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| **Assignment No:** | **01** | **Introduction and Loads** | |
| **Date:** | **02/01/2018** | | |
| **Sub Code** | **X60604 [PDDC]** | **Title of Subject** | **Structural Design – I** |

| # | Questions |
|---|---|
| 1 | Explain stress-strain curve for mild steel bar with figure. |
| 2 | What is limit state of serviceability? Discuss considerations taken by IS: 800-2007. |
| 3 | Distinguish between Limit State method and Working stress method of design. |
| 4 | Explain advantages and disadvantages of using steel structures and RCC Structures. |
| 5 | List out various types of loads to be considered in design of steel structures Also, explain effect of wind and earthquake loads |

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| Name of Professor | **Prof. K. A. Mehta** |
| Date of Submission | 15/01/2018 |

**Assignment No:** 02

**Date:** 15/01/2018

# Design of Steel roof Truss

**Sub Code** X60604 [PDDC] **Title of Subject** Structural Design – I

| # | Questions |
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| 1 | Calculate nodal loads due to dead load, live load and wind load for an industrial building of size 12 m x 60 m situated in Ahmedabad. Spacing between two trusses = 5 m C/C. Assume suitable configuration for the truss. Consider medium permeability and use A.C. Sheets. Height of eaves level is 20 m. Assume suitable data if necessary. |
| 2 | Determine the design loads on the purlins of an industrial building near Surat, Gujarat. Considered general type of building with life of 50 years in terrain category 3. The height of eave level is 5 m with 12 m truss span. Consider, Topography $\theta < 2°$, Spacing of trusses is 4 m, Permeability near to medium, Sheeting used as A.C. sheets, Spacing of purlins is 1.35 m and Pitch: 1/3.5. |
| 3 | Show various types of truss components using figure. Also, determine the design loads coming on the purlins of an industrial building near city Pune considering as general building with life of 50 years. A structure fall under terrain category 2 with maximum dimension of 40 m and width having 20 m. The height of eave level is 6 m with 13 m truss span. Other data: Topography: $\theta < 3°$, Spacing of trusses: 4.5 m, Permeability: Medium Sheeting; A. C. sheets, Spacing of purlins: 1.35 m, Pitch: 1/4 |

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| Name of Professor | **Prof. K. A. Mehta** |
| Date of Submission | 12/02/2018 |

**Assignment No:** 03

**Date:** 12/02/2018

# Design of Portal Frames using Plastic approach

**Sub Code** X60604 [PDDC] **Title of Subject** Structural Design – I

| # | Questions |
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| 1 | Explain concept of Plastic design method. Give advantages of plastic design method. |
| 2 | Explain phenomena of occurring plastic hinge. Also, show the important locations (using appropriate figure) where it occurs |
| 3 | A portal frame consists of two hinge supported column of 4 m height separated by a beam of span 6 m and loaded up to collapse with downward uniformly distributed load of 12 kN/m and lateral point load of 20 kN at beam column junction . Find the plastic moment of resistance if it is of uniform strength. |
| 4 | A portal frame consist two hinge supported column of 3.0 m length separated by a beam of span 4 m and loaded up to collapse with downward uniformly distributed load of 20 kN/m and lateral load of 15 kN (From left). Find the plastic moment of resistance if it is of uniform strength. |
| 5 | A portal frame consists of two hinge supported column of 5 m height separated by a beam of span 7 m and loaded up to collapse with downward uniformly distributed load of 20 kN/m and lateral point load of 100 kN at beam column junction . Find the plastic moment of resistance if it is of uniform strength. |

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| Name of Professor | **Prof. K. A. Mehta** |
| Date of Submission | 26/03/2018 |

**Assignment No:** 04

**Date:** 12/03/2018

# Design of steel structures

**Sub Code** X60604 [PDDC] **Title of Subject** Structural Design – I

| # | Questions |
|---|---|
| 1 | What is plate girder? Explain different methods for designing a plate girder as per IS 800:2007. |
| 2 | Enlist advantages and disadvantages of plate girder against other structural body |
| 3 | Design a simply supported gantry girder to carry one electric overhead travelling crane with following details.<br>Span of gantry girder = 6.5 m<br>Span of crane girder = 16 m<br>Crane capacity = 200 kN<br>Self weight of crane girder excluding trolley =200 kN<br>Self weight of trolley = 40 kN<br>Minimum hook approach = 1.2 m<br>Distance between wheels = 3.0 m. |
| 4 | Design a simply supported gantry girder to carry one electric overhead travelling crane. Considering following data:<br>Span of gantry girder = 5 m,<br>Span of crane girder = 20 m,<br>Crane capacity = 200 kN,<br>Self weight of crane girder excluding trolley =100 kN,<br>Self weight of trolley = 45 kN,<br>Minimum hook approach = 1.2 m,<br>Distance between wheels = 3 m,<br>Self weight of rails = 0.3 kN/m,<br>Only do the check for buckling resistance |
| 5 | A simply supported welded plate girder of span 27 m is subjected to service load of 50 kN/m Uniformly Distributed Load (U.D.L.) and two fixed point loads of 200 kN each spaced at 9 m from each supports. Design the plate girder cross section using the fy = 250 steel plates. Perform all required checks for cross section as per IS code provisions. Apply curtailment of flanges. |

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| **6** | Design only web and flange (with respective checks) of plate girder of span of 30 m subjected to factored load of 80 kN/m throughout and two factored point load of 400 kN acting at 10 m and 20 m from left support. In this plate girder transverse stiffener should be avoided. Use simple post critical method for checking of shear buckling of web. Assume μ = 0.3, E = 2 x 105 N/mm$^2$, fy = 250 MPa |
| **7** | Design the foot bridge for the following data:<br>Type of truss: N- Type lattice girder, No. of Panels: 8 panels, laterally supported by Rakers.<br>Span: 24 m, Width of walk way: 3.5 m, Height = 3 m, Flooring: RCC slab 125 mm with floor finish 1.0 kN/m$^2$, Live Load: 4 kN/m$^2$. |
| **8** | Design a pedestrian foot bridge of N - Type lattice girder considering 8 no. of panels and laterally supported by rakers. Consider bridge span of 16 m and width of walk way is 2.0 m. Flooring made up with RCC slab of 100 mm depth considering floor finish and live load is 1.3 kN/m$^2$ and 3.0 kN/m$^2$ respectively. |
| **9** | A foot over bridge is of span 24 m and pedestrian load of 5 kN/m$^2$. The clear distance between two trusses is 3.5 m and truss height is 2.2 m. Take dead weight of truss is 1.5 kN/m. Flooring made up with RCC slab of 100 mm depth, considering floor finish 1 kN/m$^2$. Assume suitable configurations of truss and design & detail a cross beam and a top chord near center. |

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| Name of Professor | **Prof. K. A. Mehta** |
| Date of Submission | 16/04/2018 |

**Assignment No:** 05

**Date:** 26/02/2018

# Connections

**Sub Code** X60604 [PDDC] **Title of Subject** Structural Design – I

| # | Questions |
|---|---|
| 1 | Enlist advantages and disadvantages of welded, bolted and riveted connection |
| 2 | Draw neat sketches of beam to column stiffened and un-stiffened connection. |
| 3 | A beam ISLB 450 transfers a factored load of 850 kN to a column ISHB 450. Using Fe 410 grade steel, design the stiffened seat connection. |
| 4 | A beam ISMB 450 transfers a factored load of 400 kN to a column ISHB 350. Using Fe 410 grade steel, design the stiffened seat connection. |

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| Name of Professor | **Prof. K. A. Mehta** |
| Date of Submission | 19/03/2018 |