

Code No: RT32211

**R13****SET - 1****III B. Tech II Semester Regular/Supplementary Examinations, April -2018****FLIGHT MECHANICS-II**

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. Answering the question in **Part-A** is compulsory  
3. Answer any **THREE** Questions from **Part-B**

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**PART-A**

- 1 a) Explain the requirements for static and dynamic stability for an airplane. [3M]
- b) Draw a graph of  $C_M$  vs  $\alpha$  for statically stable, unstable and neutrally stable aircraft configuration. [4M]
- c) Define trim point at trim angle of attack of an airplane. [4M]
- d) Plot hinge moment variation with angle of attack. [4M]
- e) Write down the expression for yawing moment coefficient. [3M]
- f) What is the criterion for lateral stability of an airplane? [4M]

**PART-B**

- 2 Bring out the relationship between yaw and roll of an airplane in the following cases: i) Rolling moment with yaw rate ii) Yawing moment with roll rate. [16M]
- 3 a) The aerodynamic forces and moments on the body are due to only two basic sources. Explain them with sketches. [8M]
- b) Explain the aerodynamic forces on elevator-stabilizer configuration in the stick free condition of an airplane. [8M]
- 4 a) Define hinge moments of aerodynamic surfaces. [8M]
- b) Derive an expression for stick fixed neutral point? [8M]
- 5 a) Explain decoupling of equations of motion of the aircraft by mentioning the conditions for its validity. [8M]
- b) Discuss about the assumptions made in obtaining equations of motion of an aircraft in terms of perturbation variables. [8M]
- 6 a) Write a short notes on [16M]  
i) Contribution of ailerons for roll moment of an aircraft  
ii) Rudder Power iii) Mechanical Gearing iv) Rudder Lock
- 7 a) Explain how dynamic stability of an aircraft is established with the help of Routh's criteria. [8M]
- b) Describe Dutch roll and Spiral instability? [8M]

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