Register No: ……

B.E DEGREE EXAMINATIONS: MAY/JUNE 2011

Second Semester

AERONAUTICAL ENGINEERING

AER101: Elements of Aeronautics

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

Answer ALL Questions:-

Note: Suitable assumptions may be taken wherever necessary

PART A (10 x 1 = 10 Marks)

1. When aircraft engines are mounted from the wing, they are usually housed in a type of shroud called

   a) Fuselage b) Flap c) Nacelle d) Aileron

2. Aircraft is considered as supersonic when Mach number, _____

   a) M<1.0 b) M = 1 c) M>1 d) M = 0

3. Hardness of a material is _____

   a) Resistance to abrasion b) Strength of the material

   c) Toughness of the material d) None of the above

4. A monocoque structure is made of _____

   a) Rod b) Ring c) Sheet d) None

5. The piston engine works fundamentally by the _____ of air in a cylinder

   a) compression b) expansion c) Compression and expansion d) mixing

6. The ratio of the area of blades to area of actuator disc is defined as_____ of a propeller.

   a) solidity b) aerodynamic ratio c) aspect ratio d) slenderness ratio

7. In a quiet atmosphere the forces which determine the trajectory of a stable rocket without misalignment are _____

   a) gravity force and thrust b) thrust and drag

   c) gravity force and drag d) thrust, drag and gravity force

8. Thrust of identical rockets at the sea level and the outer atmosphere will be _____

   a) same b) different (higher at sea level)

   c) cannot predict a *priori* d) different (higher at outer atmosphere)

9. _____law of planetary motion states that the orbit of a planet/comet about the Sun is an elipse with the Sun's center of mass at one focus.

   a) Kepler's 1st b) Kepler's 2nd c) Kepler's 3rd d) Newton's 1st

10. Which one of the following is having less take-off weight?

a) Helicopter b) Micro lights c) MAV d) Flying cars

PART B (10 x 2 = 20 Marks)

11. Define *angle of attack* and *aspect ratio*.
12. Differentiate *Aileron* and *Rudder* in an airplane.
13. Explain briefly geodesic construction.
14. What are the composite materials used for aerospace application?
15. Why propeller blades are given a twist from root to tip?
16. What is the main purpose of a tail rotor in helicopters?
17. Define specific impulse of a rocket.
18. Write down the general thrust equation of a propulsion device.
19. What does HALE-UAV stand for?
20. Define Microlight.

PART C (5 x 14 = 70 Marks)

21. a) "Anatomy of an Aero plane"- Explain briefly with a neat sketch.

(OR)

b) Derive an expression for the generation of lift.

22. a) With a neat sketch explain the semi monocoque fuselage construction.

(OR)

b) "Different types of materials used in an aero plane"- Write a summary.

23. a) Explain the basic principle of Turboprop and Turbofan Engine with a neat sketch

(OR)

b) Explain briefly the Comparative merits & Demerits of both piston & jet engines

24. a) Explain the basic principle, construction and operation of Hybrid Rocket Engine with a neat sketch.

(OR)

b) "Kepler's laws of planetary motion"-- Explain briefly all the three laws

25. a) Write short notes on-- **UAVs&MAVs**

(OR)

b) Write short notes on-- UCAVs & UVSs

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