R20 Regulation *Subject code:* 3P6AC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular Examinations, June/July 2023

DESIGN OF STEEL STRUCTURES

(Civil Engineering)

Maximum Marks: 70 Date:27.06.2023 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.
5. Use of IS 800:2007, IS 875 (part 3) and steel tables are allowed

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 List the various types of butt welds with neat sketches.
2 Mention any two physical and mechanical properties of structural steel.
3 Examine lug angle and its use?
4 List the various types of welded joints.
5 Define shape factor.
6 What is web buckling and web crippling?
7 Name the components of steel roof truss.
8 Define Purlin.
9 What is the expression for the economical depth of a plate girder?
10 List the forces acting on the web splice of a plate girder.

Part-B

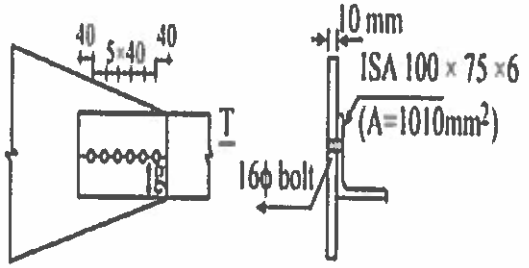
Answer All the following questions. (10MX 5=50Marks)

11 A. Explain the possible limit states that are considered in the limit state method of design of steel structures. (5M)
B. Explain the design procedure for butt welds (5M)

OR

12 Calculate the strength of a 20mm diameter bolt of grade 4.6 for the following cases. The main plates to be jointed are 12mm thick.
A. Lap joint (3M)
B. Single cover butt joint: the cover plate being 10mm thick (3M)
C. Double cover butt joint: each of the cover plate being 8mm thick (4M)

13 A single unequal angle 100 x 75 x 6mm is connected to a 10mm thick gusset plate at the ends with 6-16mmϕbolts to transfer tension as shown in fig. De-termine the design tensile strength of the angle assuming that the yield and ultimate stress used are 250MPa and Fe-410MPa.The gusset is connected to 75mm leg and gauge is 40mm (10M)



OR

14 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)

15 A. Explain the design procedure of laterally supported beams. (5M)
B. Explain the following: (i) bending and shear strength of beams, and (ii) built-up sections (5M)

OR

16 Design a stiffened seat connection for an ISMB 350@514N/m transmitting an end reaction of 320kN (due to factored loads) to a column section ISHB300 @576.8N/m. The steel is of grade Fe410 and bolts of grade 4.6. (10M)

17 Design a purlin for a roof truss having the following data:
Span of the truss = 9.0m, Spacing of truss = 3m c/c, Inclination of roof = 30^0
Spacing of Purlin = 2m c/c Wind pressure = 1.5 kN/m^2, Roof coverage= A.C
Sheeting weighing 200 N/m^2, Provide a channel section for Purlin. (10M)

OR

18 Design an angle section for a purlin having 3m span. It carries design load (working) of 2.5kN/m and supported on four supports. Angle of roof truss is 26^0. (10M)

19 Discuss about
A. Economical depth of welded plate girder. (5M)
B. Stiffeners (5M)

OR

20 Design a welded plate girder of span 24m to carry a superimposed load of 35kN/m. Avoid use of bearing and intermediate stiffeners. Use Fe-415 steel. (10M)