Module 15, GAS TURBINE ENGINE.

15.1 GAS TURBINE ENGINE Fundamentals.

Q. 1. On an axial flow, dual compressor forward fan engine, the fan turns the same speed as the.

A. low pressure turbine.
B. high pressure compressor.
C. forward turbine wheel.
Ans.- low pressure turbine.
Explanation. Rolls Royce The Jet engine Page 6 refers.

Q. 2. A turbo jet engine gives.
A. large acceleration to a small mass of air.
B. large acceleration to a large weight of air.
C. small acceleration to a large mass of air.
Ans.- large acceleration to a small mass of air.
Explanation. Rolls Royce The Jet engine Page 2/3 refer.

Q. 3. The basic gas turbine engine is divided into two main sections: the cold section and the hot section.

A. The cold section includes the engine inlet, compressor, and turbine sections.
B. The hot section includes the combustor, diffuser, and exhaust.
C. The hot section includes the combustor, turbine, and exhaust.
Ans.- The hot section includes the combustor, turbine, and exhaust.
Explanation. NIL.

Q. 4. A jet engine derives its thrust by.
A. drawing air into the compressor.
B. impingement of the propelling gases on the outside air.
C. reaction of the propelling gases.
Ans.- reaction of the propelling gases.
Explanation. Newtons third law applies- Rolls Royce The Jet engine Page 2/3 refers.

Q. 5. Which of the following might be used to identify turbine discharge pressure?.
A. Pt7.
B. Pt2.
C. Tt7.
Ans.- Pt7.
Explanation. Jeppesen A&P Powerplant Textbook 3-5.

Q. 6. In a free turbine.
A. there is a clutch between compressor and power output shaft.
B. there is a direct drive with a free-wheel unit.
C. there is no mechanical connection with the compressor.
Ans.- there is no mechanical connection with the compressor.
Explanation. Rolls Royce The Jet engine Page 5 refers.

Q. 7. Bernoulli's Theorem states that at any point in a flow of gas.
A. the static pressure and dynamic pressure are equal.

B. the static pressure is less than the dynamic pressure.

C. the total energy remains constant.
Ans.- the total energy remains constant.
Explanation. See Chapter 2 of Rolls Royce The Jet Engine.

Q. 8. The working fluid of a gas turbine engine is.

A. gasoline.
B. kerosene.
C. air.
Ans.- air.
Explanation. Kerosene provides the energy to drive the air.

Q. 9. Which statements are true regarding aircraft engine propulsion?.
A. Turbojet and turbofan engines impart a relatively large amount of acceleration to a smaller mass of air.
B. In modern turboprop engines, nearly 50 percent of the exhaust gas energy is extracted by turbines to drive the propeller and compressor with the rest providing exhaust thrust.
C. An engine driven propeller imparts a relatively small amount of acceleration to a large mass of air.
Ans.- An engine driven propeller imparts a relatively small amount of acceleration to a large mass of air.
Explanation. Jeppesen A&P Powerplant Textbook 3-43.

Q. 10. As subsonic air flows through a convergent nozzle the velocity.
A. decreases.
B. increases.
C. remains constant.
Ans.- increases.
Explanation. Bernoulli's Theorem again.

Q. 11. In a twin spool compressor system, the first stage turbine drives the.
A. N2 compressor.
B. N1 and N2 compressors.
C. N1 compressor.
Ans.- N2 compressor.
Explanation. Jeppesen A&P Powerplant Textbook 3-18.

Q. 12. At what point in an axial flow turbojet engine will the highest gas pressures occur?.
A. At the compressor outlet.
B. At the turbine entrance.
C. Within the burner section.
Ans.- At the compressor outlet.
Explanation. Jeppesen A&P Powerplant Textbook 3-20.

Q. 13. Which of the following units are generally used to measure aircraft noise?.
A. Effective perceived noise decibels (E P N d B).
B. Decibels (dB).
C. Sound pressure.
Ans.- Effective perceived noise decibels (E P N dB).
Explanation. Rolls Royce The jet engine page 199 refers.

Q. 14. The diffuser section is located between.

A. the burner section and the turbine section.
B. station No. 7 and station No. 8.
C. the compressor section and the burner section.
Ans.- the compressor section and the burner section.
Explanation. Jeppesen A&P Powerplant Textbook 3-20.

Q. 15. If the LP shaft shears.
A. turbine runaway occurs.
B. compressor overspeed occurs.
C. compressor underspeed occurs.
Ans.- turbine runaway occurs.
Explanation. The turbine drives the LP compressor or fan.

Q. 16. The term Pt7 means.
A. pressure and temperature at station No. 7.
B. the total pressure at station No. 7.
C. the total inlet pressure.
Ans.- the total pressure at station No. 7.
Explanation. NIL.

Q. 17. What section provides proper mixing of the fuel and efficient burning of the gases?.
A. Diffuser section and combustion section.
B. Combustion section and compressor section.
C. Combustion section only.
Ans.- Combustion section only.
Explanation. Jeppesen A&P Powerplant Textbook 3-21.

Q. 18. Of the following, which engine type would most likely have a noise suppression unit installed?.

A. Turboprop.
B. Turbojet.
C. Turboshaft.
Ans.- Turbojet.
Explanation. Jepperson Gas Turbine Powerplants Page 3-57 refers.

Q. 19. The pressure of supersonic air as it flows through a divergent nozzle.
A. decreases.
B. increases.
C. is inversely proportional to the temperature.
Ans.- decreases.
Explanation. A&P Airframe Textbook Page 2-31 and 2-32.

Q. 20. The symbol for designating the speed of a LP compressor in a twin spool engine is.
A. N.
B. NG.
C. N1.
Ans.- N1.
Explanation. Jepperson Gas Turbine Powerplants Page 12-13 refers to N1 for LP N2 for H P.

