

B.E. Sixth Semester (Aeronautical Engineering) (C.B.S.)  
**Aircraft Design Paper – V**

P. Pages : 2

Time : Three Hours



**KNT/KW/16/7431**

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. Explain design cycle in detail. **13**

**OR**

2. Give classification of aircraft based on. **13**

- |             |                       |
|-------------|-----------------------|
| a) Purpose  | b) Speed rang         |
| c) Fuselage | d) Wing Configuration |

3. Define following terms. **13**

- |                       |                      |
|-----------------------|----------------------|
| a) Interactive design | b) Operational Cost  |
| b) Maintainability    | d) Manufacturability |

**OR**

4. Design following airfoils. **13**

NACA 23021, NACA 0012, NACA 63-015

5. What choice are available for the selection of power plant location on aircrafts? Differentiate each term of their merits and demerits. **14**

**OR**

6. In order to calculate initial estimates of an airplane thrust-to-weight ratio, the following data is given. **14**

Total Take- off weight  $W_o = 35413$  kg  
Wing Ref. Area  $S = 75$  m<sup>2</sup>  
Wing loading  $(w/s) = 472$  kg/m<sup>2</sup>  
Cruise speed  $(v) = 210$  m/s

Assume a wing aspect ratio,  $AR=9.0$ , Profile-drag Co-efficient  $C_{D,o} = 0.024$ , Fuel equal to 2% of  $W_0$  burnt during climb, and rate of Climb,  $(R/C) = 2$  m/s. Determine the following.

- a) Drag Profile.
- b) Cruise lift Co-efficient.
- c) Drag generated.
- d) Flight path angle.
- e) Thrust/weight required.

Assume Oswald's wing efficiency factor  $e = 0.89$ .

7. What are the important factors taken into Consideration for wing design? Explain in brief. 14

**OR**

8. a) What are the different types of load acting on wing? Explain. 7
- b) What are the types of wing based on its shape? State their advantages and disadvantages. 7
9. What are the different types of tail plane configurations used in aircraft? Explain with neat sketches. 13

**OR**

10. a) What is the procedure for determination of tail surface area? Explain. 7
- b) Draw neat sketch of fuselage. Explain function of its various structural members. 6
11. a) Explain various parts of landing gear with neat sketch. 6
- b) What are the design consideration for landing gear. 7

**OR**

12. a) Explain shock absorber types with figure. 7
- b) Give a short note on landing gear ladder. 6

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