

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**M.Tech., Summer 2017-18 Examination**

**Semester: 2****Subject Code: 03209153****Subject Name: Advanced Design of Steel Structures****Date: 23-05-2018****Time: 02:00PM to 04:30PM****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1** A) What are the different loads acting on the Gantry Girder. Explain in detail. **(05)**

B) Explain the design steps involved in the design of Gantry Girder. **(05)**

C) What do you mean by Cold Formed Steel? Explain its advantages and disadvantages. **(05)**

**Q.2** Answer the following questions. (Attempt any three) (Each five mark) **(15)**

A) Explain Elastic Stress-strain relations?

B) Explain Plane stress and Plane strain?

C) Explain Tresca's Theory and Von Mises's theory?

D) What are the yield criteria? What is Flow Rule?

**Q.3** A) Explain St. Venant's theory of plastic flow? **(07)**

B) Design a Gantry Girder for a single crane M.O.T for the Following Data: **(08)**

Crane Capacity=300kN

Span of Gantry Girder=6m

Span of Crane Girder=15m

Self Weight of the crane girder excluding trolley=250kN

Self Weight of Trolley (crab)=50kN

Minimum Hook Approach 1.0m

Wheel Base of Crane=3.2m

Self Weight of Rail Section=300 N/m

Take Yield Stress of Steel =250 MPa

Assume no lateral restraint along the span.

**OR**

B) Design a Gantry Girder to carry two E.O.T cranes operating for the Following Data: **(08)**

Crane Capacity(each)=150kN

Span of Gantry Girder=7.0m

Span of Crane Girder=18m

Self Weight of the crane girder excluding trolley=180kN

Self Weight of Trolley (crab)=40kN

Minimum Hook Approach 1.1m

Minimum Spacing between cranes=2m

Wheel Base of Crane=3.0m

Self Weight of Rail Section=0.3 kN/m

Take Yield Stress of Steel =250 MPa,  $E=2 \times 10^5$  N/mm<sup>2</sup>

Assume no lateral restraint along the span.

**Q.4** A) What are the conditions under which cold form steel is preferred? **(07)**

**OR**

A) What is Plastic Analysis? What is Shape Factor? **(07)**

B) An Industrial building of plan 15m×30m is to be constructed as shown in Fig. Using plastic **(08)**

analysis, analyse and design the single span portal frame with gabled roof. The frame has a span of 15 m, the column height is 6m and the rafter rise is 3 m and the frames are spaced at 5 m centre-to-centre. Purlins are provided over the frames at 2.7 m c/c and support AC sheets. The dead load of the roof system including sheets, purlins and fixtures is 0.4 kN/m<sup>2</sup> and the live load is 0.52 kN/m<sup>2</sup>. The portal frames support a gantry girder at 3.25 m height, over which an electric overhead travelling (EOT) crane is to be operated. The crane capacity is to be 300 kN and the crane girder weighs 300 kN while the crab (trolley) weight is 60 kN.

