry two electrically operated overhead cranes travelling in tandem, having following data:

   (1) Crane capacity (each) = 200KN

   (2) Weight of crane girder = 180KN

   (3) Wheel spacing = 3.2m

   (4) Weight of crab = 50KN

   (5) Span of crane between rails = 16m

   (6) Minimum edge distance = 1.2m

(7) Minimum spacing between cranes = 2.0m

(8) Span of gantry girder = 8m

(9) Weight of rail = 0.5KN/m

(10) Height of rail section = 75mm

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ASSIGNMENT NO: 3

FOOT OVER BRIDGE

1. Design a steel foot over bridge for the following data:

   Span of bridge = 24m

   Width of walkway = 4m

   Flooring = R.C.C. slab 110 mm thick

   Live load = 5KN/

   Floor finish = 0.75KN/

   Use N-type lattice girder

   Assume suitable data if necessary.

Rakers are provided at alternate top chord joints. Take, fy = 250N/.

ASSIGNMENT NO: 4

PLASTIC DESIGN

1. Explain the concept of plastic analysis & design.
2. State the assumptions made in plastic design.
3. Define terms:

   (a.i.1.a) Shape Factor

   (a.i.1.b) Plastic hindge

   (a.i.1.c) Load Factor
4. Explain formation of plastic hinge & points at which hinge i likely to form?
5. A three span continuous beam ABCD is loaded with ultimate loads as shown in fig. Determine the required plastic moment of resistance and design the beam considering uniform section.
6. Design a uniform section for moment and shear capacity of two spans simply supported continuous beam ABC. Span AB is of 4m length and carried a central concentrated load of 150 kN and span BC is of 6m length and carries concentrated load of 200kN. Assume the beam is to be laterally supported. Adopt plastic design procedure.
7. Find the collapse load for the frame of uniform section shown in fig under the applied factored loads.

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ASSIGNMENT NO: 5

DESIGN OF INDUSTRIAL BUILDING

1. Determine dead load, live load and wind load per panel point for the roof truss of a workshop shed constructed at Ahmedabad for the following requirements.
    a. Span of truss = 15 m
    b. Spacing of truss = 4 m c/c
    c. Rise of truss = 3 m
    d. Height of truss above G.L. = 20m
    e. A.C.C sheets @ 150 N/m^2 are used as roof covering
    f. Assume weight of Purlin and other fixtures = 120 N/m^2 per plan area.
    g. Total nos. Of Panels =8
    h. Opening of wall area = 10%
    i. Probable life of roof truss = 25 years, Terrain category = 3 and class = A structures.
    j. Topography = Plain horizontal ground and upwind slope less than 3^o
2. Design an angle section for a purlin having 3 m span. It carries design load of 2.5 kN/m and supported on four supports. Angle of roof truss is 26^o.
3. Design a steel roof truss for the following data:

    Location : Ahmedabad

    Span of roof truss : 14m

    Spacing of roof truss : 5m

    Pitch : ¼

    a. Fix the configuration of truss
    b. Compute DL, LL , WL at nodal Points

c. Design purlin

d. Design principal rafter

e. Design main tie

Assume suitable data if necessary.