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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E.

Branch: Aerospace Engineering

Course Code: 21AE7DCAVD

Course: Aerospace Vehicle Design and Analysis

Semester: VII

Duration: 3 hrs.

Max Marks: 100

Date: 28.02.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Explain briefly about the phases of aircraft design. 8
b) Calculate the near exact take-off weight of an airplane from the following data; 12

(i)

$$W_{\text{crew}} + W_{\text{payload}} = 15800\text{N}$$

$$W_f/W_0 = 0.387$$

$$W_e/W_0 = 0.93 * W_0^{(-0.07)}, W_0 = 10800/(0.613-We/W_0)$$

(ii)

$$W_{\text{crew}} + W_{\text{payload}} = 10800\text{N}$$

$$W_f/W_0 = 0.387$$

$$W_e/W_0 = 0.8835 * W_0^{(-0.07)}, W_0 = 10800/(0.613-We/W_0)$$

UNIT - II

2 a) Explain briefly about the effect of airfoil thickness to chord ratio on following parameters; 15
(i) Drag
(ii) Critical Mach number
(iii) lift
b) Discuss about the effect of camber on lift curve. 05

OR

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

3 a) Explain the various tail geometry and their characteristics with a neat sketch. 10

b) Explain about the selection of airfoil selection for tail and how does the placement of tails effects the stall and spin. **10**

UNIT - III

4 a) Explain briefly about the effect of wing loading on following parameters: **15**

- (i) Take-off and landing
- (ii) Rate of climb
- (iii) Range

b) Write a short note on thrust to weight ratio **5**

UNIT - IV

5 a) What are the factors needs to be considered while designing the volume of fuselage? explain it. **10**

b) Explain briefly about the aerodynamic consideration of fuselage design. **10**

UNIT - V

6 a) Bring out the criteria for selecting the propulsion system of an aircraft. **10**

b) Briefly explain about the various loads acting on aircraft in different phases of flight. **10**

OR

7 a) Briefly explain about the load distribution of fuselage and wing. **10**

b) Explain the working principle of ramjet engine with a neat sketch. **10**
