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BAS-009

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

00183

June, 2018

BAS-009 : INTRODUCTION TO AERONAUTICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) Explain the salient features of Wright Flyer with the help of neat sketch(es).

(b) Distinguish between an airplane and a helicopter. *6+4=10*

2. (a) Explain the working principle of altimeter with the help of a neat and labelled sketch. *6*

(b) Explain the importance of standard atmosphere. List various standard atmospheres. *3+1=4*

3. (a) Define absolute, geometric and geopotential altitude. *3*

(b) Calculate standard atmospheric properties at a geopotential altitude of 21 km. Assume Lapse rate = − 6·5 K/km for troposphere. *6*

(c) Define pressure altitude. *1*

4. (a) Define the following with the help of a neat and labelled sketch : *4×2=8*

(i) Camber

(ii) Geometric angle of attack

(iii) Lift

(iv) Critical Mach Number

(b) Define Area Rule with the help of a neat sketch. *2*

5. Define range and endurance. Derive the expressions for range and endurance for a turboprop aircraft. *10*

6. Write notes on the following with the help of sketch : *3+3+4=10*

(a) Supercritical airfoils

(b) Drag bucket

(c) Induced drag

7. (a) Distinguish between active and passive boundary layer control devices. 4

(b) Explain flight envelope for a typical transport aircraft with the help of a neat and labelled diagram. 6

8. (a) Define the following : 3

(i) Balanced field length

(ii) Decision speed

(iii) Stalling speed

(b) Derive the expression for total take-off distance. 7

9. Write notes on the following : *4+3+3=10*

(a) Various types of propellers

(b) Lift and drag divergence

(c) Sweepback effects