SLR-TX – 56

Seat No.	

Set P

T.E. (Civil Engineering) (Part – I) (Old CGPA) Examination, 2018
DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 30-11-2018 Max. Marks : 70
Time : 2.30 p.m. to 5.30 p.m.

N.B. *: 1) Answer **any three** questions from **each** Section.*
*2) **Use** of IS 800-2007 and IS 875 Part **1**, Part **2** and Part **3** are allowed, but not **allowed** for MCQ (Q1).*
*3) **Use** of scientific non programmable calculator is **allowed**.*
4) Figures to the right indicate the full marks.
*5) Assume suitable data if necessary and mention it **clearly** before the solution.*
*6) Draw the appropriate sketches **whenever** necessary.*
*7) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

i) Steel is an alloy which mainly contains
a) iron and silica b) iron and sulphur
c) iron and carbon d) iron and sodium

ii) What is the hole diameter for a bolt of 25 mm diameter ?
a) 25 mm b) 26 mm c) 30 mm d) 28 mm

iii) Which of the following sections has minimum value of shape factor ?
a) Rectangle b) Triangle c) Circle d) I section

iv) Two plates of 14 mm and 12 mm are joined by fillet weld, the maximum size of fillet weld may be
a) 16.5 b) 15.5 c) 10.5 d) 12.5

P.T.O.

v) What is the value of constant 'K' to calculate throat thickness in fillet weld if the angle between fusion faces is 105° ?
a) 0.6 b) 0.65 c) 0.7 d) 0.75

vi) The allowable slenderness ratio of the elements in built-up section is
a) 180 b) 250 c) 145 d) 50

vii) Which one of the following is a compression member ?
a) Purlin b) Boom c) Girt d) Tie

viii) The deflection of steel beams in buildings other than industrial building is limited to span divided by
a) 180 b) 250 c) 300 d) 325

ix) As per the IS 800 purlins are designed as a
a) simply supported beams
b) cantilever beams
c) continuous beams
d) compression member

x) Sag rods are designed as
a) compression members
b) tension members
c) laterally supported beams
d) laterally unsupported beams

xi) A beam section is classed as low shear case when the factored shear force is less than
a) $0.4V_d$ b) $0.6V_d$ c) $0.8\ V_d$ d) V_d

xii) In case of an axially loaded column machined for full bearing, the fastenings connecting the column to the base plate in gusseted base are designed for
a) 100% of column load b) 50 % of column load
c) 25% of column load d) errection loads only

xiii) The self weight of a roof truss (N/mm^2) may be obtained by
a) (1 + 5)5 b) (1/3 + 5)10 c) (1 – 5)5 d) (1/3 – 5)10

xiv) For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then
a) t = p + r b) t = 2p + r c) t = p + 3r d) t + p + 2r

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SLR-TX – 56

Seat No.	

T.E. (Civil Engineering) (Part – I) (Old CGPA) Examination, 2018
DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 30-11-2018 Marks : 56
Time : 2.30 p.m. to 5.30 p.m.

Instructions *: 1) Answer **any three** questions from **each** Section.*
*2) **Use** of IS 800-2007 and IS 875 Part **1**, Part **2** and Part **3** are allowed, but not **allowed** for MCQ (Q1).*
*3) **Use** of scientific non programmable calculator is **allowed**.*
4) Figures to the right indicate the full marks.
*5) Assume suitable data if necessary and mention it **clearly** before the solution.*
*6) Draw the appropriate sketches **whenever** necessary.*

SECTION – I

2. a) Discuss Limit state of strength and Limit state of serviceability. **4**

   b) Find the collapse load for the following cases by static method and kinematic method. **5**
      i) Simply supported beam of span 'L' carrying uniformly distributed load 'w'.
      ii) Fixed beam with of span 'L' carrying uniformly distributed load 'w'.

3. Find the shape factor of a T section with 100 mm × 10 mm cross sectional plates as flange and 150 mm × 10 mm cross sectional plate as web. **9**

4. Design a tension member to carry a factored load of 400 kN with two angles placed back to back. Length of the member is 2.9 m. Design welded connection. **10**

5. Design a continuous strut to carry a service load of 175 kN, the effective length of the strut is 3.2 m. Design bolted connection. **9**

Set P

SECTION – II

6. Design a laterally unsupported beam for the following data : **10**

   Effective span = 4 m

   Maximum bending moment + 550 KNm

   Maximum shear force = 200 KN

   Steel grade = Fe 410

7. Design an I section purlin, for an industrial building situated at Allahabad, to support a galvanised corrugated iron sheet roof for the following data :

