

Elements of Aeronautics

P. Pages : 2

Time : Three Hours



NKT/KS/17/7262

Max. Marks : 80

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- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Diagrams and chemical equations should be given whenever necessary.
 11. Illustrate your answers whenever necessary with the help of neat sketches.
 12. Use of non programmable calculator is permitted.

1. a) Write about very early developments. 7
i) George Cayley ii) Otto Lilienthal
- b) Define following terms: 7
i) Biplane ii) Monoplane
iii) Biplane interference iv) Ornithopter
v) Triplane vi) Whirling arm apparatus
vii) Glider

OR

2. a) Write about aeronautical triangle. 7
[Langley, The Wrights and Glenn Curtiss].
- b) What is meant the interregnum? 7
3. a) Write about Developments in Aerodynamics over the years. 7
- b) Write about Developments in Propulsion over the years. 7

OR

4. a) Write about Developments in structure over the years. 7
- b) Write about Developments in materials over the years. 7
5. a) Write down component of an airplane and their functions. 8
- b) Differentiate between lighter than air and Heavier than air. 5

OR

6. a) Write short note on the following terms. 5
i) Land plane ii) Sea plane
iii) Amphibian iv) Float plane
v) Flying plane

- b) Write short note on following terms. 8
i) Longitudinal control ii) Lateral control
iii) Directional control

7. a) Derive an expression for Hydrostatic Equation. 7

- b) Derive an Expression for Geopotential and Geometric altitude. 6

OR

8. a) Calculate the standard atmosphere values T, P and ρ at a Geopotential altitude of 14km. 7

- b) Derive an Expression for variation of pressure, Temperature and Density in stratosphere Region. 6

9. a) Write short notes on: 5
i) Fuselage ii) Powerplant
iii) Wing iv) Landing gear
v) Empennage

- b) Write short notes on following terms:- 8
i) High wing ii) Mid wing
iii) Low wing

OR

10. a) Write about use of Aluminum alloy and titanium. 7

- b) What is composite material? Write down use of stainless steel and application of composite material. 6

11. a) Difference between turboJet Engine and ramJet Engine. 5

- b) Derive Thrust Equation for Rocket Engine. 8

OR

12. a) Derive Equation for Burnout velocity of Rocket Equation. 6

- b) Consider a turboJet powered airplane flying at a standard altitude of 9144m at a velocity of 804.67kmph. The TurboJet Engine it self has inlet and Exit areas of 0.65m^2 and 0.42m^2 . respectively. The velocity and pressure of the Exhaust gas at the exit are 487.68 m/s and 0.3064 bar respectively. Calculate the thrust of the TurboJet. 7
