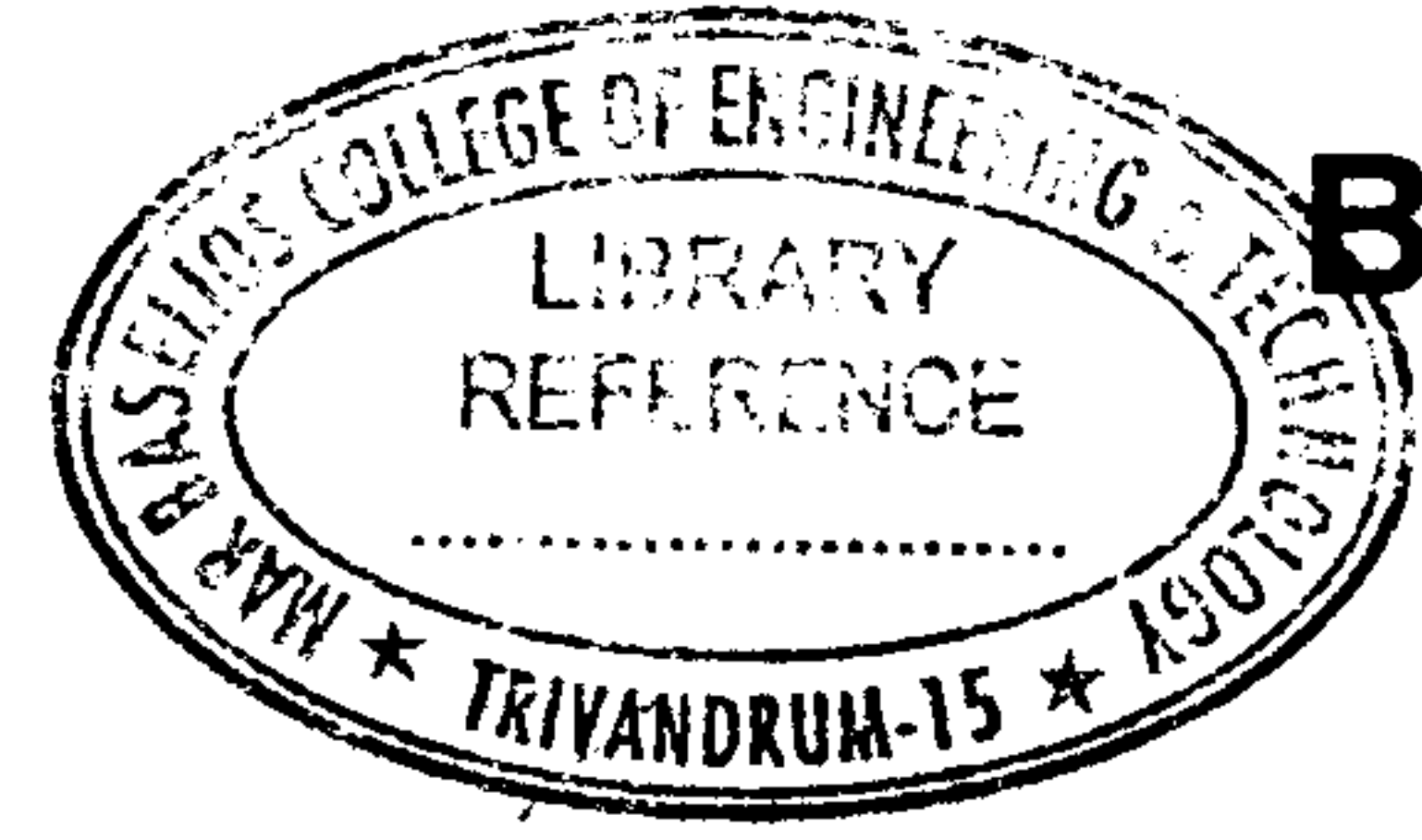




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**B – 2900**

Reg. No. : .....

Name : .....

**Second Semester M.Tech. Degree Examination, December 2016  
(2013 Scheme)**

**Branch : Electrical & Electronics Engineering  
EGE 2001 : FLIGHT DYNAMICS AND CONTROL**

Time : 3 Hours

Max. Marks : 60

**Instruction :** Answer *any two* questions from *each* Module. *All* questions carry *equal* marks.

**Module – I**

1. Sketch the general force diagram of an aircraft during flight. Derive the equations of motion from basic principles. What is meant by the aircraft at trim condition ? **10**
2. What is power available ? Plot the variation of power available with flight speed for a jet powered airplane and indicate the effect of altitude on the curve. **10**
3. a) What is the significance of L/D ratio ? Derive the conditions for minimum thrust required for an aircraft at steady, level flight. **5**  
b) The following data refers to a typical transport aircraft.  
Weight = 42000 N, Wing area = 28 sq.m,  $AR = 7.5$ , Oswald efficiency factor = 0.9, Zero lift drag coefficient = 0.03. What is the thrust required by the craft to fly with a velocity of 300 km/h at an altitude of 4 km ? **5**

**Module – II**

4. a) Define range and endurance. Derive the conditions for maximum range and maximum endurance. **6**  
b) A typical aircraft starts a power-off glide at an altitude of 4 km. The maximum lift to drag ratio for the craft is 11. Calculate the minimum glide angle and maximum range measured along the ground that the aircraft can cover. Also calculate the equilibrium glide velocity at 4 km altitude. **4**

P.T.O.



5. What is V-n diagram ? Draw the general V-n diagram for a typical aircraft indicating all important parameters. Discuss the factors that affect the flight envelope and performance. 10
6. a) Define take off distance and landing distance. 4  
b) Develop the expression for take off distance. Discuss the factors affecting take off distance. 6

### Module – III

7. a) Define stability with respect to an aircraft.  
b) Distinguish between static stability and dynamic stability. Also explain the conditions for longitudinal static stability. (2+8=10)
8. a) Explain the characteristic modes of stick fixed longitudinal motion of an aircraft.  
b) What is Dutch roll ? What is the effect of Dutch roll on the aircraft performance ? (5+5=10)
9. a) What is autopilot ? Draw the block schematic diagram of displacement autopilot and explain its operation.  
b) What is stability augmentation ? Explain the stability augmentation using pitch rate feedback. (5+5=10)

