

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-IV Remedial Examination Nov/ Dec. 2010****Subject code: 140101****Subject Name: Aircraft Structure- I****Date: 03 / 12/ 2010****Time: 03.00 pm – 05.30 pm****Total Marks: 70****Instructions:**

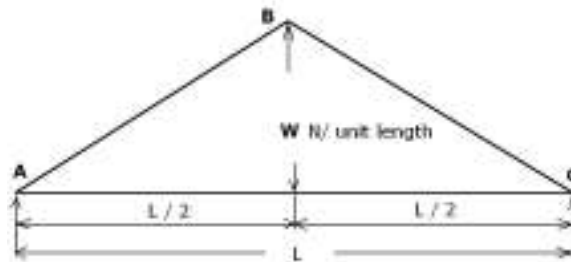
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks

- Q.1 (a) State and explain Maxwell's reciprocal theorem. **07**
 (b) Explain construction of Mohr's circle for strain. **07**

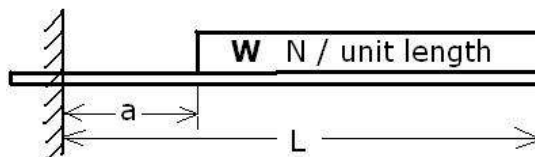
- Q.2 (a) Why thin walled shell like construction is preferred for Aircraft structure? **07**
 (b) What are the common characteristics of Aircraft structures? Write common materials available for aircraft constructions. **07**

OR

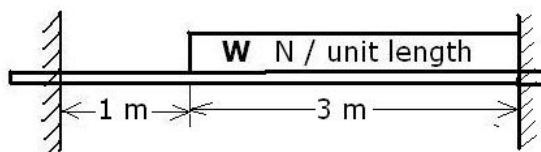
- (b) List the different aero materials available and explain about composites materials and sandwich materials. **07**
 Q.3 (a) A simply supported beam carries the triangular distributed load as shown in Fig. 1. Determine the deflection equation and the magnitude of the maximum deflection. **07**

**Fig. 1**

- (b) Determine the equation of the elastic curve of a cantilever beam supporting a uniform distributed load W N/unit length over part of its length as shown in Fig. 2. **07**

**Fig. 2****OR**

- Q.3 (a) A beam 4 m long and perfectly restrained at the ends carries a uniformly distributed load over part of its length as shown in Fig. 3. Compare the end shears and end moments. **07**

**Fig. 3**

- (b) Explain impact-factor. Deduce its expression in the form of impact factor

07

$$= 1 + \sqrt{1 + \frac{2h}{\delta_{st}}}$$

- Q.4 (a) A simply supported beam is subjected to the impact of a load falling freely through the height h before striking the mid-point of the beam and causing the dynamic deflection δ . Assuming h is larger compared to static deflection δ_{st} and 'c' is the distance of maximum distance fiber from neutral axis. Show that

10

$$S_{max} = \sqrt{\frac{6WhEc^2}{LI}}$$

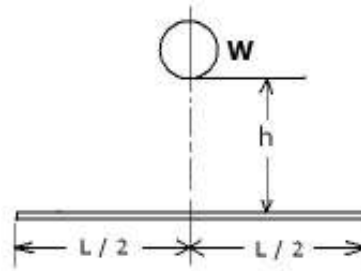


Fig. 4

- (b) With help of neat sketch explain fuselage construction.

04

OR

- Q.4 (a) A crane hook has a rectangular cross-section 50mm X 100mm, with inner radius 75 mm. What is the maximum load P that will not exceed the stress of 100 N/mm².

10

- (b) What are the basic structural elements available for aircraft structures? Explain about shear panel and axial member.

04

- Q.5 (a) Why Eulers formula is preferred for long column?

07

- (b) What do you mean by plain stress and plain strain conditions? Write equations of equilibrium for plane stress condition.

07

- Q.5 (a) Differentiate between short column and long column.

07

- (b) Evaluate- Stress is a tensor quantity.

07
