Code No: RR412111 **Set No.1**

IV B.Tech. I Semester Regular Examinations, November -2005
DESIGN AND DRAFTING
(Aeronautical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Define and classify truss structures. What are the various methods to analyze the trusses? Explain the method of sections with the help of an example. [16]

2. (a) What are tension and compression members? Explain their relevance in aircraft structure design.
   (b) Write a note on 'combined stresses and stress ratios'. [8+8]

3. What is the need of an undercarriage system? Show the basic items involved in an undercarriage of a medium transport aircraft with the help of a neat sketch and explain their function briefly. [16]

4. (a) Explain the reasons for a riveted joint failure.
   (b) How the stress analysis of a riveted joint is carried out and what are the assumptions made during this analysis? [6+10]

5. Design an end fitting of steel with an ultimate tensile strength of 110000 N/cm^2. The limit or applied loads of 10000 kg compression and 8000 kg tension. A fitting factor of 1.2 and a bearing factor of 2 are used. [16]

6. For which type of aircraft, semi-cantilever wings are used and why? Sketch a sectioned view of such a wing showing the main structural members. Explain the function of these structural members. [16]

7. Calculate the bending moments for the ring shown in Figure1. The fuselage stringers have equal areas and are spaced around the circumference. The load 'W' and radius 'R' are assumed to have unit values and the products of shear flows and the web lengths are shown as the ring reaction. The value of EI is assumed constant. [16]

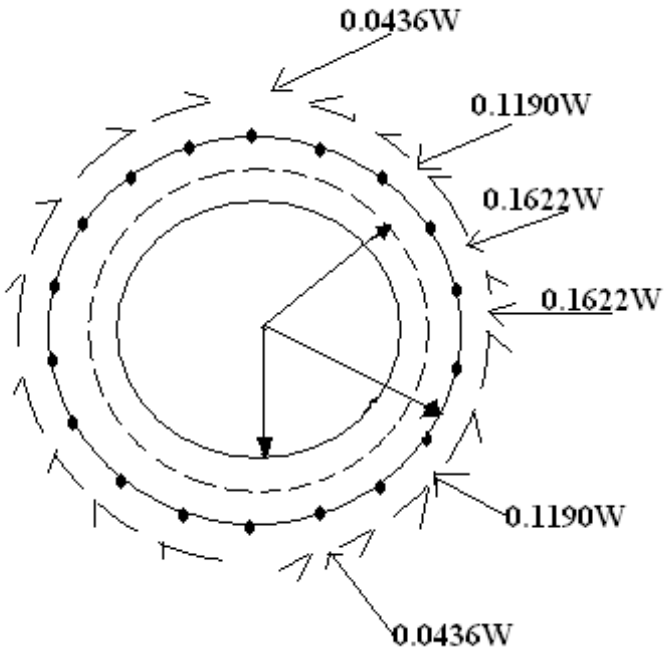

Figure 1:

8. Explain the procedure to draft and model different types of ribs used for a semi-monocoque wing using software package. [16]

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1. (a) Write equations of static equilibrium. Explain their importance in the analysis of trusses.
   (b) What are the various methods to analyze the trusses? Explain the method of joints with the help of an example. [6+10]
2. (a) What is meant by 'plastic bending'? Explain its relevance aircraft structure design.
   (b) How eccentric loading affects the ultimate strength of columns? [8+8]
3. Show the various types of arrangements of undercarriage system with the help of neat sketches. For which type of aircrafts are these arrangements used and why? [16]
4. (a) Explain the phenomenon of crack propagation of a rivet hole. What are the various methods to reduce/eliminate the crack propagation?
   (b) What are cherry rivets and where are they used? [10+6]
5. Explain briefly the different type of stresses that can develop during screw fastening for static loading conditions. [16]
6. Write notes on the following:
   (a) Full tension field beam
   (b) Shear flow distribution in Box beams. [8+8]
7. Find the shear flow distribution around the circular tube shown in Figure2 Assume the wall thicknesst to be small compared to the radius of the center of the tube wall. [16]

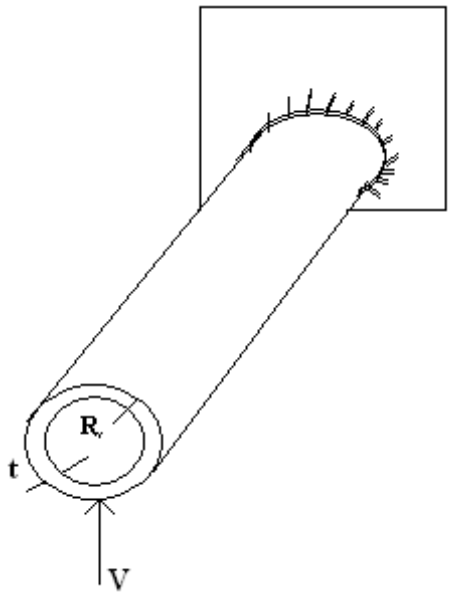

Figure 2:

