Register Number:……..

**B.E., DEGREE EXAMINATION: JUNE/JULY 2013**

Seventh Semester

**AERONAUTICAL ENGINEERING**

AER119: Flight Vehicle Design

**Time: Three Hours** **Maximum Marks: 100**

**Answer ALL Questions:-**

**PART A (10x1=10 Marks)**

1. At _____ process the individual components of aircraft is designed.

   (A) Conceptual design (B) Preliminary design

   (C) Detailed design (D) None of the above

2. Choose the correct answer.

   (A) Ramp weight is greater than maximum take off weight.

   (B) Empty weight =Structural weight+Engine weight+Instrument weight

   (C) Maximun take off weight is lesser than maximun landing weight

   (D) Empty mass fraction always greater than one

3. Wing loading is defined as ratio of:

   (A) Weight of the aircraft to the wetted area of the wing.

   (B) Lift produced by wing to the platform area of the wing at level flight.

   (C) Thrust produced by aircraft to the area of the wing.

   (D) Max Take off weight to the wetted area of the wing.

4. The altitude at which the rate of climb 100 ft/hr is called as_____

   (A) Service ceiling (B) Absolute ceiling (C) Cursing altitude (D) none of the above

5. _____ is increased by wing sweep angle

   (A) Induced Drag (B) Drag divergence Mach no

   (C) Interference Drag (D) Critical Mach no

6. The ratio of the air passes through the central core of the engine to the air passes over the engine is called as _____ for turbo fan engine

   (A) Air fuel ratio (B) Mass ratio (C) By pass ration (D) Thrust ratio

7. _____ Stability is more for high wing aircraft

   (A) Lateral (B) Directional (C) Longitudinal (D) All the above

8. The distance between center of gravity and neutral point is called as_____.

   (A) Static Margin (B) Longitudinal Neutral point

   (C) Forward C.G Travel limit (D) Center of Mass

9. _____ Landing Gear offers more advantages for nose mounted Propeller aircraft.

(A) High skid (B) Conventional (C) Tricycle (D) All the above

10. Choose the correct answer

(A) Anti icing system removes ice formed over the aircraft structures.

(B) Pneumatic system is used as a primary control system

(C) Gravity feed fuel systems are used in B747 aircraft

(D) Pressurization system is essential for altitude above 3000m

**PART B (10 x 2 = 20 Marks)**

11. Define Ramp Weight.
12. Draw the flow chart of aircraft design process.
13. What is called balance diagram? What is the use of it?
14. Define rate of climb
15. What are advantages of having wing sweep?
16. Define SFC and TSFC.
17. What are types of flaps used in aircraft?
18. Define Neutral point.
19. What are differences between anti-icing and de-icing system.
20. What are the design requirements for navigation systems?

**PART C (5 x 14 = 70 Marks)**

21. a) With neat diagram explain the design process of an aircraft

**(OR)**

b) Explain the procedure adapted for first estimate of weight.

22. a) What are the factors influencing the choice of high, mid and low wings for an aircraft? Consider all aspects of design affected by this factor.

**(OR)**

b) Explain briefly about the first estimate of C.G location.

23. a) What are the different types of air inlet used in aircraft? Explain the advantages and disadvantages of each type.

**(OR)**

b) Explain the following (7+7)

i. Types of Tail plane

ii. Engine Selection

24. a) In order to calculate initial estimates of an airplane thrust-to-weight ratio, the following data is given: maximum take-off mass, MTOM = 35413 kg, wing area, S = 75 $m^2$, wing loading, (W/S) = 472 $kg/m^2$. The airplane cruise speed is V = 210 m/s. Assume a wing aspect ratio, A = 9.0, profile drag co-efficient, $CD_0$ = 0.024, and 2% fuel burnt during climb, and rate of climb, R/C = 2 m/s, Determine the following:

(i) Drag profile

(ii) Cruise lift co-efficient

(iii) Drag generated

(iv) Flight path angle

(v) Thrust/weight required

**(OR)**

b) Explain the body axis and wind axis coordinate systems. Define stability. Explain the different types of static and dynamic stabilities.

25. a) Explain the design requirements of the followings: (7+7)

(i) Pressurization system

(ii) Hydraulic system

**(OR)**

b) What are the design requirements for the communication system? Explain the function of any one type of communication system briefly.

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