Q. 21. A turbojet engine is smoother running than a piston engine because.
A. the lubrication is better.
B. it runs at a lower temperature.
C. it has no reciprocating parts.

Ans.- it has no reciprocating parts.
Explanation. NIL.

Q. 22. A gas turbine engine comprises which three main sections?.
A. Compressor, diffuser, and stator.
B. Turbine, compressor, and combustion.
C. Turbine, combustion, and stator.
Ans.- Turbine, compressor, and combustion.
Explanation. NIL.

Q. 23. When a volume of air is compressed.

A. heat is gained.
B. no heat is lost or gained.
C. heat is lost.
Ans.- no heat is lost or gained.
Explanation. Jepperson Gas Turbine Powerplants Page 2-18 refers - assuming adiabatic.

Q. 24. The pressure of subsonic air as it flows through a convergent nozzle.
A. increases.
B. remains constant.
C. decreases.
Ans.- decreases.
Explanation. NIL.

Q. 25. If a volume of a mass of air is 546 cubic feet at 273K, at 274K it will be.
A. 2 cubic feet greater.
B. 1/273 less by weight.
C. 2 cubic feet smaller.
Ans.- 2 cubic feet greater.
Explanation. NIL.

Q. 26. In what section of a turbojet engine is the jet nozzle located?.
A. Exhaust.
B. Turbine.
C. Combustion.
Ans.- Exhaust.
Explanation. NIL.

Q. 27. Newton's First Law of Motion, generally termed the Law of Inertia, states:.
A. To every action there is an equal and opposite reaction.
B. Force is proportional to the product of mass and acceleration.
C. Every body persists in its state of rest, or of motion in a straight line, unless acted upon by some outside force.

Ans.- Every body persists in its state of rest, or of motion in a straight line, unless acted upon by some outside force.
Explanation. NIL.

Q. 28. A high bypass engine results in.
A. overall slower airflow and greater propulsive efficiency.
B. overall faster airflow.
C. greater propulsive efficiency.
Ans.- overall slower airflow and greater propulsive efficiency.
Explanation. Jepperson Gas Turbine Powerplants Page 2-29 refers.

Q. 29. Bernoulli's Theorem states that at any point in a flow of gas.
A. the static pressure and dynamic pressure are equal.

B. the static pressure is less than the dynamic pressure.

C. the total energy remains constant.
Ans.- the total energy remains constant.
Explanation. NIL.

Q. 30. The Brayton cycle is known as the constant.

A. temperature cycle.
B. mass cycle.
C. pressure cycle.
Ans.- pressure cycle.
Explanation. NIL.

Q. 31. In a choked nozzle, velocity increases, and.

A. density decreases.
B. pressure decreases.
C. pressure increases.
Ans.- pressure increases.
Explanation. Jepperson Gas Turbine Powerplant Page 2-23. As the nozzle goes sonic the pressure starts to increase as a result of the shock wave.

Q. 32. Using standard atmospheric conditions, the standard sea level temperature is.
A. 29°C.
B. 59°F.
C. 59°C.

Ans.- 59°F.
Explanation. NIL.

Q. 33. Standard sea level pressure is.
A. 29.92 inches Hg.
B. 29.29 inches Hg.
C. 29.00 inches Hg.
Ans.- 29.92 inches Hg.
Explanation. NIL.

Q. 34. The highest pressure in a gas turbine is.

A. at the nozzle exit.
B. at the burner exit.
C. just after the last compressor stage but before the burner.
Ans.- just after the last compressor stage but before the burner.
Explanation. Rolls Royce The Jet Engine Page 15 refers.

Q. 35. The velocity of subsonic air as it flows through a convergent nozzle.
A. remains constant.
B. increases.
C. decreases.
Ans.- increases.
Explanation. NIL.

Q. 36. A turboprop engine derives its thrust by.

A. impingement of the prop-wash on the outside air.
B. reaction of the prop-wash.
C. reaction of the propulsion gases.
Ans.- reaction of the prop-wash.
Explanation. Newtons Third Law.

Q. 37. Adiabatic compression is.
A. an isothermal process.
B. one where there is an increase in kinetic energy.
C. one where there is no loss or gain of heat.
Ans.- one where there is no loss or gain of heat.
Explanation. Sherwin and Horsley Thermodynamics Page 144 refers.

Q. 38. In a ducted fan engine, the fan is driven by the.

A. turbine.
B. air passing over the compressor.
C. accessory gearbox.
Ans.- turbine.
Explanation. Jeppesen Aircraft Powerplant Page 2-9.

Q. 39. A modular constructed gas turbine engine means that.
A. all engines have a specific component layout.
B. the engine is constructed by the vertical assembly technique.
C. its major components can be removed and replaced without disturbing the rest of the engine.
Ans.- its major components can be removed and replaced without disturbing the rest of the engine.
Explanation. The Dictionary of Aircraft Terms by Dale Crane has this definition.

Q. 40. The accessory gearbox of a high bypass engine is.
A. on the HP Compressor housing.
B. in the forward bearing housing.
C. attached to the turbine casing.
Ans.- on the HP Compressor housing.
Explanation. Jeppesen Aircraft Powerplant Page 3-9.

Q. 41. On a gas turbine engine, what is the fan driven by?.
A. I P turbine.
B. LP turbine.
C. H P turbine.
Ans.- LP turbine.
Explanation. Rolls Royce The Jet Engine Page 6 refers.

Q. 42. Which law relates to the kinetic, pressure, and potential energy in a fluid
flow?.
A. Bernoulli's theorem.
B. Newton's laws.
C. Charles's law.
Ans.- Bernoulli's theorem.
Explanation. The sum of the energies in a system is constant. so if one decreases another will increase.

