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**GAS TURBINE ENGINES (CASA ATPL)**  
**CHAPTER 13 – SAMPLE QUESTIONS**

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## SAMPLE QUESTIONS

1. The thrust output of a gas turbine engine will increase:-
  - a) with a decrease in ambient air temp.
  - b) with a decrease in ambient air pressure.
  - c) with an increase in ambient air temp.
  - d) with a decrease in the calorific value of the fuel.
  
2. Gas decreases in velocity and increases in pressure when flowing through:-
  - a) a convergent duct.
  - b) a divergent duct.
  - c) a parallel duct.
  - d) a viaduct.
  
3. If compressor blade stall occurs:-
  - a) increase airspeed or lower the aircraft to a nose down attitude.
  - b) the compressor assembly ceases to rotate in the normal direction.
  - c) the smooth flow of air over the compressor blades breaks away and causes an interruption of airflow through the engine.
  - d) the fuel flow to the burners will cease immediately.
  
4. Compressor surge is:-
  - a) caused by ground running with air intake guard screens fitted.
  - b) most likely caused by an unserviceable igniter.
  - c) unstable airflow through the whole compressor.
  - d) unstable airflow in the first few stages of the compressor.
  
5. In passing through the turbine:-
  - a) gas pressure and temperature decreases and velocity increases.
  - b) gas pressure, velocity and temperature all decrease.
  - c) gas pressure increases, velocity falls and temperature increases.
  - d) gas pressure remains constant and the temperature increase.

6. The addition of heat to the airflow in a combustion chamber causes;
  - a) constant pressure and temperature with an increase in velocity.
  - b) a large expansion at substantially constant static pressure.
  - c) a large increase in pressure at substantially constant volume.
  - d) a large expansion with accompanying increase in static pressure.
  
7. A jet turbine engine thrust reverser;
  - a) causes the exhaust gas flow to be reversed externally.
  - b) causes the exhaust gas flow to be reversed through the turbine.
  - c) reverses the turbine rotation.
  - d) is most effective at airspeeds below 80 kt.
  
8. The purpose of variable inlet guide vanes is;
  - a) to prevent ice entering the engine.
  - b) to prevent turbine blade stall.
  - c) to prevent compressor blade stall.
  - d) to compensate for compressor bleed air and are fully open at high altitudes.
  
9. A reaction turbine is one in which rotation of the turbine wheel is derived from;
  - a) the pressure increase through the turbine stages.
  - b) an increase in pressure through the stage.
  - c) acceleration of the gas flow through the turbine blades.
  - d) the tangential impingement of the gases on the turbine.
  
10. Tapping of air from the compressor stage of the engine to supply de-icing results in;
  - a) an increase in the temperature of the gas stream, reduced thrust and an increase in specific fuel consumption.
  - b) an improved thrust output from the engine since less air will be mixed with the fuel in the combustion chambers.
  - c) an increase in RPM and a drop in the temperature of the gas stream.
  - d) decrease in cooling air available to the turbine and increases thermal efficiency.

- 11.** In a gas turbine engine, the primary reason for a maximum gas temperature limitation is;
- a) to flat rate the engine.
  - b) to prevent overheating of the turbine.
  - c) to prevent buckling of the jet pipe.
  - d) to prevent burning of the thermocouples.
- 12.** In a gas turbine engine, maximum gas pressure is attained;
- a) between the final compressor stage and the inlet to the combustion chamber.
  - b) at the inlet to the first stage turbine.
  - c) within the exhaust unit.
  - d) in the combustion chamber.
- 13.** For a gas turbine engine, one reason for increase in engine efficiency with altitude is;
- a) the decreased mass airflow which permits a decrease fuel/air ratio.
  - b) the decreased mass airflow which permits a increase fuel/air ratio.
  - c) the lower ambient pressure which results in greater pressure rise in the gas flow through the engine.
  - d) the lower ambient temperature which results in greater temperature rise in the gas flow through the engine.
- 14.** After leaving the compressor, air entering the combustion chambers passes through;
- a) nozzles designed to increase the velocity of the air.
  - b) a divergent duct which reduces the velocity of the air and increases the pressure.
  - c) special passages which drop the pressure of the air before combustion takes place.
  - d) nozzle guide vanes.
- 15.** When are bleed valves open and closed on normal engine operation?
- a) open during start up and low RPM, then closed up to max RPM.
  - b) open over the entire RPM range unless stall occurs.
  - c) closed from idling to nearly design RPM, then open up to max RPM.
  - d) closed over the entire RPM range unless stall occurs.