   Spacing of truss c/c = 6.0 m

   Span of truss = 12 m

   Slope of truss = 30°

   Spacing of purlin = 1.5 m

   Intensity of wind pressure = 2 KN/m^2

   Weight of galvanised sheets = 130 N/m^2

   Grade of steel = Fe 410. **9**

8. Design battening for column consisting of 2 ISLC 300 placed face to face over total width of 300 mm. Length of column is 4 m with both ends hinged. Take f_y = 250 MPa. **9**

9. A column section ISHB 350 @ 661.2 KN/m carries a factored axial compressive load of 1650 KN and factored bending moment of 90 KNm. Design the base plate and its connections. Assume concrete pedestal of M 20 grade. **9**

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SLR-TX – 56

Seat No.	

Set Q

T.E. (Civil Engineering) (Part – I) (Old CGPA) Examination, 2018
DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 30-11-2018 Max. Marks : 70
Time : 2.30 p.m. to 5.30 p.m.

N.B. *: 1) Answer **any three** questions from **each** Section.*
*2) **Use** of IS 800-2007 and IS 875 Part **1**, Part **2** and Part **3** are allowed, but not **allowed** for MCQ (Q1).*
*3) **Use** of scientific non programmable calculator is **allowed**.*
4) Figures to the right indicate the full marks.
*5) Assume suitable data if necessary and mention it **clearly** before the solution.*
*6) Draw the appropriate sketches **whenever** necessary.*
*7) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

i) The deflection of steel beams in buildings other than industrial building is limited to span divided by
a) 180 b) 250 c) 300 d) 325

ii) As per the IS 800 purlins are designed as a
a) simply supported beams b) cantilever beams
c) continuous beams d) compression member

iii) Sag rods are designed as
a) compression members
b) tension members
c) laterally supported beams
d) laterally unsupported beams

P.T.O.

iv) A beam section is classed as low shear case when the factored shear force is less than
a) $0.4V_d$ b) $0.6V_d$ c) $0.8\ V_d$ d) V_d

v) In case of an axially loaded column machined for full bearing, the fastenings connecting the column to the base plate in gusseted base are designed for
a) 100% of column load b) 50 % of column load
c) 25% of column load d) errection loads only

vi) The self weight of a roof truss (N/mm^2) may be obtained by
a) (1 + 5)5 b) (1/3 + 5)10 c) (1 – 5)5 d) (1/3 – 5)10

vii) For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then
a) t = p + r b) t = 2p + r c) t = p + 3r d) t + p + 2r

viii) Steel is an alloy which mainly contains
a) iron and silica b) iron and sulphur
c) iron and carbon d) iron and sodium

ix) What is the hole diameter for a bolt of 25 mm diameter ?
a) 25 mm b) 26 mm c) 30 mm d) 28 mm

x) Which of the following sections has minimum value of shape factor ?
a) Rectangle b) Triangle c) Circle d) I section

xi) Two plates of 14 mm and 12 mm are joined by fillet weld, the maximum size of fillet weld may be
a) 16.5 b) 15.5 c) 10.5 d) 12.5

xii) What is the value of constant 'K' to calculate throat thickness in fillet weld if the angle between fusion faces is 105° ?
a) 0.6 b) 0.65 c) 0.7 d) 0.75

xiii) The allowable slenderness ratio of the elements in built-up section is
a) 180 b) 250 c) 145 d) 50

xiv) Which one of the following is a compression member ?
a) Purlin b) Boom c) Girt d) Tie

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Seat No.	

T.E. (Civil Engineering) (Part – I) (Old CGPA) Examination, 2018
DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 30-11-2018 Marks : 56
Time : 2.30 p.m. to 5.30 p.m.

Instructions *: 1) Answer* ***any three*** *questions from* ***each*** *Section.*
2) ***Use*** *of IS 800-2007 and IS 875 Part* ***1****, Part* ***2*** *and Part* ***3*** *are allowed, but not* ***allowed*** *for MCQ (Q1).*
3) ***Use*** *of scientific non programmable calculator is* ***allowed****.*
4) Figures to the right indicate the full marks.
5) Assume suitable data if necessary and mention it ***clearly*** *before the solution.*
6) Draw the appropriate sketches ***whenever*** *necessary.*

SECTION – I

2. a) Discuss Limit state of strength and Limit state of serviceability. **4**

   b) Find the collapse load for the following cases by static method and kinematic method. **5**
      i) Simply supported beam of span 'L' carrying uniformly distributed load 'w'.
      ii) Fixed beam with of span 'L' carrying uniformly distributed load 'w'.