Q. 43. The density of gas may be expressed as.

A. volume/weight.
B. weight/volume.
C. pressure/volume.
Ans.- weight/volume.
Explanation. Basic Physics this one.

Q. 44. E S HP is.
A. Horsepower/efficiency.
B. Shaft horse power + exhaust efflux.
C. Power available at the turbine less the power required to drive the.
Ans.- Shaft horse power + exhaust efflux.
Explanation. Effective Shaft Horse Power is the measure of total power of a turbo prop engine.

Q. 45. A divergent duct will cause subsonic flow to decrease in.
A. velocity, increase pressure.
B. velocity, pressure remains constant.
C. pressure, increase velocity.
Ans.- velocity, increase pressure.
Explanation. Rolls Royce The Jet Engine page 13 fig 2-3 refers.

Q. 46. The Brayton cycle is.
A. the name given to the intermittent cycling of an electrical de-icing system.
B. the continuous combustion cycle taking place in a gas turbine engine.
C. the constant velocity cycle taking place in a gas turbine engine.
Ans.- the continuous combustion cycle taking place in a gas turbine engine.
Explanation. The Brayton Cycle is also known as the constant pressure cycle.

Q. 47. The purpose of a diffuser is to.
A. increase the kinetic energy of the air.
B. induce a swirl to the air prior to combustion.
C. increase the static pressure of the air.
Ans.- increase the static pressure of the air.
Explanation. Diffusers are always static divergent ducts.

Q. 48. On a triple spool engine, the first stage of turbines drive.
A. the LP compressor.
B. the HP compressor.
C. the I P compressor.
Ans.- the HP compressor.
Explanation. Rolls Royce The Jet Engine Fig 2-5-2 refers.

Q. 49. Ram effect is.
A. the increase of dynamic pressure at the face of the compressor.
B. conversion of static pressure to kinetic pressure at the face of the compressor.
C. conversion of kinetic energy to pressure energy at the face of the compressor.
Ans.- conversion of kinetic energy to pressure energy at the face of the compressor.
Explanation. The greater the ram effect the greater the efficiency of the propulsion system.

Q. 50. Which of the following statements is true on a high bypass ratio
turbofan?.
A. Both the compressor and combustion system are larger than their turbojet equivalent.
B. The compressor assembly is larger and combustion chamber smaller than their turbojet equivalent.
C. Both the compressor and combustion chamber are smaller than the turbojet equivalent.
Ans.- Both the compressor and combustion chamber are smaller than their turbojet equivalent.
Explanation. Smaller compressors and combustion chambers can be used on high bypass fans as they are more efficient than turbo jets.

Q. 51. In the dual axial flow or twin spool compressor system with a free power turbine, Nf would be an indication of.
A. turbine thrust indication.
B. first stage compressor speed.
C. free power turbine speed.
Ans.- free power turbine speed.
Explanation. The free turbine drives the prop-shaft only.

Q. 52. A waisted drive shaft is primarily to.

A. achieve dynamic balance.
B. reduce weight.
C. provide a fuse if the driven component is overloaded.

Ans.- provide a fuse if the driven component is overloaded.
Explanation. An example of this type of drive shaft is fitted between a gearbox and an I D G .

Q. 53. The 'core engine' or 'gas generator' is made up of the following components:.
A. Inlet, compressor, combustion chamber, turbine, exhaust.
B. Turbine, combustion chamber, compressor.

C. Compressor, turbine, exhaust, propelling nozzle.
Ans.- Turbine, combustion chamber, compressor.
Explanation. The core engine is that which the primary airflow passes(the air that passes through the combustion chamber.The inlet is not included as the air is normally split down the bypass duct at the entrance to the compressor system.

Q. 54. The principle of jet propulsion is.
A. the calorific value of fuel burnt is equal to aircraft.
B. the interaction of fluids and gases.
C. every action has a equal and opposite reaction.
Ans.- every action has a equal and opposite reaction.
Explanation. This is Newtons Third Law.

Q. 55. Boyle's law states that, at constant temperature, if a gas is compressed.
A. its absolute pressure is proportional to its volume.
B. its absolute temperature is proportional to it's volume.
C. its absolute pressure is inversely proportional to its volume.
Ans.- its absolute pressure is inversely proportional to its volume.
Explanation. If the volume is reduced the pressure goes up.

Q. 56. What part of a jet engine has the most potential energy?.
A. Immediately after the combustion chamber.
B. Just before the combustion chamber.
C. Immediately after the HP compressor.
Ans.- Just before the combustion chamber.
Explanation. Where the fuel (unburned) is pumped in.

15.2 Engine Performance.

Q. 1. Ram effect' due to aircraft forward speed will cause the efficiency of the engine to.
A. remain constant.
B. decrease.
C. increase.
Ans.- increase.
Explanation. Ram effect improves compression ratio which improves thrust without using extra fuel Rolls Royce The Jet engine Page 219 refers.

Q. 2. The efficiency of a gas turbine engine at altitude.
A. decreases.
B. remains constant.
C. increases.
Ans.- increases.
Explanation. The compressor performs better at lower air temperatures(see Jeppersen Gas Turbines Page 2-33) thus improving thermal efficiency. Also lower air temperatures up to the tropopause assist in maintaining Propulsive Efficiency(whilst accepting that decreasing density decreases mass flow). Also note that operators fly at the tropopause whenever possible even for short flights for the best SFC.

Q. 3. Which statement is true regarding jet engines?.

A. At the higher engine speeds, thrust increases rapidly with small increases in RPM.
B. At the lower engine speeds, thrust increases rapidly with small increases in RPM.
C. The thrust delivered per pound of air consumed is less at high altitude.
Ans.- At the higher engine speeds, thrust increases rapidly with small increases in RPM.
Explanation. Jeppesen A&P Powerplant Textbook 3-43.

