



R20 Regulation

Subject code: 3P6AC

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

## B.Tech VI Semester Supplementary Examinations, February 2024

### DESIGN OF STEEL STRUCTURES

(Civil Engineering)

Maximum Marks: 70

Date:20.02.2024 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**Note: IS 800:2007 STEEL CODE BOOK AND TABLE BOOK IS ALLOWED**

#### Part-A

All the following questions carry equal marks (10x2M=20 Marks)		CO	Bloom Tx
1	What are the advantages and disadvantages of steel as a structural material?	CO1	L1
2	Explain the following terms considering I.S specification i) Loads and combinations ii) Local bulckling	CO1	L2
3	Explain shortly about block shear.	CO2	L2
4	List the modes of failures in a column.	CO2	L2
5	What is meant by laterally supported beam?	CO3	L1
6	Define plastic moment.	CO3	L2
7	List out different types of trusses.	CO4	L2
8	Write down the assumptions involved in the design of purlins.	CO4	L1
9	What is plate girder? Where is it used?	CO5	L1
10	Differentiate between intermediate stiffeners and bearing stiffeners.	CO5	L2

#### Part-B

Answer All the following questions. (5X10M=50Marks)			
11	A. What are the various types of structural steel? Discuss their mechanical properties. (5M) B. Sketch the various types of Bolted connections and Welded connections. (5M)	CO1	L1 L2
OR			
12	A single bolted double cover butt joint is used to connect two plates which are 8mm thick. Assuming 16mm diameter bolts of grade 4.6 and cover plates 6mm thick. Calculate the strength and efficiency of the joint, if 4 bolts are provided in the bolt line at a pitch of 45mm as shown in fig. Also determine the efficiency of the joint if two lines of bolts with two bolts in each line have been arranged to result in a double bolted double cover butt joint. (10M)	CO1	L3

13	<p>Determine the design tensile strength of plate (160 x 8mm) connected to 10mm gusset using 16mm bolts as shown in fig. If the yield and ultimate stress of the steel used are 250MPa and 410MPa respectively. (10M)</p>	CO2	L3
	OR		
14	<p>A column section ISHB 300@577 N/m is carrying a factored axial load of 600 kN. A factored moment of 30N-m and a factored shear force of 60 kN. Design a suitable column splice. Assume ends are milled. (10M)</p>	CO2	L3
15	<p>Write short notes on:  A. Bending strength of a laterally supported beam. (5M)  B. Shearing strength of a laterally supported beam. (5M)</p>	CO3	L2
	OR		
16	<p>Design of simply supported beam of span 5m carrying a reinforced concrete floor capable of providing lateral restrained to the top compression flange. The UDL is made-up of 20kN/m imposed load and 20kN/m dead load (section is stiff against bearing). Assume Fe410 grade steel. (10M)</p>	CO3	L3
17	<p>Design an angle from purlin for trussed roof from the following data.  Span of roof truss =12m  Spacing of roof truss =5m  Spacing of purlins along the slope of roof = 1.2m  Slope of roof truss = 1 vertical to 2 horizontal  Wind load on roof surface normal to roof = 1.04kN/m<sup>2</sup>  Vertical load from roof sheeting = 0.200kN/m<sup>2</sup> (10M)</p>	CO4	L3
	OR		
18	<p>A. Explain the different types of roof trusses with neat sketches. (5M)</p>	CO4	L2

	B. Explain briefly the various loads to be considered for the designing of roof trusses. (5M)		L3
19	A. Write the steps involved in the design of plate girder. (5M) B. Analyse the expression for the economical depth of the plate girder. (5M)	CO5	L2 L2
	OR		
20	Design a welded plate girder of span 24m and laterally restrained throughout. It has to support a uniform load of 100kN/m throughout the span exclusive of self-weight. Design the cross section of the girder without intermediate stiffeners, also check bending strength and shear capacity of the web by post critical method. (10M)	CO5	L3

