

IV B.Tech. I Semester Regular Examinations, November -2005
AIRCRAFT SYSTEMS AND INSTRUMENTS
(Aeronautical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are the basic advantages of pneumatic system? [8]
(b) Draw a block diagram of a typical mechanical pneumatic system of a basic trainer aircraft and explain. [8]
2. Write short notes on the following: [16]
 - (a) Hydraulic retracting mechanism.
 - (b) Skid control valves.
 - (c) Expander tube brakes.
 - (d) Piston-type shimmy damper.
3. (a) Write about various system components which are being used in airplane control. [8]
(b) Draw the control-position indicating system of a jet aircraft and explain its working principles. [8]
4. Write short notes on the following: [16]
 - (a) Gravity feed fuel system.
 - (b) Bladder fuel cells.
 - (c) Fuel strainers.
 - (d) Fuel heaters.
5. (a) Explain the principles of voltage regulation in an aero plane. [8]
(b) Draw the carbon-pile voltage regulator and explain. [8]
6. Write short notes on the following: [16]
 - (a) Water separators in cabin air-conditioning system.
 - (b) Oxygen regulators.
 - (c) Thermal switch fire detecting system.
 - (d) Smoke and toxic gas detection systems.
7. (a) What is the "Standard Instrument Panel Layout" in the cockpit as per ICAO. Explain briefly the types of instruments in an aircraft. [8]
(b) With the help of a neat sketch, explain 'pitot-static' air data sensor. [8]

8. (a) Define the term Mach number and explain how airspeed indicator is modified as Mach meter and indicated. [8]
- (b) Describe the working of a pitot-static pressure sensing probe. [8]

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1. Write short notes on the following: [4x4=16]
 - (a) Hand pumps
 - (b) Gear type pumps
 - (c) Types of hydraulic fluid
 - (d) Pressure switches
2. Write short notes on the following: [16]
 - (a) Mechanical Retracting mechanism.
 - (b) Landing gear.
 - (c) Anti-skid system.
 - (d) Nose wheel centering system.
3. (a) Explain 'Rigging' of an airplane. [8]
(b) List out and explain in detail various control system components which one may come across during rigging of an aeroplane. [8]
4. (a) What is meant by "Pressure Fuel System" and explain how it differs from gravity flow system. [6]
(b) With a simple block diagram explain Fuel system of a twin-engine airplane. [10]
5. (a) Write about different types of Magnetos used in aircraft starting systems. [8]
(b) With the help of simple sketch explain the working of an aircraft starting system. [8]
6. (a) Differentiate between cabin pressurization and air-conditioning systems. [8]
(b) With a neat sketch, explain the working of a Boot-strap air cycle system. [8]
7. Explain the functioning principles of [4x4=16]
 - (a) Force balanced accelerometer;
 - (b) Vibrating reed accelerometer;
 - (c) Electrostatic accelerometer; and
 - (d) Ring laser accelerometer.

8. (a) Define the term Mach number and explain how airspeed indicator is modified as Mach meter and indicated. [8]
- (b) Describe the working of a pitot-static pressure sensing probe. [8]

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1. Write short notes on the following: [4x4=16]
 - (a) Pneumatic controller for fuel metering
 - (b) Push Pull rods
 - (c) Gear system
 - (d) Characteristics of hydraulic fluid
2. (a) Explain the working of air braking system. [8]
(b) Explain the importance of shock absorbers. [8]
3. Using a full version schematic layout of air data (digital) computer, explain the function of Auto-pilot in a modern aircraft. [16]
4. With the help of a functional schematic layout explain the working of engine indicating and crew alerting system incorporating centralized electronic computer. [16]
5. Write short notes on the following: [16]
 - (a) Breaker assembly in high- tension magnet to ignition system.
 - (b) Distributor.
 - (c) Ignition on switches.
 - (d) Spark plugs.
6. (a) Differentiate between De-icing and Anti-icing systems. [8]
(b) With the help of a simple figure, explain pneumatic - mechanical de-icing system for a twin engine airplane. [8]
7. (a) Why does it require to integrate the 'Magnetic Heading Reference System (MHRS)' and 'Flight Director System (FDS)' with inertial navigation. [8]
(b) Explain various types of accelerometers. [8]
8. Write short notes on the following: [4x4=16]
 - (a) Engine Tachometer
 - (b) Turbine Gas Temperature (TGT) measuring device
 - (c) Resistance type fuel quantity indicators

(d) Bourdon tube pressure measuring instrument

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1. Write notes on the following: [16]
 - (a) Open hydraulic system
 - (b) Accumulators
 - (c) Pressure relief valves
 - (d) Moisture control
2. Write short notes on the following: [16]
 - (a) Electrical retracting mechanism.
 - (b) Nose Wheel steering mechanism.
 - (c) Trunnion.
 - (d) Fixed gear.
3. Write short notes on the following: [16]
 - (a) Basic radio principle.
 - (b) Communication systems.
 - (c) VHF Omni range system.
 - (d) Distance measuring equipment.
4. (a) List out the parameters that are to be monitored during the operation of an aero engine. [8]
(b) Explain a supervisory electronic engine control system of a modern airplane with a schematic layout. [8]
5. (a) List out the main components Pre-start and start procedure of a turbo-prop engine. [8]
(b) Discuss the procedures to be followed in extinguishing engine fire. [8]
6. (a) Explain the effects of less and excess of oxygen to human body. [8]
(b) Using a schematic diagram explain 'Crew Oxygen System'. [8]
7. Draw a detailed pictorial view of Flight Director System and explain how it helps in achieving integrated Navigation in a modern aircraft. [16]

8. (a) Define the term Mach number and explain how airspeed indicator is modified as Mach meter and indicated. [8]
- (b) Describe the working of a pitot-static pressure sensing probe. [8]

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