Q. 4. Some turboprop and turbojet engines are equipped with two spool or split compressors. When these engines are operated at high altitudes, the.

A. low pressure rotor will increase in speed as the compressor load decreases in the lower density air.
B. low pressure rotor will decrease in speed as the compressor load decreases in the lower density air.
C. throttle must be retarded to prevent overspeeding of the high pressure rotor due to the lower density air.
Ans.- low pressure rotor will increase in speed as the compressor load decreases in the lower density air.
Explanation. Jeppesen A&P Powerplant Textbook 3-18.

Q. 5. Ram effect' due to aircraft forward speed will cause the thrust of the engine to.
A. remain constant.
B. decrease.
C. increase.
Ans.- remain constant.
Explanation. Thrust is constant, but efficiency will increase.

Q. 6. With a fixed throttle, and with increased massairflow, what happens to EPR?.
A. EPR goes up.
B. EPR remains constant.
C. EPR goes down.
Ans.- EPR goes down.
Explanation. With increasing mass airflow with throttles fixed Ram pressure (Pt2) increases but the P7 pressure remains the same. Jeppesen Aircraft Gas Turbines page 12-18 refers.

Q. 7. At what stage in a gas turbine engine are gas pressures the greatest?
A. Compressor outlet.
B. Turbine outlet.
C. Compressor inlet.
Ans.- Compressor outlet.
Explanation. NIL.

Q. 8. Increasing ram effect with increased speed.

A. reduces thrust due to reduced compressor efficiency.

B. increases thrust due to increased maximum airflow.

C. reduces thrust due to reduced turbine temperature.

Ans.- increases thrust due to increased maximum airflow.
Explanation. Jepperson Gas Turbine Powerplants Page 2-35 refers.

Q. 9. The highest heat to metal contact in a jet engine is the.
A. burner cans.
B. turbine inlet guide vanes.
C. turbine blades.
Ans.- turbine inlet guide vanes.
Explanation. NIL.

Q. 10. Which compressor type gives the greatest advantages for both starting flexibility and improved high altitude performance?.
A. Single spool, axial flow.
B. Dual stage, centrifugal flow.
C. Split spool, axial flow.
Ans.- Split spool, axial flow.
Explanation. NIL.

Q. 11. Which of the following is the ultimate limiting factor of turbine engine operation?.
A. Compressor inlet air temperature.
B. Burner can pressure.
C. Turbine inlet temperature.
Ans.- Turbine inlet temperature.
Explanation. NIL.

Q. 12. At altitude, idling RPM is.
A. same as at sea level.
B. higher than at sea level.
C. lower than at sea level.
Ans.- higher than at sea level.
Explanation. Due to decreased density there is less resistance to rotation.

Q. 13. Thrust.
A. increases with high temperature.
B. increases with low temperature.
C. decreases with low temperature.
Ans.- increases with low temperature.
Explanation. Jeppesen Gas Turbine Powerplants Page 2-33 Refers.

Q. 14. Which of the following variables affect the inlet air density of a turbine engine?.
A. Altitude of the aircraft, Ambient temperature.
B. Compression ratio, Turbine inlet temperature, Altitude of the aircraft, Ambient temperature.
C. Speed of the aircraft, Compression ratio, Turbine inlet temperature,Altitude of the aircraft.
Ans.- Altitude of the aircraft, Ambient temperature.
Explanation. NIL.

Q. 15. The propulsive efficiency is.
A. low, with a low mass flow acceleration.
B. high, with a low mass flow acceleration.
C. high, with a high mass flow acceleration.
Ans.- high, with a low mass flow acceleration.
Explanation. Jeppesen Gas Turbine Powerplants Page 2-37 Refers - a large mass of air moved slowly!.

Q. 16. The RPM for maximum power would be.

A. lower on a colder day.
B. lower on a hotter day.
C. greater on a colder day.
Ans.- lower on a colder day.
Explanation. Jeppesen Gas Turbine Powerplant Page 3-16 refers.

Q. 17. How does engine thrust vary with temperature?.
A. Increase in temperature gives greater thrust because of low friction in compressors.
B. Low temperatures give low thrust.
C. Low temperature gives greater mass flow and therefore greater thrust.
Ans.- Low temperature gives greater mass flow and therefore greater thrust.
Explanation. Jeppesen Aircraft Gas Turbine Power plant Page 2-33 Refers.

Q. 18. A method of comparing engine efficiencies is by comparing.
A. fuel consumption.
B. thrust to weight ratio.
C. specific fuel consumption.
Ans.- specific fuel consumption.
Explanation. Jeppesen Aircraft Gas Turbine Power plant Page7-3 Refers.

Q. 19. With a fixed throttle in a climb.
A. RPM will increase.
B. RPM will remain constant.
C. RPM will decrease.
Ans.- RPM will increase.
Explanation. Jeppesen Gas Turbine Powerplants Page 3-15 refers.

Q. 20. The point of maximum velocity in the engine is in the.
A. exhaust exit nozzle.
B. combustion chamber.
C. nozzle guide vanes.
Ans.- exhaust exit nozzle.
Explanation. Rolls Royce The Jet Engine page 15 refers.

Q. 21. At constant RPM, the pressure ratio of the compressor and the temperature rise across the compressor.
A. increases with height.
B. remains constant irrespective of height.
C. decrease with height.
Ans.- remains constant irrespective of height.
Explanation. Jeppesen Aircraft Gas Turbine Powerplant Page 3-20 refers.

Q. 22. With the aircraft stationary, propulsive efficiency.
A. depends on RPM.
B. is minimum.
C. is maximum.
Ans.- is minimum.
Explanation. Jeppesen Gas Turbine Powerplants Page 2-29 refers.

