B.E. (Aeronautical Engineering) Third Semester (C.B.S.)

Elements of Aeronautics Paper - V

P. Pages : 3 **TKN/KS/16/7350**

Time : Three Hours * 0 9 8 9 * Max. Marks : 80

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) Samuel Pierpont Langley ii) Daedalus and Icarus.

b) Write about Wright brothers **7**

[Wilbur wright & Orville Wright]

OR

2. a) Write about aeronautical triangle [Langley, The Wrights and Glenn Curtiss] **7**

b) Define following terms. **7**

i) Biplane ii) Monoplane

iii) Biplane interference iv) Ornithopter

v) Triplane vi) Whirling arm apparatus

vii) Glider

3. a) Write about developments in Propulsion over the years. **7**

b) Write about developments in materials over the years. **7**

OR

4. a) Write about developments in structure over the years. **7**

b) Write about developments in Aerodynamics over the years. **7**

5. a) Write down the component of an airplane and their functions. **8**

b) Give classification of different types of flight vechicles. **5**

OR

6. a) Write short note on the following terms. **7**

i) Conventional control ii) Power control

b) Write short note on Airspeed indicator, The altimeter, Navigation instruments, and flight instruments. **6**

7. a) Derive an expression for hydrostatic Equation. **7**

b) Derive an expression for Geopotential and Geometric altitude. **6**

OR

8. a) What is NACA airfoil series. Write down its significance? **7**

i) 4 Digit series [NACA 2412]

ii) 5 Digit series [NACA 23012]

iii) 6 Series [NACA 65-218]

b) Define following terms **6**

i) Centre of pressure ii) Mach number

iii) Reynolds number iv) Lift

v) Drag vi) Side force

9. a) Write short note on: **4**

i) Mono coque construction. ii) Semi Mono coque construction

b) Write short note on following terms. **9**

i) High wing ii) Mid wing iii) Low wing

OR

10. a) Write physical properties of metals and Non metals. **8**

b) Define following terms. **5**

i) Brittle ii) Ductile

iii) Malleable iv) Luster

v) Corrosion

11. a) Write difference between Turboprop engine and Turbojet engine. **5**

b) Derive Thrust equation for Jet propulsion Equation. **8**

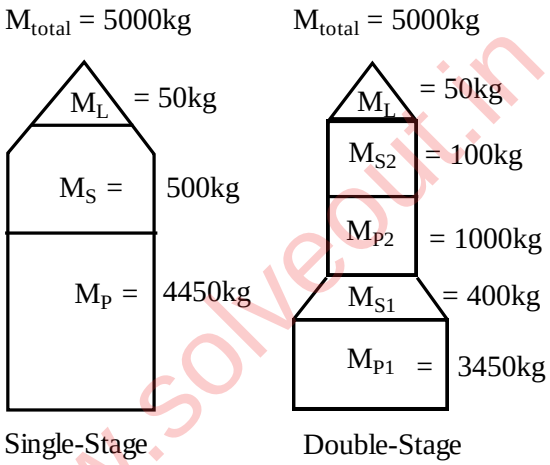
OR

12. a) Derive equation for burnout velocity of Rocket equation. **7**

b) Consider the single stage rocket and the double stage rocket sketched respectively. Both Rockets have the same total mass $M_{total} = 5000\,kg$ and same specific impulse $I_{SP} = 350\,Sec.$ Both Rockets have the same Payload mass $M_L = 50\,kg.$ The total mass of the Double stage rocket is $M_{S1} + M_{S2} = 400\,kg + 100\,kg = 500\,kg,$ which is the structural mass of the single stage rocket. The Propellant mass of the double stage rocket is $M_{P1} + M_{P2} = 3450\,kg + 1000\,kg = 4450\,kg,$ Which is the propellant mass of the single stage rocket. Both rockets are boosting the same payload mass of 50 kg into space. Calculate and compare the Bwrnout velocity for the Rockets. **6**

i) Single stage Rocket.

ii) Double stage Rocket.



****