**Technical test 04 – gas turbine engines**

1. A "Hung Start" is indicated by:

a) Low EGT - idle fuel flow - low rpm

b) Low EGT - high fuel flow - high rpm

**c) High EGT - idle fuel flow - low rpm**

2.. A "Hung Start" occurs when

a) There is a double igniter failure

**b) The engine lights up but does not accelerate to self sustaining speed**

c) The engine accelerates but does not light up

3. A Barometric Pressure Control capsule is sensitive to:

a) Outside air temperature

**b) Aircraft speed and ambient pressure**

c) Engine vibration

4. A By-Pass Ratio of 5:1 means that:

a) 10 pound of air goes through the by-pass for every 5 pounds that enters the

intake

b) 1 pound if air is by-passed for every 5 pounds that goes through the hot core of

the engine

**c) 5 pounds if air is by-passed for every 1 pound that goes through the hot core of**

**the engine**

5. A centrifugal breather is used on a gas turbine engine:

a) To circulate the oil smoothly

b) To allow oxidisation of the oil

**c) To minimise oil loss**

6. A complete breakdown of flow through a compressor is known as:

a) Compressor turbulence

b) Compressor seizure

**c) Compressor surge**

7. A compressor blade will stall when:

a) The mass air flow and speed relationship is constant

**b) There is mismatch in the relationship between the axial velocity of the airflow and**

**the RPM**

c) The speed of the gas flow through the turbine falls to below 0.4 Mach

8. A compressor stall causes:

a) The airflow through the engine to stop suddenly

b) The RPM to rapidly increase

c) **An increase in the turbine gas temperature and the vibration level**

9. A compressor stall:

**a) May only affect one stage or several stages of a compressor**

b) Is overcome by increasing the fuel flow

c) Is mechanical failure of the compressor

10. A free power turbine :

**a) Is mechanically independent of other turbines and compressors**

b) Is always connected to a propeller

c) Comes free with every 20 ltrs worth of unleaded petrol

11. A free power turbine:

**a) Has no mechanical connection with the other turbine or compressor shafts**

b) Has no direct drive with a free wheel unit

c) Has a clutch between the compressor and the power output shaft

12. A free power turbine:

**a) Has no mechanical connection with the other turbine or compressor shafts**

b) Has no direct drive with a free wheel unit

c) Comes free with every 2000 gallons of AVTUR

13. A high energy ignition system works on the principle of:

a) Obtaining power from a step up transformer from the aircraft’s AC power system

b) Fleming’s Right Hand Rule

**c) Obtaining energy from the discharge of the capacitor**

14. A jet engine when being operated with a 'choked nozzle':

a) Has no effect on thrust

b) Decreases thrust

**c) Implies that no further increase in velocity can be obtained without the increase**

**of heat**

15. A magnetic chip detector is fitted:

a) Downstream of scavenge pump

**b) To give advance warning of bearing failure**

c) To remove metal particles from the oil

16. A nozzle is said to be "choked" when:

a) The gas flow through it is subsonic

b) The gas temperature rises

**c) The gas flow through it has reached its sonic value**

17. A nozzle is said to be “sonic” when the velocity at the throat is:

a) Above Mach 1

b) Mach.5

**c) At Mach 1**

18. A Reverse Thrust Warning Light illuminates:

a) Only when the reverser doors are fully deployed in the reverse thrust position

b) Whenever reverse thrust is selected

**c) When the reverser doors are not stowed in the forward thrust position**

19. A reverse thrust warning light illuminates on the flight deck when:

**a) The reverser doors are unlocked**

b) The thrust reverse lever is in the reverse thrust position

c) The reverser doors are locked

20. A temperature gauge attached to a thermocouple sensing system is connected

at:

**a) The cold junction**

b) The ballast resistor in the Wheatstone Bridge

c) The hot junction

21. A tubo-annular or cannular combustion system is:

a) Superior to the annular system because it only requires one igniter

b) One common flame tube enclosed in a common air casing

**c) A set of flame tubes enclosed in a common air casing**

22. A turbo-Jet engine gives

**a) A large acceleration to a small mass of air**

b) A small acceleration to a small mass of air

c) A small acceleration to a large mass of air

23. Aft of the compressor

a) The velocity increases before the combustion chamber

b) The air pressure decreases before the combustion chamber

**c) The velocity of the airflow decreases before the combustion chamber**

24. After a gas turbine engine fails to 'light up' during a start:

**a) The engine must be motored over with the HP fuel cock shut to evaporate**

**excess fuel from within the engine before attempting a second start**

b) It is permissible to carry out an immediate attempt to start

c) Fuel must be left to drain down through the combustion chamber drain valve

25. After a wet start:

a) It is permissible to carry out an immediate attempt to start

b) A period of 30 minutes must elapse before the next attempt to start is carried out.