Q. 23. The efficiency of conversion of kinetic energy into propulsive work is a measure of.
A. mechanical efficiency.
B. propulsive efficiency.
C. thermal efficiency.
Ans.- propulsive efficiency.
Explanation. Jeppesen Gas Turbine Powerplants Page 2-29 refers.

Q. 24. What effect does high atmospheric humidity have on the operation of a jet engine?.
A. Decreases compressor and turbine RPM.
B. Decreases engine pressure ratio.
C. Has little or no effect.
Ans.- Has little or no effect.
Explanation. Jeppesen A&P Technician Propulsion Textbook 7-70.

Q. 25. Power is adjusted in a gas turbine engine by.

A. increasing fuel flow.
B. increasing air and fuel flow.
C. increasing airflow to the combustion chamber.
Ans.- increasing air and fuel flow.
Explanation. You cannot have extra fuel without extra air.

Q. 26. The engine rating plug.
A. is permanently connected to the E E C.
B. is connected to the EPR transmitter.
C. is permanently connected to the Engine casing.
Ans.- is permanently connected to the Engine casing.
Explanation. Jeppesen Aircraft Powerplant Page 7-21.

Q. 27. Flat Rated thrust is defined as.
A. the thrust at the ambient temperature point above which thrust drops below 100%.
B. that power achieved at idle RPM.
C. that power achieved at maximum EGT.
Ans.- the thrust at the ambient temperature point above which thrust drops below 100%.
Explanation. Jeppesen Aircraft Powerplant Page 7-34.

Q. 28. Thrust rating on an FADEC controlled engine can be changed by.
A. varying the ballast resistor in the EGT system.
B. changing the engine rating plug.
C. varying the EPR datum plug.
Ans.- changing the engine rating plug.
Explanation. Jeppesen Aircraft Powerplant Page 7-21 refers.

Q. 29. Propeller torque is analogous to.
A. engine RPM.
B. shaft horsepower.
C. propeller RPM.
Ans.- shaft horsepower.
Explanation. Propeller torque is equal and opposite to SHP under steady state conditions.

Q. 30. The total power in a turboprop engine is the.

A. SHP.
B. BHP.
C. E S HP .
Ans.- E S HP .
Explanation. E S HP = shaft horse power plus residual gas exhaust thrust.

Q. 31. In a dive, with the throttles fixed, the EPR will.

A. not change.
B. increase.
C. decrease.
Ans.- decrease.
Explanation. Jeppesen Aircraft Gas Turbines page 12-18 refers.

Q. 32. With an increase in forward speed, the engine thrust.
A. decreases slightly but recover due to ram effect.
B. increases.
C. decreases.
Ans.- decreases slightly but recover due to ram effect.

Explanation. Jeppesen Aircraft Gas Turbine Powerplant Page 2-35 refers.

Q. 33. The main factor considered when designing an engine is.
A. maximum fuel consumption.
B. maximum turbine temperature.
C. maximum tip speed.
Ans.- maximum turbine temperature.
Explanation. The turbine is the most highly stressed component in the engine.

Q. 34. To ensure an engine maintains self sustaining speed.
A. idle remains same for any density.
B. idle increases with density decrease.
C. idle increases with density increase.
Ans.- idle increases with density decrease.
Explanation. Rolls Royce The Jet Engine page 103 para 15 refers.

Q. 35. A factor that limits EGT is the.
A. jet pipe.
B. compressors.
C. turbine.
Ans.- turbine.
Explanation. Rolls Royce the Jet Engine Page 13 refers.

Q. 36. Thrust will.
A. increase at high temperatures.
B. decrease at low temperatures.
C. increase at low temperatures.
Ans.- increase at low temperatures.
Explanation. Higher density gives higher mass flow hence higher thrust.

Q. 37. Across the turbines, there is.
A. a general temperature rise.
B. a general temperature drop.
C. an isometric expansion.
Ans.- a general temperature drop.
Explanation. Rolls Royce the Jet Engine Page 15 shows a temperature decrease across the turbines due to energy extraction.

Q. 38. If the throttle position remains constant.

A. with increasing OAT, RPM and TGT will increase.
B. with decreasing OAT, RPM will increase.
C. with increasing OAT, TGT will increase.
Ans.- with increasing OAT, RPM and TGT will increase.

Explanation. As OAT increases the air is thinner RPM increases but thrust decreases due to the thin air. Extra fuel is required to increase thrust therefore TGT increases.

Q. 39. If an aircraft climbs with a fixed throttle position.
A. thrust decreases and RPM increases.
B. thrust and RPM remain the same.
C. thrust increases and RPM remains the same.
Ans.- thrust decreases and RPM increases.
Explanation. Thinner air causes thrust to decrease and the compressor to speed up.

Q. 40. Ram pressure recovery will generally take effect at aircraft speeds of.
A. mach 1.
B. mach 0.1 - 0.2.
C. only when the aircraft is stationary with engines running.
Ans.- mach 0.1 - 0.2.
Explanation. Jeppesen Gas turbine Powerplant page 3-2 refers. With the aircraft stationary and engines running intake pressure is negative. As the aircraft begins its take off run the pressure recovers to above ambient (ram recovery.

Q. 41. As the air is passed through the turbine, due to the convergent shape formed between adjacent blades.

A. pressure decreases, velocity increases, temperature increases.
B. pressure increases, velocity increases, temperature constant.
C. pressure decreases, velocity increases, temperature decreases.
Ans.- pressure decreases, velocity increases, temperature decreases.
Explanation. Rolls Royce The Jet Engine Fig 2-5-1 refers.

Q. 42. The hottest component in a gas turbine engine is.
A. the nozzle guide vanes.
B. the turbines.
C. the combustion chamber.
Ans.- the combustion chamber.
Explanation. Combustors have to withstand flame temperatures of 2000 degrees C.