8. What are the main features of a delta wing? Explain the procedure to model and draft a delta wing using software package? [16]

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Code No: RR412111 **Set No.3**

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DESIGN AND DRAFTING
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain pratt & warren trusses with the help of sketches.
   (b) What are the various methods used for truss analysis? Explain the graphic method with the help of an example. [6+10]

2. Differentiate between short and long columns. Derive the expression for buckling stress for long columns. [16]

3. Show the various possible locations for the retraction of main landing gears with the help of neat sketches. Also state their merits and demerits. [16]

4. What are blind rivets? How and where are these rivet used? What are the various equipments used during blind riveting and what are their function? [16]

5. Write notes on the following:
   (a) Dynamic loading of bolt and stress concentration.
   (b) Types of screw fastening. [8+8]

6. Write notes on the following:
   (a) Shear flow in thin webs
   (b) Torsion of box sections. [8+8]

7. The cylinder shown in Figure3 is stiffened by rings at 20cm intervals along its length and by four longirons which are equally spaced around the circumference. Find the compressive forces P in the longirons, the stresses f_p and f_x in the web and the angle α_p of the principal web stress. Use E = 7 x 10^6 N/$cm^2$and

(a) $f_s = 3500$ N/cm^2,

(b) $f_s = 7000$ N/cm^2,

(c) $f_s = 10000$ N/cm^2 and

(d) $f_s = 14000$ N/cm^2. [16]

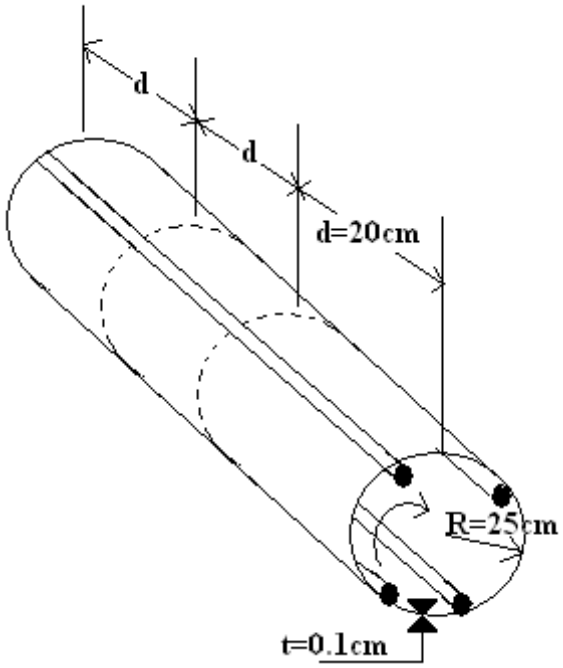

Figure 3:

8. What are the main features of a swept wing? Explain the procedure to model and draft a swept wing using software package? [16]

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Code No: RR412111 **Set No.4**

IV B.Tech. I Semester Regular Examinations, November -2005
DESIGN AND DRAFTING
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Differentiate between determinate and indeterminate structures.
   (b) How do you analyze the torsion of space structures composed of two-force members? Explain with the help of an example. [6+10]
2. Derive the expression for angle of twist for circular shaft under torsional loads.[16]
3. (a) Explain the various factors affecting the efficiency of a shock absorber.
   (b) Which type of landing gear (retractable or non-retractable) is used for high speed aircraft and why? [10+6]
4. What are Lozenge joints? Explain the design procedure for a typical Lozenge joint. [16]
5. Discuss in detail the design of eccentrically loaded bolted joints. [16]
6. Sketch the sectional view of a two spar semi-monocoque wing showing the various structural members. Explain the function of main structural members. [16]
7. The skin on a fuselage is supported by stringers, which are spaced at 5-in and by rings spaced at 50 cm. Find the shear buckling stresses for the flat sheet if (a) t = 0.050 cm, (b) t = 0.08 cm, (c) t = 0.1 cm and (d) t = 0.16 cm. Assume E = 7×10^6 N/cm^2 and an average between simply supported and clamped edge conditions. [16]
8. What are the main features of an elliptical wing? Explain the procedure to model and draft an elliptical wing using software package? [16]

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