Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14AE2015** | **Duration :** | **3hrs** |
| **Sub. Name :** | **AIRCRAFT STABILITY AND CONTROL** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Derive the contribution of wing of aircraft pitching moment in stick fixed longitudinal Stability. | CO1 | 10 |
| b | Derive the contribution of Tail of aircraft pitching moment in stick fixed longitudinal Stability. | 10 |
| (OR) | | | | |
| 2. |  | A wing section being tested in a wind tunnel is hinged at its leading edge,  with freedom to rotate about the hinge axis. Calculate the equilibrium floating angle of the wing at a tunnel speed of 100 kmph, given that: wing weight is 250 N/m2, c.g. location at 0.4 c, a.c. location at 0.24c,  Cmac = -0.04, αol = -30, dCl / dα = 0.105 deg-1. Assume standard sea level conditions. Is the equilibrium statically stable? | CO1 | 20 |
| 3. | a. | Derive the stick fixed Neutral point for stick fixed longitudinal Stability and Discuss the effect of Neutral Point in Stick Fixed Stability. | CO1 | 12 |
| b. | Derive the Elevator angle in trim condition. | CO1 | 8 |
| (OR) | | | | |
| 4. | a. | Explain in Detail   1. Stick Force & Stick force Gradients 2. Trim Taps | CO1 | 10 |
| b. | If the slope of Cm versus Cl curve is -0.15 and the pitching moment at zero lift is equal to 0.08,determine the trim lift coefficient .If the center of gravity of the airplane is located Xcg/C=0.3,Determine the Stick fixed neutral point. | CO2 | 10 |
| 5. | a. | What is Aerodynamic Balancing? and Explain about the differet types of Aerodynamic Balancing. | CO2 | 15 |
| b. | What is Advarse Yaw? | 5 |
| (OR) | | | | |
| 6. | a. | Discuss the Effect of Dihedral in Latral Stability. | CO2 | 10 |
| b. | Using strip theory estimate the latral control power. | 10 |
| 7. |  | Derive the stability derivative with a contribution of wing,Fuselage,Propeller in Static Directional Stablity. | CO2 | 20 |
| (OR) | | | | |
| 8. | a. | Explain in Detail.  Rudder Lock. | CO2 | 5 |
| b. | One Engine In operative condition. | 8 |
| c. | Weather cocking Stabilty. | 7 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain in detail  Auto Rotaion | CO3 | 5 |
| b. | Dutch Roll | 5 |
| c. | Spin | 5 |
| d. | Sprial Instability | 5 |

ALL THE BEST