Register Number.....

B.E. DEGREE EXAMINATIONS: OCTOBER / NOVEMBER-2008

Third Semester

AERONAUTICAL ENGINEERING

U07AR304: Elements of Aeronautics-II

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

Answer ALL Questions: -

PART A (20 x 1 = 20 Marks)

1. In the momentum theory of propellers the rotation of slip stream is

A. accounted
B. not accounted
C. does not arise
D. negligibly small

2. High rotational speed of propellers is not advisible because of

A. poor structural strength of blade
B. energy loss in slip stream
C. shock and boundary layer separation losses on blades
D. the losses due to vortex formation

3. Propeller blades are given a twist from root to tip

A. to make uniform strength of blade
B. to provide uniform distribution of aerodynamic forces
C. to avoid compressibility effect
D. to make rotation of slip stream

4. What is solidity of propeller?

A. Ratio of number of blades to circumference of actuator disc
B. Ratio of the area of blades to area of actuator disc
C. Ratio of chord length of aerofoil element of blade to circumference of disc
D. The strength of the propeller blade

5. Why aspect ratio cannot be increased for airfoils above certain limit, because

A. aerofoil will have very large area
B. it reduces aerodynamic forces
C. it looses its structural strength
D. it attains very large drag

6. The relation between the energy ratio and power factor of a wind tunnel

A. Both are same
B. One is the reciprocal of the other
C. There is no relation
D. Both are related to contraction ratio

7. Instrument to measure dynamic pressure of air flowing through wind tunnel

A. Pitot static tube
B. Pressure gauge
C. Hot wire probes
D. Wind tunnel balance

8. Most of the wind tunnels are provided with suction blowers for air flow. Why?

A. Easy to construct
B. More convenient and economical
C. Test section flow becomes undisturbed
D. To make tunnel maintainer free

9. Variable thrust rocket motors regulate the flow of propellant by

A. throttling orifices
B. injector pressure regulation
C. controlling the flow with fixed orifice
D. varying the temperature

10. What is scorching of liquid propellant Rocket Motors?

A. mechanism of failure due to improper heat transfer
B. due to temperature gradient between inner and outer surface
C. due to combination of chemical action and mechanical erosion
D. Erosion of wall by temperature gradient between outer and inner surface

11. The property of material used to construct Rocket motor

A. High thermal conductivity and good strength at high temperature
B. Low thermal conductivity and good strength at high temperature
C. High thermal conductivity and low strength at high temperature
D. Low thermal conductivity with heavy thick chambers

12. A good performance of a bi-propellant combination is determined by

A. A high content of chemical energy and with low weight of products
B. A low content of chemical energy and with high weight of products
C. moderate content of chemical energy and with high weight of products
D. A high content of chemical energy and with moderate weight of products

13. Which is the most suitable Aspect ratio for tail rotor design?

A. 4 – 6
B. 8 – 11
C. 11 – 15
D. 5 – 9

14. Accessory losses include

A. Electrical power generation
B. Transmission of cooling blowers
C. Hydraulic power supply
D. All the above

15. The lifting capability of any part of rotating blade is related to its

A. Aerodynamic center
B. Dynamic pressure
C. Local angle of attack and dynamic pressure
D. Blade camber

16. For good Hover performance of a helicopter, the blade area

A. should be small
B. should be large
C. should be too small
D. not depends on the blade area

17. Application of combat UAV is

A. providing ground and aerial gunnery
B. providing attack capability for high risk missions
C. providing battle field intelligence
D. providing reconnaissance

18. Airplane type MAV has

A. flapping wing
B. rotary wing
C. fixed wing
D. wing less

19. The main difference of UMAV from ordinary UAV is

A. design to deliver weapons
B. design to take aerial photography
C. design for agricultural purpose
D. design for space research

20. A micro light is

A. a small light aircraft whose maximum take-off weight does not exceed 450 kg
B. a surface to surface missile which can travel up to 10 km
C. a supersonic aircraft whose maximum speed is Mach number 3
D. a part of aircraft instrument

PART B (5 x 16 = 80 Marks)

21. (a) Using simple blade element theory, determine expressions for thrust and torque gradings.

(OR)

(b) Explain various types of propellers.

22. (a) Explain with neat sketch the working of a six component wind tunnel balance for model testing.

(OR)

(b) Explain the flow visualization by Schileron method.

23. (a) Derive an expression for exit velocity of isentropic flow through a nozzle in terms of pressure ratio.

(OR)

(b) Derive an expression for acceleration of rocket along the flight path and perpendicular to the flight Path in terms of thrust of propulsion, angle of flight path, aerodynamic forces. State the assumptions made to analyse the vertical trajectory of a rocket from above results.

24. (a) (i) Write short notes about Disk loading and Power loading. (8)

(ii) Explain briefly about various types of Helicopter controls. (8)

(OR)

(b) (i) Explain in detail about basic design requirements of helicopter. (10)

(ii) Describe about flow near a Hovering rotor. (6)

25. (a) Explain in detail about the structure and fabrication of UAV? Mention its applications.

(OR)

(b) Write the operation and safety procedure of MAV and Micro lights.

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