**c) The engine must be motored over with the HP fuel cock shut to evaporate**

**excess fuel from within the engine**

26. After engine start starter motor overrun is limited by:

a) Am electric interlock system

**b) An overrun sprag clutch**

c) Centrifugal force

27. An A.P.U. is:

a) A source of auxiliary power driving an electrical generator air compressor and a

hydraulic pump.

**b) A constant speed self contained gas turbine engine driving an electrical**

**generator and air compressor.**

c) Self contained but with a separate thrust selector

28. An advantage of a centrifugal compressor that it is:

a) Able to handle a larger mass of air than an axial flow compressor

b) Unaffected by turbulence

**c) More robust and is easier to develop and manufacture**

29. An aircraft uses clamshell doors for thrust reversal to:

a) Direct the gas flow rearwards

b) Change the direction of the exhaust gas

**c) Block the flow of exhaust gas**

30. An axial flow compressor is designed to produce:

a) Turbulent flow into the combustion chamber

**b) A steady velocity with a pressure rise from front to back**

c) A constant flow over the engine speed range

31. An indication of a surge bleed valve sticking closed at low RPM is:

**a) Possible compressor stall**

b) That bleed air is reduced

c) That the engine will stop

32.An interstage air seal is used where:

**a) Engine sections are operating at different pressures**

b) Engine sections are subjected to pressures of the same value

c) It is difficult to obtain access during routine servicing

33. As air passes through an axial flow compressor compression takes place in:

a) In the inlet guide vanes

b) The stator vanes only

**c) Both the rotor blades and the stator vanes**

34.. Before opening the High Pressure shut-off valve during the engine start:

a) The Low Pressure compressor must be rotating faster then the High Pressure

compressor.

b) Obtaining energy from the discharge of the capacitor

**c) The Low Pressure compressor must be turning slowly in the right direction**

35.. Before the selection of reverse thrust the throttle must be set to:

a) Full power

**b) Idle power**

c) 80% full power

d) 80% full power with the brakes off

36. Blade creep is:

a) Temporary expansion due to temperature change

b) Temporary elongation due to centrifugal forces

**c) Permanent elongation of turbine blades due to heat and centrifugal force**

37. Bleed air for engine anti-icing is provided by:

a) The surge bleed valves

b) The turbine stages

**c) The compressor**

38. Bleeding compressor air for anti-icing will cause:

a) An increase in RPM and fuel flow

**b) An increase in TGT a decrease in thrust and an increase in SFC**

c) A decrease in TGT an increase in thrust and a decrease in SFC

39. Centrifugal breathers are provided to:

a) Take the dust out of the air before it enters the compressor

**b) Reduce oil loss**

c) Direct air to the main bearings

40.. Chip detectors are fitted in the engine:

a) To facilitate early warning of cracks in the turbine blades

b) To facilitate early detection of cracks in the compressor blades

c**) To provide a warning of impending failure in the engine bearings**

41. Compressor blades are twisted from root to tip:

a) To decrease the pressure

b) To give added rigidity to the blade structure

**c) To ensure an even pressure rise along the length of the blade**

42. Contamination of the compressor:

a) Is not likely to prove a problem if the aircraft is not flown at low level over the sea

b) Will not decrease the performance of the engine if the fuel sulphur content does

not exceed 0.001%

**c) Can seriously reduce the efficiency of the engine**

43. During the Brayton cycle combustion takes place:

**a) Continuously**

b) Once every other revolution

c) Once every revolution

44. E.P.R. or the Engine Pressure Ratio is the ratio of:

a) Jet pipe pressure to compressor inlet pressure on a turbo-prop engine only

**b) Jet pipe pressure to compressor inlet pressure on a gas turbine engine**

c) The compressor outlet pressure to the compressor inlet pressure

45. Failure of the engine to light up is shown by:

a) TGT increasing but no RPM

b) The failure of the engine to turn and no TGT

c) **Low RPM and no TGT**

46. Foreign matter:

a) May adhere to the turbine blades and cause corrosion

b) Never adheres to the compressor blades

**c) Will adhere to both the turbine and compressor blades and can significantly**

**impair engine performance**

47. Fuel is heated:

a) To prevent water contamination

b) To maintain a constant viscosity

**c) To stop icing up of the LP filter**

d) To stop air locks in the HP pump

48.. Fuel is regulated on rapid acceleration

**a) To control the increase of compressor rpm which might cause over fuelling surge**

b) The fast acceleration might cause a flame out due to a fast compressor

c) To prevent detonation

49.. Gas turbine efficiency increases with:

a) An increase in humidity

b) A decrease in ambient air pressure

**c) A decrease in ambient temperatue**

50. High oil temperature would indicate:

**a) The air intake of the air cooled oil cooler was blocked**

b) A high oil pressure

c) The oil filter was blocked

d) The exhaust gas temperature (EGT) was high

51.. If a gas turbine engine fails to start and a 'wet start' is diagnosed:

a) No further attempt to start may be made until the fuel has evaporated

**b) It must be motored over with the HP fuel cock shut**

c) It must be motored over with the HP fuel cock open.

