Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2023**

**Subject Code:3140101 Date:19-07-2023**

**Subject Name: Aircraft Structures**

**Time: 10:30 AM TO 01:00 PM Total Marks:70**

**Instructions:**

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

| | | | **MARKS** |
|---|---|---|---|
| **Q.1** | **(a)** | Explain ground loads & air loads. | **03** |
| | **(b)** | Explain basic function of aircraft's structure. Define semi-monocoque & monocoque. | **04** |
| | **(c)** | Write short note on factor of safety-flight envelope. | **07** |
| **Q.2** | **(a)** | Differentiate between statically determinate structure & indeterminate structure. | **03** |
| | **(b)** | Write advantages & disadvantages of indeterminate structure. | **04** |
| | **(c)** | Define truss. Find out forces in members of truss using method of joint. Refer fig. 1 | **07** |
| | | **OR** | |
| | **(c)** | Determine slope & deflection at the free end of a cantilever beam using moment area method. $I_{xx} = 6 \times 10^7$ mm$^4$ & $E = 2 \times 10^5$ N/mm$^2$ Refer fig. 2 | **07** |
| **Q.3** | **(a)** | Explain stress & strain. | **03** |
| | **(b)** | Define stiffness, carry over moment, carry over factor & distribution factor. | **04** |
| | **(c)** | Enlist the advantages of slope deflection method. Explain equilibrium equations with neat sketch. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Derive formula to find strain energy due to axial loading. | **03** |
| | **(b)** | Write statement of Reciprocal theorem in different ways. | **04** |
| | **(c)** | Write short note on unit load method. | **07** |
| **Q.4** | **(a)** | Explain symmetrical bending with neat sketch | **03** |
| | **(b)** | Explain calculation of section properties. | **04** |
| | **(c)** | Explain shear of open section beams. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Explain torsion of beams. | **03** |
| | **(b)** | Explain torsion of closed section beams. | **04** |
| | **(c)** | Explain shear of closed section beams. | **07** |
| **Q.5** | **(a)** | Explain pure bending of thin plates. | **03** |
| | **(b)** | Explain bending of thin plate having a small initial curvature. | **04** |

**(c)** Explain energy method to calculate buckling load in column. **07**

**OR**

**Q.5** **(a)** Explain buckling load of column with neat sketch. **03**

**(b)** State the assumption made in Euler's theory of column buckling. **04**

**(c)** Explain in brief buckling of thin plates. **07**

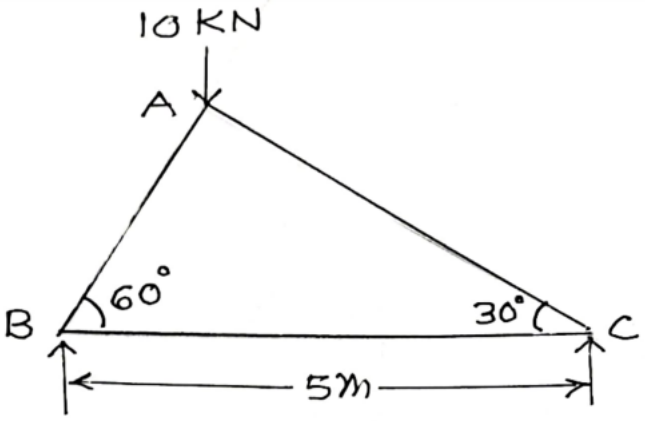


Fig. 1

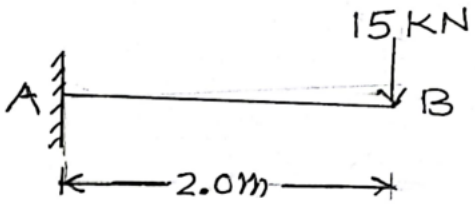


Fig. 2