Q. 43. The basic equation for thrust is.
A. thrust = force * acceleration.
B. thrust = mass * velocity.
C. thrust = mass * acceleration.
Ans.- thrust = mass * acceleration.
Explanation. Newtons second Law.

Q. 44. To maintain the selected RPM of a gas turbine at altitude.
A. the pilot will have to throttle back.
B. more fuel will automatically be added.
C. the fuel will automatically be reduced as the aircraft climbs.
Ans.- the fuel will automatically be reduced as the aircraft climbs.
Explanation. In a hydro mechanical engine the P1 capsule will sense increasing altitude and trim off the fuel.

Q. 45. The term Pb means.
A. burner pressure measured at the diffuser case.
B. burner pressure measured at the NGV.
C. burner pressure measured at the combustion chamber.
Ans.- burner pressure measured at the combustion chamber.
Explanation. Burner pressure is the static pressure in the combustor can, used in some systems to regulate fuel flow.

Q. 46. Which of the following is not an engine rating?.

A. Maximum Continuous.
B. Idle.
C. Maximum Take Off.
Ans.- Idle.
Explanation. NIL.

Q. 47. At higher then standard day ambient temperatures, compressor speed will be.
A. lower than standard day speed.
B. no different.
C. higher than standard day speed.
Ans.- higher than standard day speed.
Explanation. The air is thinner at higher temperatures, therefore the compressor has less load to work against and goes faster. RR Jet Engine Fig 2-18 refers. Note that due to the max allowable EGT the engine will reach a limiting 'corner-point thrust' and fuel will be trimmed off to prevent any over boost or over temperature

Q. 48. Ram Recovery' is a measure of.
A. intake efficiency.
B. net thrust.
C. forward air speed.
Ans.- intake efficiency.

Explanation. Ram Recovery is the ability of an intake to convert kinetic energy into useful pressure energy.

Q. 49. most likely parameter limiting the height at which a jet engine powered aircraft can operate would be insufficient.
A. lift to support the aircraft weight.
B. mass airflow to maintain 15:1 air/fuel ratio.
C. oxygen to support combustion.
Ans.- oxygen to support combustion.
Explanation. The engine will flame out with insufficient oxygen.

Q. 50. With increasing ram effect.
A. turbine temperatures decreases.
B. propulsive efficiency decreases.
C. propulsive efficiency increases.
Ans.- propulsive efficiency increases.
Explanation. Increasing Ram Effect increases the overall system pressure ratio, hence increasing propulsive efficiency.

Q. 51. Full reverse power is approximately.

A. 95% of forward thrust.
B. 75% of forward thrust.
C. 50% of forward thrust.
Ans.- 50% of forward thrust.
Explanation. Jeppesen Aircraft Gas Turbine Powerplants page 3-52 refers.

Q. 52. The efficiency of a gas turbine would be greatest at.
A. cold temperatures.
B. low pressure.
C. hot temperatures
Ans.- cold temperatures
Explanation. Maximum thermal efficiency is achieved at the tropopause due to that being the coldest ambient temperature achievable.

Q. 53. In a gas turbine engine, turbine section.

A. temperature decreases along with pressure and velocity.
B. velocity decreases and pressure increases.
C. velocity increases and pressure decreases.
Ans.- velocity increases and pressure decreases.
Explanation. Pressure and temperature always go down in the turbine as velocity goes up.

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Q. 54. As air density changes the RPM of a gas turbine engine will change. How is RPM kept at a constant speed?.
A. It is not.
B. Automatically by a simple engine device.
C. Manually by the pilot.
Ans.- It is not.
Explanation. Whilst maximum RPM's are limited by various devices RPM is free to wander with changing density. eg As you climb higher minimum idle will increase.

Q. 55. With fixed throttle and increasing altitude, the fan on a high by-pass engine will.
A. decrease RPM.
B. increase RPM.
C. stay the same RPM.
Ans.- increase RPM.
Explanation. NIL.

Q. 56. Through turbine rotor blades, the pressure.

A. increases, temperature increases, velocity decreases.

B. decreases, temperature and velocity decreases.
C. remains constant, temperature increases.
Ans.- decreases, temperature and velocity decreases.

Explanation. RR The Jet Engine (4th edition) fig 2-5-1 page 15 (working cycle and airflow).

Q. 57. Temperature of the mass airflow through a Gas Turbine Engine.
A. increases from the inlet, through the compressor and the diffuser into the burner, and decreases through the turbine into the exhaust.
B. increases from the inlet, through the compressor and remains constant through the diffuser and increases at the burner, and decreases through the turbine into the exhaust.

C. remains constant at the inlet, increases from the compressor and the diffuser into the burner, and decreases through the turbine into the exhaust.

Ans.- increases from the inlet, through the compressor and the diffuser into the burner, and decreases through.

Explanation. NIL.

15.3 Engine Inlet.

Q. 1. If an electrical de-icing system is operating, thrust will.
A. decrease.
B. remain constant.
C. increase.
Ans.- remain constant.
Explanation. Hot air anti icing will reduce thrust, not electrical.

Q. 2. A bellmouth compressor inlet is used on.

A. helicopters.
B. supersonic aircraft.
C. aircraft with low ground clearance.
Ans.- helicopters.
Explanation. Jepperson Gas Turbine Powerplant Page 3-5 refers.

Q. 3. Electrical de-icing operates.
A. continuously and intermittently.
B. cyclically independent of ambient air temperature.

C. cyclically dependent on ambient air temperature.
Ans.- continuously and intermittently.
Explanation. Rolls Royce The Jet Engine page 150 refers.

Q. 4. The inlet door on a variable geometry intake is open at.
A. idle speed.
B. supersonic speeds.
C. subsonic speeds.
Ans.- subsonic speeds.
Explanation. Rolls Royce The Jet Engine fig 23.9 refers.

