Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

III SEMESTER B.TECH (AERONAUTICAL ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2015/JAN16

SUBJECT: AIRCRAFT STRUCTURES [AAE-2101]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. What is meant by section modulus? Find an expression for section modulus for a rectangular and circular sections. **(02)**

1B. Show that for a beam subjected to the pure bending, neutral axis coincides with the centroid of the cross section. **(04)**

1C. A cast iron beam is of T-section as shown in fig.1. The beam is simply supported on a span of 8m. The beam carries a uniformly distributed load of 1.5kN/m length on the entire span. Determine the maximum tensile and maximum compressive stresses. **(04)**

2A. Write a short note on Mohr's circle of stresses. **(02)**

2B. Derive an expression for the stresses on an oblique plane of a rectangular body, when the body is subjected to a simple shear stress. **(04)**

2C. At a point within a body subjected to two mutually perpendicular directions, the stresses are 80 N/mm^2 tensile and 40N/mm^2 tensile. Each of the above stresses is accompanied by a shear stress of 60 N/mm^2. Determine the normal stress, shear stress and resultant stress on an oblique plane inclined at an angle of 45^0 with axis of minor tensile stress. **(04)**

3A. Define the term polar modulus. Find the expressions for polar modulus for a solid shaft. **(02)**

3B. When a circular shaft is subjected to torsion, show that the shear stress varies linearly from the axis to the surface. **(04)**

3C. A hollow shaft of external diameter 120 mm transmits 300 kW power at 200 rpm. Determine the maximum internal diameter if the maximum stress in the shaft is not to exceed 60 N/mm^2. **(04)**

4A. Define shear centre. **(02)**

4B. Derive an expression for the Euler's formula for a column with both the ends are hinged. **(04)**

4C. Derive an expression for the deflection and slope for a cantilever beam with a moment at the free end. **(04)**

5A. Determine the position of shear centre for the section shown in fig.2 **(05)**

5B. Calculate the bending stress at points L, M for the section shown in fig.3 (Take M_x =1kNm) **(05)**

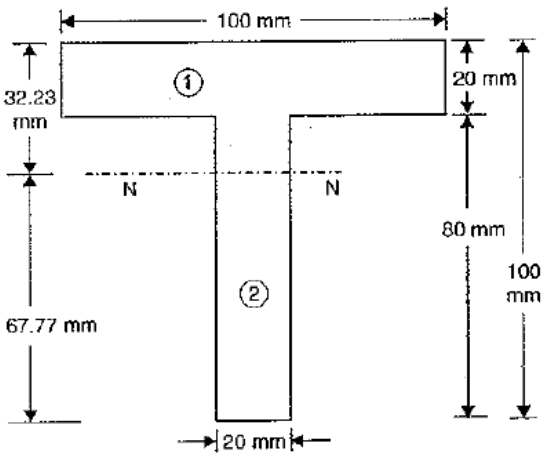

Fig.1.