d) The fuel system must be drained

52.. If one probe of a multi-sensor E.G.T. system became disconnected the reading

would:

a) Fall to zero

b) Increase by between 20øC - 30øC

c) Be largely unaffected

53. In a by-pass engine the by-pass air:

**a) Increases the air mass flow and therefore increases the propulsive efficiency**

b) Reduces the air mass flow and therefore increases the propulsive efficiency

c) Increases the air mass flow and therefore reduces thermal efficiency

54. In a compressor

a) The air temperature falls with a pressure rise

b) The drop in air temperature is inversely proportional to the pressure rise

**c) The air temperature rises with a pressure rise**

55. In a divergent duct:

a) The pressure velocity and temperature increases

b) The velocity pressure and temperature increase

**c) The pressure and temperature increase and the velocity decreases**

56. In a gas turbine electrical starter system the power to the starter motor is

normally terminated by:

**a) An RPM sensitive speed switch or a time switch**

b) The Start/Relight Selector Switch

c) A centrifugal governor

57. In a gas turbine engine:

a) Thrust is unaffected by the aircraft’s forward speed

b) Ram pressure is maximum at the start of the take off run

**c) Thrust is maximum and ram pressure minimum at the start of the take off run**

58. In a High Energy Igniter Unit the choke:

**a) Prolongs the discharge**

b) Protects the unit from excessive voltages

c) Protects the unit from excessive current

59. In a High Energy Igniter Unit the discharge resistors:

a) Protects the unit from excessive voltages

**b) Allow the capacitor to discharge when the unit is switched off**

c) Allow sufficient energy to the stored in the capacitor to provide re-light facilities

up to 55 000 ft

60. In a high ratio by-pass engine

a) All the air goes through the combustion chamber

b) The fan is driven by the high pressure turbine

c) **Not all the air goes through the high pressure compressor**

d) Not all the air goes through the low pressure compressor

61. In a turbo-fan engine the fan speed is controlled by

a) The gearbox

b) Varying the pitch

**c) The turbine**

62. In the event of a compressor surge occurring the correct action to be taken is:

**a) To close the throttle slowly**

b) To open the throttle fully

c) Press the re-light button

63. Modular construction methods

a) Has a weight saving function

b) Cannot be used on high ratio engines

**c) Enables malfunctioning sections of the engine to be changed without changing**

**the whole engine**

64. Nozzle guide vanes

a) Direct the air into the flame tubes

**b) Direct the gas onto the turbine blades**

c) Direct the air onto the first stages of the compressor and so prevent a

compressor stall

65. Nozzle guide vanes are fitted before the turbine:

a) To decrease the velocity of the gas flow by increasing its pressure

b) **To increase the velocity of the gas flow**

c) To increase the velocity of the air flow by decreasing its pressure

d) To increase the temperature of the gas flow

66. Oil seals are pressurised:

a) To minimise heat loss in the bearing housing

**b) To ensure minimum oil loss**

c) To ensure oil is forced into the bearings

67. One advantage of an annular combustion chamber system is that:

**a) There are no flame propagation problems**

b) The air casing area is greater

c) The diameter of the engine is reduced

68. One indication that a compressor bleed valve has stuck closed at low RPM is:

a) An inability to achieve full power

**b) Possible compressor stall**

c) That bleed air is reduced

69. One reason for shrouding turbine blades is:

a) To reduce “creep” which may occur in the blades

b) To minimise blade end erosion

**c) To improve efficiency and reduce vibration**

70. One stage of an axial flow compressor consists of:

a) One stator assembly and one row of guide vanes

**b) One row of rotor blades followed by one row of stator blades**

c) One rotor and one impeller assembly

71. Power changes are initiated in a gas turbine engine by:

a) Controlling the air flow into the compressor

b) By controlling the airflow into the compressor and the fuel flow into the

combustion chambers

**c) By controlling the fuel flow only**

72. Precautionary use of igniters may be necessary during:

**a) Flight through a heavy tropical rainstorm**

b) Flight through sandy conditions

c) Ground running

73. Re-lighting is:

a) When the engine bleed valve opens and dumps air into the bypass duct

b) Selection of reheat during the valve take off run

c) **Starting the engine in flight after a flame out has occurred**

74. Selection of continuous ignition may be necessary

a) During ground running

b) During flight through very dry air

c) **During flight through heavy tropical rainstorm**

75. Self sustaining speed is:

a) **The speed from which the engine will accelerate to idle without the assistance of the starter motor**