3. Find the shape factor of a T section with 100 mm × 10 mm cross sectional plates as flange and 150 mm × 10 mm cross sectional plate as web. **9**

4. Design a tension member to carry a factored load of 400 kN with two angles placed back to back. Length of the member is 2.9 m. Design welded connection. **10**

5. Design a continuous strut to carry a service load of 175 kN, the effective length of the strut is 3.2 m. Design bolted connection. **9**

Set Q

SECTION – II

6. Design a laterally unsupported beam for the following data : **10**

   Effective span = 4 m

   Maximum bending moment + 550 KNm

   Maximum shear force = 200 KN

   Steel grade = Fe 410

7. Design an I section purlin, for an industrial building situated at Allahabad, to support a galvanised corrugated iron sheet roof for the following data :

   Spacing of truss c/c = 6.0 m

   Span of truss = 12 m

   Slope of truss = 30°

   Spacing of purlin = 1.5 m

   Intensity of wind pressure = 2 KN/m^2

   Weight of galvanised sheets = 130 N/m^2

   Grade of steel = Fe 410. **9**

8. Design battening for column consisting of 2 ISLC 300 placed face to face over total width of 300 mm. Length of column is 4 m with both ends hinged. Take f_y = 250 MPa. **9**

9. A column section ISHB 350 @ 661.2 KN/m carries a factored axial compressive load of 1650 KN and factored bending moment of 90 KNm. Design the base plate and its connections. Assume concrete pedestal of M 20 grade. **9**

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Set Q

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Seat No.	

Set R

T.E. (Civil Engineering) (Part – I) (Old CGPA) Examination, 2018
DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 30-11-2018 Max. Marks : 70
Time : 2.30 p.m. to 5.30 p.m.

N.B. *: 1) Answer **any three** questions from **each** Section.*
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*7) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

i) What is the value of constant 'K' to calculate throat thickness in fillet weld if the angle between fusion faces is 105° ?
a) 0.6 b) 0.65 c) 0.7 d) 0.75

ii) The allowable slenderness ratio of the elements in built-up section is
a) 180 b) 250 c) 145 d) 50

iii) Which one of the following is a compression member ?
a) Purlin b) Boom c) Girt d) Tie

iv) The deflection of steel beams in buildings other than industrial building is limited to span divided by
a) 180 b) 250 c) 300 d) 325

P.T.O.

v) As per the IS 800 purlins are designed as a
   a) simply supported beams
   b) cantilever beams
   c) continuous beams
   d) compression member

vi) Sag rods are designed as
   a) compression members
   b) tension members
   c) laterally supported beams
   d) laterally unsupported beams

vii) A beam section is classed as low shear case when the factored shear force is less than
   a) $0.4V_d$ b) $0.6V_d$ c) $0.8\ V_d$ d) V_d

viii) In case of an axially loaded column machined for full bearing, the fastenings connecting the column to the base plate in gusseted base are designed for
   a) 100% of column load b) 50 % of column load
   c) 25% of column load d) errection loads only

ix) The self weight of a roof truss (N/mm^2) may be obtained by
   a) (1 + 5)5 b) (1/3 + 5)10 c) (1 – 5)5 d) (1/3 – 5)10

x) For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then
   a) t = p + r b) t = 2p + r c) t = p + 3r d) t + p + 2r

xi) Steel is an alloy which mainly contains
   a) iron and silica b) iron and sulphur
   c) iron and carbon d) iron and sodium

xii) What is the hole diameter for a bolt of 25 mm diameter ?
   a) 25 mm b) 26 mm c) 30 mm d) 28 mm

xiii) Which of the following sections has minimum value of shape factor ?
   a) Rectangle b) Triangle c) Circle d) I section

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   a) 16.5 b) 15.5 c) 10.5 d) 12.5

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Seat No.	

T.E. (Civil Engineering) (Part – I) (Old CGPA) Examination, 2018
DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 30-11-2018 Marks : 56
Time : 2.30 p.m. to 5.30 p.m.

