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**BAS-017**

# B.Tech. AEROSPACE ENGINEERING (BTAE)

## Term-End Examination

## December, 2015

## BAS-017 : FLIGHT MECHANICS

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Answer any* ***seven*** *questions. All questions carry equal marks.*

**1.** State whether the following statements are *True* or *False* : *10*

(a) In a simple U-tube manometer the absolute pressure is also referred to as gauge pressure.

(b) Shape of the aerofoil makes great difference to the angle at which stalling takes place.

(c) Tail-less type aeroplane has two tails instead of one.

(d) Induced drag is caused because of wing-tip vortices.

(e) Load factor given to every part of an aeroplane is constant.

2. Answer briefly the following questions :

(a) What is meant by centre of pressure of an aerofoil ? *2*

(b) What is aspect ratio and what is its significance ? *3*

(c) What is the object of balancing controls ? *3*

(d) Distinguish between 'ceiling' and 'service ceiling'. *2*

3. The mass of an aeroplane is 2000 kg. At a certain speed in straight and level flight, the ratio of lift to drag of the complete aircraft is 7·5 to 1·0. If there is no force on the tail plane, what are the values of lift, thrust and drag ? *10*

4. An aircraft of 5000 kg mass is powered by an engine capable of producing 1500 kW power. Calculate the maximum angle of climb at an airspeed of 130 knots, if the efficiency of the propeller is 80% and the drag at this speed is 6·7 kN. *10*

5. What is the wing divergence ? Explain the torsional and flexural divergence. How is it controlled in design ? *10*

6. (a) What are the six degrees of freedom of an aeroplane ? *3*

(b) Why is there a definite limit to the smallness of the radius on which an aeroplane can turn ? *3*

(c) Under what conditions does an aeroplane spin ? *4*

7. An aircraft in level flight has a stalling speed of 31 m/s. While taking a coordinated horizontal turn with 70 degree bank angle :

   (a) What is its load factor ? *5*

   (b) What would be its stalling speed ? *5*

8. (a) What do you understand by stick-fixed and stick-free conditions ? Explain in brief. *5*

   (b) Explain, what is Dutch Roll Phenomenon. *5*

9. (a) How does the load carried in an aeroplane affect the gliding angle and gliding speed ? *5*

   (b) If the load carried by an aeroplane is increased, what will be the effects on performance ? *5*

10. What do you understand by aerodynamic balancing ? What are the different methods of aerodynamic balancing ? *10*

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