b) The speed at which the ignition plugs are switched off by the pilot

c) The speed at which the engine bleed valves are closed

76. Shrouding of stator blade tips is designed to:

a) Ensure adequate cooling

b**) Minimise vibration**

c) Increase tip losses

77. Spool down or run down time is the:

**a) Time taken for the engine to stop after the HP fuel shut-off valve is closed**

b) Time taken for the engine to slow from full power to 30% power

c) Time taken for the engine to decelerate from full power to 30% power

d) Time taken for the engine to run down to ground idle from flight idle

78. Swirl vanes in the combustion chamber

a) Permit an immediate attempt to re-start after a flameout

b) Reduce the velocity of the airflow and keep the flame alive

**c) Help to stabilise combustion**

79. Take Off E.P.R.:

a) Must be set before brake release

b) Is available when reverse thrust is selected

**c) Must be set by between 60 - 80 knots**

80. The A.P.U. receives its starting power from:

**a) The aircraft batteries**

b) The ground power unit only

c) The air starter trolley

81. The addition of heat in a combustion chamber of a gas turbine engine allows a:

a) Minimum expansion at a constant volume

**b) Large expansion at constant pressure**

c) Large expansion at a constant temperature

82. The air entering the combustion chamber is divided a small percentage is used in

combustion the rest:

**a) Is used to cool both the gas exiting the chamber and the walls of the air casing**

b) Is siphoned off for airframe anti-icing purposes

c) Is used only for cooling the gases before they exit the combustion chamber

83. The air supply for an air start system is:

a) Filtered to prevent damage to the starter motor

**b) At a relatively low pressure but high volume**

c) Preheated to avoid icing in the starter nozzle guide vanes

84. The air supply to operate an air starter usually comes from:

a) An external installation

b) A cross bleed start

**c) The auxiliary power unit**

85. The attachment of blades to the compressor disc:

**a) Is a dovetail fitting that allows slight movement**

b) Is rigid fir tree fixing

c) Is carried out by argon welding

86. The Barometric Pressure Control unit on the FCU is sensitive to:

**a) Aircraft speed and ambient pressure**

b) Engine vibration

c) OAT

87. The blades are usually attached to the turbine disc by a "Fir Tree" root.

A tight fit is ensured during operation:

a) By blade compression loads and thermal expansion

b) To minimise blade end erosion

**c) By centrifugal force**

88. The combustion chamber drain valve is closed:

a) By a return spring

**b) By combustion chamber gas pressure**

c) During a blow out cycle

89. The cross sectional area of the air annulus is reduced at each stage:

a) To permit stronger shorter blades to be used in the later stages of the

compressor

b) To allow the velocity of the air to increase towards the rear of the compressor

**c) To maintain the velocity of the air under rising pressure**

90. The effect on the temperature and velocity of the gases as they pass along the

turbine is:

a) Their temperature increases and their velocity falls

**b) Both their temperature and velocity decrease**

c) Their temperature decreases and their velocity rises

91. The efficiency of a gas turbine engine increases with:

**a) A decrease in ambient temperature**

b) A decrease in ambient air pressure

c) An increase in ambient temperature

92. The engine casing of a gas turbine engine is vented:

a) Via the auxiliary gear box drive

**b) Via the centrifugal breather**

c) To prevent oil loss

93. The engine does not light up this is indicated by:

a) The engine failing to turn and no RPM

b) EGT increasing but no RPM

**c) Low RPM and no EGT**

94. The engine pressure ratio of a gas turbine engine is:

**a) Ratio between the turbine outlet pressure and compressor inlet pressure**

b) Never greater than 5 to 1

c) The ratio between exhaust inlet and exhaust outlet pressure

95. The exhaust cone:

**a) Prevents the hot gases flowing across the rear turbine face**

b) Straightens the gas flow before it goes into the turbine assembly

c) Increases the velocity of the gases

d) Decreases the pressure of the gas

96. The exhaust gases pass to atmosphere via:

**a) The propelling nozzle which is a convergent duct thus increasing the gas velocity**

b) The bleed valves

c) The propelling nozzle which converts kinetic energy into pressure energy

97. The fan in a high by-pass ration turbo - fan engine is driven by:

a) The HP compressor

**b) The rearmost turbine**

c) The intermediate pressure turbine

98. The function of the exhaust cone is to

a) Allow entry of the by-pass air into the exhaust system

b) Add swirl to the gases before they travel down the jet pipe

**c) Prevent the hot gases flowing across the rearmost turbine disc and bearing**

**assembly**

99. The function of the fuel cooled oil cooler (FCOC) is to:

a) cool the oil using ram air

b**) cool the engine oil and heat the fuel**

c) heat the engine oil and cool the fuel

100. The idling speed of a high by-pass ratio engine with an uncompensated fuel

system will:

a) Be controlled by the barometric pressure controller

b**) Vary with air density changes**

c) Be proportional to air density changes