Instructions *: 1) Answer **any three** questions from **each** Section.*
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SECTION – I

2. a) Discuss Limit state of strength and Limit state of serviceability. **4**

   b) Find the collapse load for the following cases by static method and kinematic method. **5**
      i) Simply supported beam of span 'L' carrying uniformly distributed load 'w'.
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3. Find the shape factor of a T section with 100 mm × 10 mm cross sectional plates as flange and 150 mm × 10 mm cross sectional plate as web. **9**

4. Design a tension member to carry a factored load of 400 kN with two angles placed back to back. Length of the member is 2.9 m. Design welded connection. **10**

5. Design a continuous strut to carry a service load of 175 kN, the effective length of the strut is 3.2 m. Design bolted connection. **9**

Set R

SECTION – II

6. Design a laterally unsupported beam for the following data : **10**

   Effective span = 4 m

   Maximum bending moment + 550 KNm

   Maximum shear force = 200 KN

   Steel grade = Fe 410

7. Design an I section purlin, for an industrial building situated at Allahabad, to support a galvanised corrugated iron sheet roof for the following data :

   Spacing of truss c/c = 6.0 m

   Span of truss = 12 m

   Slope of truss = 30°

   Spacing of purlin = 1.5 m

   Intensity of wind pressure = 2 KN/m^2

   Weight of galvanised sheets = 130 N/m^2

   Grade of steel = Fe 410. **9**

8. Design battening for column consisting of 2 ISLC 300 placed face to face over total width of 300 mm. Length of column is 4 m with both ends hinged. Take f_y = 250 MPa. **9**

9. A column section ISHB 350 @ 661.2 KN/m carries a factored axial compressive load of 1650 KN and factored bending moment of 90 KNm. Design the base plate and its connections. Assume concrete pedestal of M 20 grade. **9**

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SLR-TX – 56

Seat No.	

Set **S**

T.E. (Civil Engineering) (Part – I) (Old CGPA) Examination, 2018
DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 30-11-2018 Max. Marks : 70
Time : 2.30 p.m. to 5.30 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

i) Sag rods are designed as
a) compression members b) tension members
c) laterally supported beams d) laterally unsupported beams

ii) A beam section is classed as low shear case when the factored shear force is less than
a) $0.4V_d$ b) $0.6V_d$ c) $0.8\ V_d$ d) V_d

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P.T.O.

iv) The self weight of a roof truss (N/mm^2) may be obtained by
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ix) Two plates of 14 mm and 12 mm are joined by fillet weld, the maximum size of fillet weld may be
a) 16.5 b) 15.5 c) 10.5 d) 12.5

x) What is the value of constant 'K' to calculate throat thickness in fillet weld if the angle between fusion faces is 105° ?
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xi) The allowable slenderness ratio of the elements in built-up section is
a) 180 b) 250 c) 145 d) 50

xii) Which one of the following is a compression member ?
a) Purlin b) Boom c) Girt d) Tie

xiii) The deflection of steel beams in buildings other than industrial building is limited to span divided by
a) 180 b) 250 c) 300 d) 325

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b) cantilever beams
c) continuous beams
d) compression member

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SLR-TX – 56

Seat No.	

T.E. (Civil Engineering) (Part – I) (Old CGPA) Examination, 2018
DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 30-11-2018 Marks : 56
Time : 2.30 p.m. to 5.30 p.m.

Instructions *: 1) Answer* ***any three*** *questions from* ***each*** *Section.*
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6) Draw the appropriate sketches ***whenever*** *necessary.*

SECTION – I

2. a) Discuss Limit state of strength and Limit state of serviceability. **4**

   b) Find the collapse load for the following cases by static method and kinematic method. **5**
      i) Simply supported beam of span 'L' carrying uniformly distributed load 'w'.
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4. Design a tension member to carry a factored load of 400 kN with two angles placed back to back. Length of the member is 2.9 m. Design welded connection. **10**

5. Design a continuous strut to carry a service load of 175 kN, the effective length of the strut is 3.2 m. Design bolted connection. **9**

Set S

SECTION – II

6. Design a laterally unsupported beam for the following data : **10**

   Effective span = 4 m

   Maximum bending moment + 550 KNm

   Maximum shear force = 200 KN

   Steel grade = Fe 410

7. Design an I section purlin, for an industrial building situated at Allahabad, to support a galvanised corrugated iron sheet roof for the following data :

   Spacing of truss c/c = 6.0 m

   Span of truss = 12 m

   Slope of truss = 30°

   Spacing of purlin = 1.5 m

   Intensity of wind pressure = 2 KN/m^2

   Weight of galvanised sheets = 130 N/m^2

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8. Design battening for column consisting of 2 ISLC 300 placed face to face over total width of 300 mm. Length of column is 4 m with both ends hinged. Take f_y = 250 MPa. **9**

9. A column section ISHB 350 @ 661.2 KN/m carries a factored axial compressive load of 1650 KN and factored bending moment of 90 KNm. Design the base plate and its connections. Assume concrete pedestal of M 20 grade. **9**

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