

Code No: R05412102

R05**Set No. 2****IV B.Tech I Semester Examinations, November 2010****FLIGHT VEHICLE DESIGN****Aeronautical Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. (a) Draw a reference (trapezoidal) wing.
 (b) Explain how an elliptic wing is superior to a trapezoidal wing.
 (c) What are the advantages of selecting a trapezoidal wing over an elliptic wing?
 (d) Explain the effect of taper of the wing on drag. [16]
2. Define drag and describe the various components of drag of a subsonic aircraft. Explain how the profile drags for various components are estimated. [16]
3. (a) Derive the expression for turn rate in level flight ($d\psi / dt$) in terms of velocity and 'n', the load factor.
 (b) Derive the expression for load factor, 'n', in terms of T/W (Thrust to weight ratio) and W/S (Wing loading). [8+8]
4. Describe, with sketches, the following components of a wing and describe how they affect the aerodynamic design of a civil jet aircraft:
 (a) Fowler flaps
 (b) Wing plan form
 (c) Slats and slots
 (d) Krueger flaps. [4+4+4+4]
5. (a) Explain what is meant by statistical analysis in the context of aircraft conceptual design?
 (b) Assuming no analyses are available, what are the data you would collect. How do you proceed with the analyses? [8+8]
6. What are the different arrangements of tail surfaces used for airplane design? Discuss all the options available and the relative merits and demerits. Draw good sketches and show relevant graphs. [16]
7. While evaluating the preliminary design of a passenger aircraft, what are the weights you would verify? How do you proceed to verify these? Explain in detail. [16]
8. What data do you need to make the first estimate of take-off weight? Clearly describe you make the estimation. [16]

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R05**Set No. 4**

IV B.Tech I Semester Examinations, November 2010
FLIGHT VEHICLE DESIGN
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Draw a reference (trapezoidal) wing.
 (b) Explain how an elliptic wing is superior to a trapezoidal wing.
 (c) What are the advantages of selecting a trapezoidal wing over an elliptic wing?
 (d) Explain the effect of taper of the wing on drag. [16]
2. While evaluating the preliminary design of a passenger aircraft, what are the weights you would verify? How do you proceed to verify these? Explain in detail. [16]
3. Describe, with sketches, the following components of a wing and describe how they affect the aerodynamic design of a civil jet aircraft:
 (a) Fowler flaps
 (b) Wing plan form
 (c) Slats and slots
 (d) Krueger flaps. [4+4+4+4]
4. What data do you need to make the first estimate of take-off weight? Clearly describe you make the estimation. [16]
5. (a) Derive the expression for turn rate in level flight ($d\psi / dt$) in terms of velocity and 'n', the load factor.
 (b) Derive the expression for load factor, 'n', in terms of T/W (Thrust to weight ratio) and W/S (Wing loading). [8+8]
6. Define drag and describe the various components of drag of a subsonic aircraft. Explain how the profile drags for various components are estimated. [16]
7. (a) Explain what is meant by statistical analysis in the context of aircraft conceptual design?
 (b) Assuming no analyses are available, what are the data you would collect. How do you proceed with the analyses? [8+8]
8. What are the different arrangements of tail surfaces used for airplane design? Discuss all the options available and the relative merits and demerits. Draw good sketches and show relevant graphs. [16]

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R05**Set No. 1**

IV B.Tech I Semester Examinations, November 2010
FLIGHT VEHICLE DESIGN
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

1. What are the different arrangements of tail surfaces used for airplane design? Discuss all the options available and the relative merits and demerits. Draw good sketches and show relevant graphs. [16]
2. Describe, with sketches, the following components of a wing and describe how they affect the aerodynamic design of a civil jet aircraft:
 - (a) Fowler flaps
 - (b) Wing plan form
 - (c) Slats and slots
 - (d) Krueger flaps. [4+4+4+4]
3. (a) Derive the expression for turn rate in level flight ($d\psi / dt$) in terms of velocity and 'n', the load factor.
 (b) Derive the expression for load factor, 'n', in terms of T/W (Thrust to weight ratio) and W/S (Wing loading). [8+8]
4. While evaluating the preliminary design of a passenger aircraft, what are the weights you would verify? How do you proceed to verify these? Explain in detail. [16]
5. (a) Explain what is meant by statistical analysis in the context of aircraft conceptual design?
 (b) Assuming no analyses are available, what are the data you would collect. How do you proceed with the analyses? [8+8]
6. What data do you need to make the first estimate of take-off weight? Clearly describe you make the estimation. [16]
7. Define drag and describe the various components of drag of a subsonic aircraft. Explain how the profile drags for various components are estimated. [16]
8. (a) Draw a reference (trapezoidal) wing.
 (b) Explain how an elliptic wing is superior to a trapezoidal wing.
 (c) What are the advantages of selecting a trapezoidal wing over an elliptic wing?
 (d) Explain the effect of taper of the wing on drag. [16]

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R05**Set No. 3****IV B.Tech I Semester Examinations, November 2010****FLIGHT VEHICLE DESIGN****Aeronautical Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. Define drag and describe the various components of drag of a subsonic aircraft. Explain how the profile drags for various components are estimated. [16]
2. (a) Explain what is meant by statistical analysis in the context of aircraft conceptual design?
(b) Assuming no analyses are available, what are the data you would collect. How do you proceed with the analyses? [8+8]
3. (a) Derive the expression for turn rate in level flight ($d\psi/dt$) in terms of velocity and 'n', the load factor.
(b) Derive the expression for load factor, 'n', in terms of T/W (Thrust to weight ratio) and W/S (Wing loading). [8+8]
4. What are the different arrangements of tail surfaces used for airplane design? Discuss all the options available and the relative merits and demerits. Draw good sketches and show relevant graphs. [16]
5. What data do you need to make the first estimate of take-off weight? Clearly describe you make the estimation. [16]
6. Describe, with sketches, the following components of a wing and describe how they affect the aerodynamic design of a civil jet aircraft:
(a) Fowler flaps
(b) Wing plan form
(c) Slats and slots
(d) Krueger flaps. [4+4+4+4]
7. While evaluating the preliminary design of a passenger aircraft, what are the weights you would verify? How do you proceed to verify these? Explain in detail. [16]
8. (a) Draw a reference (trapezoidal) wing.
(b) Explain how an elliptic wing is superior to a trapezoidal wing.
(c) What are the advantages of selecting a trapezoidal wing over an elliptic wing?
(d) Explain the effect of taper of the wing on drag. [16]