Q. 5. Anti-ice is recommended during.
A. OAT +10°Centigrade and visible moisture.
B. thunderstorms.
C. OAT below 10°Centigrade .
Ans.- OAT +10°Centigrade and visible moisture.
Explanation. Jepperson Gas Turbine Powerplants Page 9-2 Refers.

Q. 6. A pitot intake is divergent from front to rear because it.
A. reduces ram compression.
B. produces the maximum amount of ram compression.

C. speeds up the air before it hits the compressor face.

Ans.- produces the maximum amount of ram compression.
Explanation. NIL.

Q. 7. Anti icing of jet engine air inlets is commonly accomplished by.
A. electrical heating elements located within the engine air inlet cowling.
B. electrical heating elements inside the inlet guide vanes.
C. engine bleed air ducted through the critical areas.
Ans.- engine bleed air ducted through the critical areas.

Explanation. NIL.

Q. 8. The term 'Ram Ratio' in regard to air intakes is the relationship between.
A. ambient pressure and ambient temperature.
B. ambient temperature and compressor inlet temperature.
C. ambient pressure and compressor inlet pressure.
Ans.- ambient pressure and compressor inlet pressure.

Explanation. NIL.

Q. 9. An increase in the Ram Ratio of an intake will.

A. have no effect upon the temperature of the air.
B. increase the temperature of the air.
C. decrease the temperature of the air.
Ans.- decrease the temperature of the air.
Explanation. NIL.

Q. 10. As an aircraft approaches the transonic range, the aerodynamic efficiency of a Pitot type intake.

A. increases due to the ram effect.
B. decreases due to the shock wave.

C. is not effected by forward speed.
Ans.- decreases due to the shock wave.
Explanation. NIL.

Q. 11. Inlet guide vanes are anti-iced with.

A. rubber boots.
B. thermal blankets.
C. engine bleed air.
Ans.- engine bleed air.
Explanation. Jeppesen Gas Turbine Powerplants Page 9-1 Refers.

Q. 12. Intake air turbulence.
A. decreases the efficiency of the compressor.
B. increases the efficiency of the compressor.
C. has little effect on the efficiency of the compressor.

Ans.- decreases the efficiency of the compressor.
Explanation. Jeppesen Gas Turbine Powerplants Page 3-1 Refers.

Q. 13. What will be the effect of operating the intake anti-icing system of a gas turbine engine?.
A. A decrease in power.
B. Increased power at altitude.
C. Increased power for take off.
Ans.- A decrease in power.
Explanation. Bleeding off air from the compressor must reduce power.

Q. 14. A Pitot intake is divergent from front to rear because it.
A. produces the maximum amount of ram compression.

B. reduces ram compression and turbulence.
C. speeds up the air before it hits the compressor face.

Ans.- produces the maximum amount of ram compression.
Explanation. Rolls Royce Jet Engine Page 245 refers.

Q. 15. With an electrical ice protection system, the heating elements operate.
A. continuously.
B. part continuous - part intermittent.
C. intermittently.
Ans.- part continuous - part intermittent.
Explanation. Rolls Royce The Jet Engine Page 150 refers.

Q. 16. The purpose of a bellmouth compressor inlet is to.
A. provide an increased ram air effect at low airspeeds.

B. maximize the aerodynamic efficiency of the inlet.
C. provide an increased pressure drop in the inlet.
Ans.- maximize the aerodynamic efficiency of the inlet.

Explanation. Jeppesen A&P Technician Propulsion Textbook 5-20.

Q. 17. The vortex dissipators installed on some turbine-powered aircraft to prevent engine FOD utilize.

A. variable geometry inlet ducts.
B. variable inlet guide vanes (IGV) and/or variable first stage fan blades.
C. a stream of engine bleed air blown toward the ground ahead of the engine.
Ans.- a stream of engine bleed air blown toward the ground ahead of the engine.
Explanation. Jeppesen A&P Technician Propulsion Textbook 3-12.

Q. 18. Variable Ramp Intakes restrict airflow by.

A. diverting the airflow around the intake.
B. reducing the area of the intake.
C. creating shock-waves in the intake.
Ans.- creating shock-waves in the intake.
Explanation. Jeppesen Aircraft Powerplant Page 3-5.

Q. 19. The inlet door of a variable geometry intake at supersonic speeds will be.
A. closed.
B. open.
C. mid-Position.
Ans.- closed.
Explanation. Jeppesen Aircraft Gas Turbine Powerplant page 3-5 refers.

Q. 20. When operating an engine in icing conditions, care should be taken when the.
A. temperature is below +10°Centigrade with visible moisture.
B. temperature is below 10°Centigrade.
C. temperature is below 0°Centigrade.
Ans.- temperature is below +10°Centigrade with visible moisture.

Explanation. Jeppesen Aircraft Gas Turbine Powerplant page 9-1 refers.

Q. 21. Anti-icing for a turboprop is achieved by.

A. bleed air supply from compressor.
B. electric bonded heater mats.
C. hot oil supply from lubrication system.
Ans.- electric bonded heater mats.
Explanation. Jeppesen Aircraft Gas Turbines Powerplant Page 9-14 and RR Page 130 Fig.13-4 refers.

Q. 22. A divergent intake is.
A. divergent from front to rear.
B. convergent/divergent from front to rear.
C. divergent/convergent from front to rear.
Ans.- divergent from front to rear.
Explanation. Jeppesen Aircraft Gas Turbines Powerplant Page 3-2 refers.

Q. 23. What purpose does the nose cone serve on the(N1) fan on a high bypass engine?.
A. Streamlined fairing.
B. Reduce and straighten any turbulent air.
C. Assist in diffusing airflow.
Ans.- Streamlined fairing.
Explanation. The nose cone is fitted to the N1 fan disc streamlining the airflow into the fan.

