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Code No: R05222105 **R05** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
INTRODUCTION TO AEROSPACE TRANSPORTATION SYSTEMS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Consider the 'Fail safe' and 'safe life' of Empennage-fuselage junction of a large airplane. Which of the two is of relevance to the component under consideration? Make use of sketches / diagrams and other illustrations to explain your choice. [16]

2. A sailplane has GTOW of 5500 N and wing loading w = $600Nm^{-2}$. Its drag polar is given as $C_D = 0.010 + 0.022\ {C_L}^2$. Determine its V_{md} and V_{mp}. Check if the two velocities are as per the relation (to be established by you). [16]

3. Explain the requirements of cabin-cooling systems in an aerospace vehicle. Describe the vapor-cycle cooling system of such air conditioning employed in a space vehicle. Make use of sketches and diagrams to illustrate the answer. [16]

4. (a) Explain if the principles of gyroscope are helpful in explaining the motion and stability of a two wheeler. Make use of sketches.
   (b) A motor cycle is preferred by the younger generation to a scooter. Comment on the statement as an engineer. [8+8]

5. (a) What is the role of Secondary Surveillance Radar in the communications from Air Traffic Control Tower?
   (b) Explain the functioning of an all moving horizontal tail of an airplane in a Fly-By-Wire control system with a detailed layout sketch. [8+8]

6. (a) What are the features of a long range military bomber airplane? Compare these with that of a long range heavy capacity civil Jetliner. Provide as many details.
   (b) What do you know about the trainer airplane designed and built in India by NAL Bangalore? Provide as much details known to you and make use of sketches. [8+8]

7. (a) Describe the purpose of acquiring a 6 seater aircraft for flight test laboratory and air taxi service provider for an academic institute What are the essential features of such airplanes? Elaborate with examples.
   (b) Describe the most essential radio aids for a 4 seater airplane required for its operations. [8+8]

8. Define aerodynamic forces acting on a flying object. How is the lift force generated in such cases? Show with representative sketches and plots these forces acting on the following:

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(a) flat plate aligned with flow

(b) flat plate at $\alpha = 2^o$.

(c) a stationary circular cylinder.

(d) a rotating circular cylinder.

(e) a symmetrical airfoil at $\alpha = 0^o$.

(f) a cambered airfoil at $\alpha = 0^o$. [4+12=16]

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Code No: R05222105 **R05** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
INTRODUCTION TO AEROSPACE TRANSPORTATION SYSTEMS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the features of a long range military bomber airplane? Compare these with that of a long range heavy capacity civil Jetliner. Provide as many details.
   (b) What do you know about the trainer airplane designed and built in India by NAL Bangalore? Provide as much details known to you and make use of sketches. [8+8]
2. (a) What is the role of Secondary Surveillance Radar in the communications from Air Traffic Control Tower?
   (b) Explain the functioning of an all moving horizontal tail of an airplane in a Fly-By-Wire control system with a detailed layout sketch. [8+8]
3. (a) Explain if the principles of gyroscope are helpful in explaining the motion and stability of a two wheeler. Make use of sketches.
   (b) A motor cycle is preferred by the younger generation to a scooter. Comment on the statement as an engineer. [8+8]
4. Explain the requirements of cabin-cooling systems in an aerospace vehicle. Describe the vapor-cycle cooling system of such air conditioning employed in a space vehicle. Make use of sketches and diagrams to illustrate the answer. [16]
5. Define aerodynamic forces acting on a flying object. How is the lift force generated in such cases? Show with representative sketches and plots these forces acting on the following:
   (a) flat plate aligned with flow
   (b) flat plate at $\alpha = 2^o$.
   (c) a stationary circular cylinder.
   (d) a rotating circular cylinder.
   (e) a symmetrical airfoil at $\alpha = 0^o$.
   (f) a cambered airfoil at $\alpha = 0^o$. [4+12=16]
6. A sailplane has GTOW of 5500 N and wing loading w = $600 Nm^{-2}$. Its drag polar is given as $C_D = 0.010 + 0.022\ {C_L}^2$. Determine its V_{md} and V_{mp}. Check if the two velocities are as per the relation (to be established by you). [16]

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7. Consider the 'Fail safe' and 'safe life' of Empennage-fuselage junction of a large airplane. Which of the two is of relevance to the component under consideration? Make use of sketches / diagrams and other illustrations to explain your choice. [16]

8. (a) Describe the purpose of acquiring a 6 seater aircraft for flight test laboratory and air taxi service provider for an academic institute What are the essential features of such airplanes? Elaborate with examples.

   (b) Describe the most essential radio aids for a 4 seater airplane required for its operations. [8+8]

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Code No: R05222105 **R05** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
INTRODUCTION TO AEROSPACE TRANSPORTATION SYSTEMS
Aeronautical Engineering

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

Answer any FIVE Questions
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1. Explain the requirements of cabin-cooling systems in an aerospace vehicle. Describe the vapor-cycle cooling system of such air conditioning employed in a space vehicle. Make use of sketches and diagrams to illustrate the answer. [16]

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   (a) flat plate aligned with flow
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   (d) a rotating circular cylinder.
   (e) a symmetrical airfoil at $\alpha = 0^o$.
   (f) a cambered airfoil at $\alpha = 0^o$. [4+12=16]

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Code No: R05222105 **R05** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
INTRODUCTION TO AEROSPACE TRANSPORTATION SYSTEMS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the requirements of cabin-cooling systems in an aerospace vehicle. Describe the vapor-cycle cooling system of such air conditioning employed in a space vehicle. Make use of sketches and diagrams to illustrate the answer. [16]

2. (a) Describe the purpose of acquiring a 6 seater aircraft for flight test laboratory and air taxi service provider for an academic institute. What are the essential features of such airplanes? Elaborate with examples.
   (b) Describe the most essential radio aids for a 4 seater airplane required for its operations. [8+8]

3. Define aerodynamic forces acting on a flying object. How is the lift force generated in such cases? Show with representative sketches and plots these forces acting on the following:
   (a) flat plate aligned with flow
   (b) flat plate at $\alpha = 2^o$.
   (c) a stationary circular cylinder.
   (d) a rotating circular cylinder.
   (e) a symmetrical airfoil at $\alpha = 0^o$.
   (f) a cambered airfoil at $\alpha = 0^o$. [4+12=16]

4. (a) What is the role of Secondary Surveillance Radar in the communications from Air Traffic Control Tower?
   (b) Explain the functioning of an all moving horizontal tail of an airplane in a Fly-By-Wire control system with a detailed layout sketch. [8+8]

5. (a) What are the features of a long range military bomber airplane? Compare these with that of a long range heavy capacity civil Jetliner. Provide as many details.
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