USN | | | | | | | | | | |

10AE72

Seventh Semester B.E. Degree Examination, April 2018
Aircraft Structures II

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain V-n diagram with a neat sketch. **(10 Marks)**

b. Fig Q1(b) show a simplified airplane landing gear unit. The brace struts are pinned at each end and the support at 'C' is of roller type, thus no vertical reaction. A known load of 5000kg is applied to axle unit at 'A'. Find the load in the brace struts and reaction at 'C'.

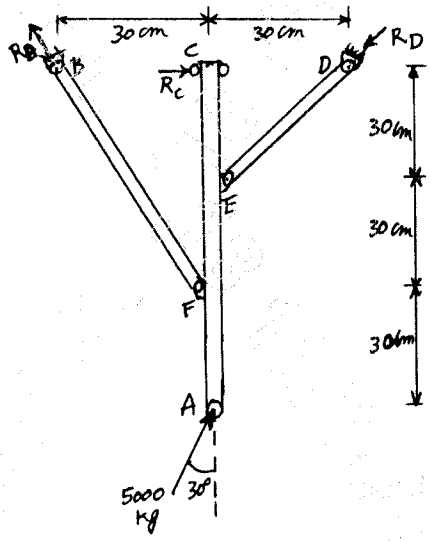

Fig Q1(b) **(10 Marks)**

2 a. Derive an expression for direct stress for the case of unsymmetrical bending. **(10 Marks)**

b. A thin walled, Cantilever beam of unsymmetrical cross section supports shear loads at its free end as shown in Fig Q2(b). Calculate the value of direct stress at the extremity of the lower flange (point 'A') at a section halfway along the beam if the position of shear loads is such that no twisting of the beam occurs.

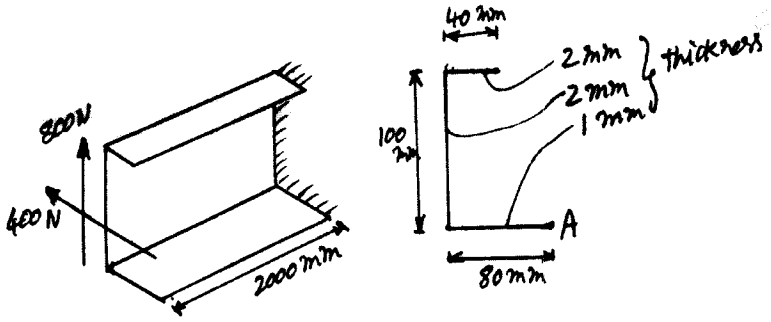

Fig Q2(b) **(10 Marks)**

3 a. Define the terms: shear centre, shear flow, shear lag and Elastic axis. **(08 Marks**

b. Determine the shear flow distribution in thin walled 'Z' section shown in Fig Q3(b) due to a shear load S_y applied through the shear center of the section.

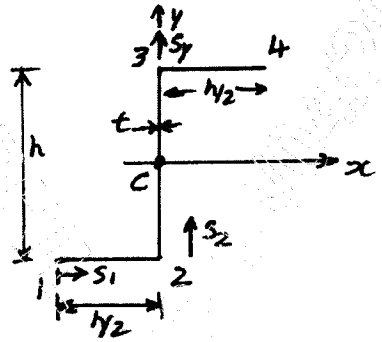

Fig Q3(b) **(12 Marks**

4 a. A thin walled closed section beam has single symmetry as shown in Fig Q4(a). Each wall is flat and has the same thickness t and shear modulus G. calculate the distance of the shear center from point '4'.

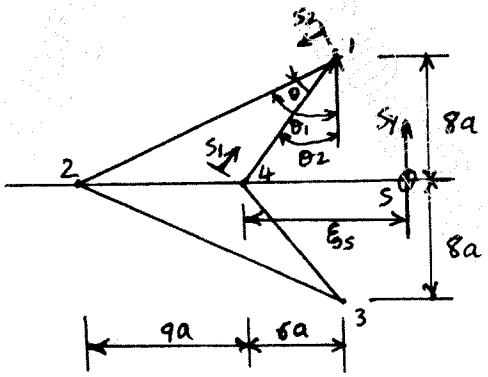

Fig Q4(a) **(12 Marks**

b. Explain Bredt-Batho theory and derive formula for the same. **(08 Marks**

PART – B

5 a. Derive an expression for buckling stress for isotropic flat plate in compression. **(12 Marks**

b. Write a note on :

i) effective skin width

ii) crippling stress and buckling stress

iii) inter rivet and sheet wrinkling failure. **(08 Marks**

6 Calculate the shear flow distribution and the stringer and flange loads in the beam shown in Fig Q6 at a section 1.5m from the built in end. Assume that the skin and web panels are effective in resisting shear stress only. The beam tapers symmetrically in a vertical direction about its longitudinal axis.

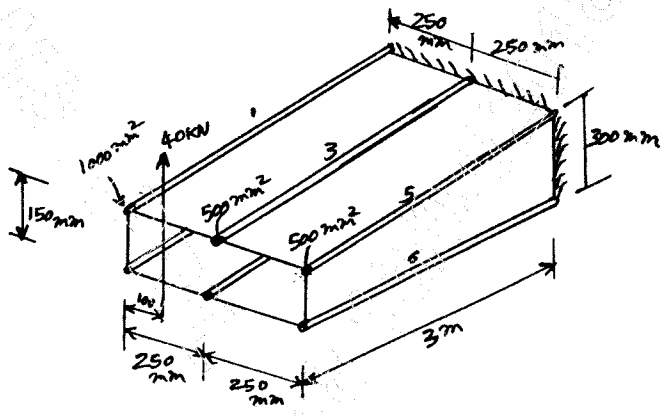

Fig Q6 **(20 Marks)**

7 a. Discuss the safe life and fail safe concept. **(10 Marks)**

b. Briefly describe two bay crack criteria. **(10 Marks)**

8 a. Write a note on design parameters in riveted joints. **(10 Marks)**

b. A plate of 80mm wide and 10mm thick is to be welded to another plate by means of parallel fillet weld. The plates are subjected to a load of 50kN. Find the length of weld so that maximum stress does not exceed 50N/mm^2. Consider the joint under static loading and dynamic loading for which stress concentration factor can be assumed to be 2.7. **(10 Marks)**

* * * * *