Q. 24. A variable geometry intake at subsonic speeds.

A. jet pipe area is increased.
B. throat area is decreased.
C. throat area is increased.
Ans.- throat area is increased.
Explanation. The inlet is only reduced at mach 1.0 or above.

Q. 25. Electrical anti-ice.
A. heats oil which is distributed around engine.
B. heats elements, placed under mats around engine.

C. heats air which is distributed around engine.
Ans.- heats elements, placed under mats around engine.

Explanation. Rolls Royce The Jet Engine page 150 refers.

Q. 26. The cycling speed of the electrical de-icing mat.

A. comes in 4 speeds.
B. is not affected by weather conditions.
C. is affected by weather conditions.
Ans.- is affected by weather conditions.
Explanation. Jeppesen Aircraft Gas Turbine Powerplant Page 9-4 refers.

Q. 27. The variable inlet guide vanes are operated.

A. by fuel pressure.
B. electrically from cockpit.
C. using N1 fan speed.
Ans.- by fuel pressure.
Explanation. IGV's have traditionally been electrically controlled and fuel operated, within an IGV actuator.

Q. 28. The intake of a gas turbine engine is designed to.
A. protect compressor from FOD .
B. provide turbulent free air.
C. provide streamlined fairing for aircraft.
Ans.- provide turbulent free air.
Explanation. Rolls Royce The Jet engine Page 245 refers.

Q. 29. The velocity of air on entry to compressor inlet on an aircraft flying supersonic speed would be controlled at.
A. Mach 2.2.
B. Mach 1.
C. Mach 0.4.
Ans.- Mach 0.4.
Explanation. The variable ramp causes a normal shock wave to form in the intake thus Mach 1 is the maximum speed through it; however it is further slowed by diffusion in the divergent portion of the intake duct. Jeppesen a+p Technician Powerplant Textbook page 5-18.

Q. 30. If an inlet is choked then the velocity.

A. increases and pressure decreases.
B. increases and pressure increases.
C. decreases and pressure increases.
Ans.- decreases and pressure increases.
Explanation. A choked nozzle will occur as the air reaches Mach 1; hence it is forming a shock-wave in the intake.

Q. 31. In an aircraft flying at supersonic speed, to reduce the air velocity at the compressor, the variable intake.
A. exhaust jet cone area increased.
B. throat area is decreased.
C. throat area is increased.
Ans.- throat area is decreased.
Explanation. Rolls Royce The Jet Engine Page 247 refers.

Q. 32. A well designed intake will take advantage of forward speed by.
A. converting kinetic energy into pressure energy.
B. converting velocity energy into kinetic energy.
C. converting pressure energy of the air into kinetic energy.
Ans.- converting kinetic energy into pressure energy.
Explanation. This is known as Ram effect.

Q. 33. In subsonic multi-engine aircraft, a normal inlet duct will.
A. decrease and then increase in size, front to rear, along length of the duct.
B. increase in size, front to rear, along length of the duct.
C. increase and then decrease in size, front to rear, along length of the duct.
Ans.- increase in size, front to rear, along length of the duct.
Explanation. Page 3-2 Jeppesen Aircraft Gas Turbine Powerplants refers.

Q. 34. What type of intake is one that decreases gradually in area and then increases?.
A. Convergent.
B. Convergent / Divergent.
C. Divergent.
Ans.- Convergent / Divergent.
Explanation. The fixed plug supersonic intake is a con/di shaped intake.

Q. 35. In an electrical de-icing system, the main elements will be on.
A. intermittently, 8 times a minute, dependant on OAT .

B. intermittently, 4 times a minute, dependant on OAT .

C. continuously and intermittently.
Ans.- continuously and intermittently.
Explanation. Rolls Royce the Jet Engine Page 150 refers.

Q. 36. Intakes are designed to.
A. decrease the intake air pressure.
B. decelerate the free air stream flow.
C. accelerate the free air stream flow.
Ans.- decelerate the free air stream flow.
Explanation. Jeppesen Aircraft Gas Turbine Powerplant page 3-2 refers.

Q. 37. The air intake for a gas turbine powered subsonic aircraft would be of.
A. convergent form.
B. divergent form.
C. convergent/divergent form.
Ans.- divergent form.
Explanation. Jeppesen Aircraft gas turbine Powerplant page 3-2 refers.

Q. 38. turboprop engine inlet anti-ice system operates.
A. continuously.
B. cyclically dependant on weather conditions.
C. cyclically independent on weather conditions.
Ans.- continuously.
Explanation. Whilst the blades may be intermittent the intake mat is on continuously.

Q. 39. What is true for a bellmouth intake?.

A. Pressure increases and velocity decreases.
B. Velocity increases and pressure decreases.
C. Pressure and velocity decrease.
Ans.- Velocity increases and pressure decreases.
Explanation. A bellmouth intake is only used on helicopters or static test beds to improve aerodynamic efficiency. It is a convergent duct therefore pressure decreases and velocity increases.

Q. 40. What is the system that breaks up ice formations on a turboprop engine nose cowl called?.

A. Nose cowl heating.
B. De-icing.
C. Anti-icing.
Ans.- De-icing.
Explanation. Whilst the nose cowl is heated (by air or oil) the question is about removing ice after it has formed so deicing is correct.

Q. 41. In a variable geometry intake, the velocity of the air on the engine compressor face is controlled by.

A. ramp and spill doors.
B. intake augmentation doors.
C. shock-wave pattern, ramp and spill doors.
Ans.- shock-wave pattern, ramp and spill doors.
Explanation. Rolls Royce The Jet Engine page 247 para 12 fig 23-9.