- 16.** An engine with two independent rotation assemblies is described as;
- a) a bypass engine.
  - b) a duplex engine.
  - c) a compound engine.
  - d) a twin spool engine.
- 17.** In relation to a turbine engine the term 'mass flow' is defined as;
- a) the total mass of air passing through the engine in unit time.
  - b) the mass of air passing through the engine multiplied by its velocity.
  - c) the weight of air passing through the engine multiplied by the temperature coefficient.
  - d) the total amount of air entering the combustion chamber.
- 18.** On a free turbine turboprop, which turbine drives the propeller;
- a) both HP and LP turbines drive the propeller.
  - b) only the front HP turbine drives the propeller.
  - c) only the rear LP turbine drives the propeller.
  - d) only rear  $N_2$  or  $N_3$  turbine depending on the number of spools.
- 19.** Why are turbine blades shrouded?
- a) to prevent blade tips rubbing against the shroud ring on expansion.
  - b) to prevent gas leaking past blade tips and to increase their rigidity.
  - c) to prevent hot gases distorting the turbine blades.
  - d) to prevent cooling air escaping out of the blade tips.

20. What initial action should be taken in case of surge?
- a) throttle back then forward to stabilize the airflow.
  - b) open the throttle and watch RPM increase to optimum range.
  - c) close the thrust lever.
  - d) reduce thrust and turn ignition switches on.
21. A reverse thrust door warning light on the flight deck instrument panel illuminates when;
- a) The reverser doors are locked.
  - b) Reverse has been selected but the doors have remained locked.
  - c) The reverser doors have moved to the reverse thrust position.
  - d) The reverser doors are unlocked.
22. The type of lubricant generally used in the main oil systems of gas turbine engines is;
- a) synthetic oil.
  - b) a mixture of petroleum base and vegetable oils.
  - c) MIL-H-23699.
  - d) vegetable oil.
23. The complete breakdown of the airflow through an axial compressor is known as;
- a) compressor stall.
  - b) compressor turbulence.
  - c) compressor buffet.
  - d) compressor surge.
24. A high propulsive efficiency is obtained when the propulsive unit provides a relatively..... in relation to the aircraft's forward speed;
- a) large acceleration to the propulsive medium.
  - b) large deceleration to the propulsive medium.
  - c) small acceleration to the propulsive medium.
  - d) small deceleration to the propulsive medium.

- 25.** Accumulation of foreign matter on gas-turbine compressors;
- a) will not cause corrosion but may cause erosion.
  - b) is prevented by the speed of airflow around the blades.
  - c) will have little or no effect on engine performance, though may promote corrosion.
  - d) may cause a significant decline in engine performance and promote corrosion.
- 26.** When an aircraft fitted with a gas turbine engine is flying at high forward speed, the resulting intake RAM pressure;
- a) causes a decrease in thrust due to choking of the compressor.
  - b) causes a decrease in thrust because the extra air flow reduces the combustion temperature.
  - c) causes an increase in thrust because mass flow increases.
  - d) will increase the calorific value and range.
- 27.** On the ground, the APU can be substituted for;
- a) Ground power unit, the starting system the airconditioning unit
  - b) Ground power unit, the airconditioning unit.
  - c) Ground power unit, the starting system.
  - d) Ground power unit.
- 28.** The thrust specific fuel consumption (TSFC) of an engine is;
- a) used to calculate fuel order when the SG is known.
  - b) calculated by dividing the weight of fuel by the engine thrust at a constant RPM, airspeed and altitude.
  - c) a measure of engine performance for temperature, airspeed and thrust.
  - d) fuel consumed in lbs/hr divided by thrust in pounds
- 29.** Measuring the torque produced by a gas turbine engine;
- a) is converted to EPR by most commercial airlines.
  - b) is not a reliable guide to power output under any circumstances.
  - c) is only a reliable guide to power output when most of the engine power is being utilised to produce torque and not thrust.
  - d) is a reliable guide to power output of any gas turbine engine.



- 30.** Withdrawal of a 'chip-detector' from a contaminated oil system would indicate the presence of ferrous particles by;
- a) the blockage of the small filter found at the tip of the detector.
  - b) the colour change which occurs when the particles react with the chemicals at the tip.
  - c) their collection on the magnetic tip, either as individuals chips or a thick 'fur-like' growth.
  - d) taking a sample of oil and burning it in a spectrometric analysis machine.
- 31.** The purpose of the combustion chamber drain valve on a gas turbine engine is to;
- a) drain unburnt fuel from the combustion chamber and is closed when the engine is running.
  - b) collect unburnt fuel on failure to start and fuel which has leaked from certain fuel system glands.
  - c) return to the inlet side of the fuel control unit when the HP cock is closed.
  - d) drain fuel to the inlet side of the LP fuel pump.
- 32.** Engine pressure ratio is;
- a) not a reliable guide to power output under any circumstances.
  - b) the ratio of intake pressure to exhaust pressure and is used to set engine power.
  - c) a compression of  $N_1$  to  $N_2$ , compressor stages.
  - d) the ratio of exhaust pressure over intake pressure.

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