

NOORUL ISLAM COLLEGE OF ENGINEERING
SEVENTH SEMESTER
AE 1009 AERO ENGINE MAINTENANCE AND REPAIR

1. What is operating principle of jet engine?
 1. Air is collected and accelerated rearwards to a high velocity and the reaction due to this is transmitted to the aircraft as a forward thrust.
2. What is the difference between propeller propulsion and jet propulsion?
 2. Both are forms of reaction propulsion but jet engine produces its thrust by accelerating small amount of air at high velocity & the propeller moves large mass of air at low velocity.
3. Does jet engine propel the aircraft by causing gas stream to push on the atmosphere?
 3. No
4. What are relative spheres of operation for propeller propulsion and jet propulsion?
 4. 300-400 m.p.h. for propeller & 500 and above for jet.
5. For what sphere of operation are by-pass and fan engine suitable?
 5. They provide higher propulsive efficiency
6. Can a propeller be drive by a turbine engine?
 6. Yes
7. What form does the compressor usually take ?
 7. Centrifugal (single and two stage) and axial (single spool and twin spool)
8. What form does the turbine usually take?
 8. Single stage turbine ,two stage turbine ,multi stage turbine
9. Is there any difference between the air flow through a propeller turbine engine and jet engine?
 9. Jet engine drives only compressor where as propeller turbine engine drives compressor and propeller.
10. What is the temp of air entering the combustion chamber?
 10. 250 to 400 degree C
11. What is the gas temp at the entry of turbine?
 11. About 600 degree C
12. How much pressure drop occurs across the combustion chambers?
 12. 1-2 p.s.i.
13. Are the air velocity in an axial compressor as high as those produced in a centrifugal type?
 13. No
14. Why do some jet engines have a double sided centrifugal compressor?

14. To allow air to enter the compressor by front and rear intake, and to reduce the compressor diameter.
15. What is the reason for the guide vanes fitted into some compressor air intakes?
15. For equal air distribution to compressor rotor and minimize the possibility of blade stalling
16. What type of bearing is used to support the main bearing shaft?
16. Antifriction bearings are used. For front and rear the roller bearings are used and for centre ball bearings are used.
17. What are two spool compressors?
17. Two halves of a multistage axial flow compressor, each half being driven independently by separate turbine.
18. What are interconnectors?
18. Flame tubes joining adjacent combustion chambers so that air pressures are equalized and allow light up to be passed to all tubes during starting.
19. How does the turbine transmit power to the compressor?
19. Directly or through reduction gear
20. How is turbine blade attached to the disk.
20. By "fir-tree" attachment.
21. Why are turbine blades with extended roots sometimes used?
21. To deal with high rim temperature problems.
22. How much should be turbine blade tip clearance?
22. 0.04 to 0.06 inch
23. Why is a bullet or inner cone fitted inside the exhaust unit behind the turbine?
23. For smooth flow of gas and also act as heat insulator plate
24. How is the gas flow from the circular combustion chamber outlets spread across the annulus formed by the turbine stator blades?
24. Sheet metal nozzles are shaped to provide a smooth change in cross-section from circular at the inlet end to part-annular at exit.
25. Give a simplified explanation of the working of a single-stage turbine?
25. See notes
26. What is two stage turbine?
26. Each stage consists of a set of stationary guide vanes and a rotor carrying a set of blades. The first stage is high and the second stage is low.
27. Explain the air flow of single stage centrifugal compressor?
27. See notes
28. Explain the air flow through a multi-stage axial-flow compressor?
28. See notes
29. What is the max r.p.m of a turbine engine?
29. Depends upon the type of compressor. Usually around 12,500
30. Factors on which propeller reduction gear depends?
30. Depends upon r.p.m. of turbine driving propeller and propeller diameter

31. What equipment is driven from the engine?
31. Fuel pump, oil pumps, starter, generators, an accessory gearbox, propeller etc
32. What are the main limitations imposed when running a turbo engine?
32. Over speed and over heat
33. How is the maximum r.p.m. controlled?
33. By governor to control fuel or by propeller control unit to control r.p.m by regulation of fuel supply
34. On what does the thrust depend?
34. Thrust depends on mass flow and velocity increase imparted
35. What effect does altitude have on engine thrust at a constant r.p.m.?
35. As altitude increases the mass flow falls due to the reduced air density, causing the thrust to decrease progressively
36. Does air temp. affect the engine performance?
36. In hot conditions the mass flow is reduced due to the decreased air density, so causing thrust to be reduced. In cold condition the mass flow is increased due to increased air density, so causing thrust to be increased
37. Indicate the fuel consumption obtained on a turbine engine?
37. On jet engines the specific consumption is usually approx. 1lb of fuel per 1 lb thrust per hour.
38. How is the main rotating member balanced?
38. In the case of centrifugal compressor rotor, the out of balance is corrected by the removal of metal from the face of the rotor disc. Final balancing is then checked on a dynamic balancing machine and corrected by fitting balancing plugs to screwed sockets provided in assembly. In the case of axial compressor and turbine rotors the initial balance is obtained by weighing the blades and selection for fitting acc to weight. Finally out of balance can be corrected by fitting balance plus,
39. How can the thrust of a jet engine be augmented for short period?
39. Reheat or afterburning & water methanol injection
40. What is the principle of reheat?
40. See notes
41. What is the principle of thrust boosting by water methanol injection?
41. It consists of spraying a water-methanol mixture in to compressor inlet. This increases the thrust by causing an increase in mass flow due to the inlet air temperature being reduced.
42. Is reheat applied to all engine r.p.m.'s?
42. No
43. Can the compressor air be used for purposes other than supplying the combustion chamber?
43. Yes, for internal cooling, anti-icing, cabin pressurizing etc
44. What is a by-pass jet engine?
44. See notes
45. What is the advantage of the by-pass arrangement?

45. Gives better propulsive efficiency and better fuel economy
46. What is a fan engine?
46. See notes
47. Write a note on fir tree roots ?
47. A type of attachment of turbine blades to the turbine wheel. The name is derived from V-shape of the root giving it the outline of a fir tree.
48. What is wet start?
48. When, during engine starting, the fuel fails to ignite, wet fuel will drain from the combustion chambers. It might be necessary to dry out engine before restarting.
49. What is a starting by-pass?
49. A starting by-pass is a device to supplement the fuel flowing through the throttle valve by an extra amount to give better starting
50. List the type of scheduled inspections which have to be carried out as routine during the engine life?
50. check oil level as soon as possible after shut-down/visually examine internally the air intake structure and all visible components/examine externally for fuel or oil leaks and overheating/visually examine turbine, exhaust unit and propelling nozzle/examine and functional check engine controls/remove and inspect oil filters/check operation of ignition system/functional check power plant/examine fuel for contamination/as per engine the other inspection will be carried out.
51. Differentiate between two stroke and four stroke engine?
51. see notes
52. Define piston stroke?
52. Distance the piston moves from TDC to BDC.
53. Define cylinder bore?
53. is the dia of engine cylinder
54. What is piston displacement?
54. the volume the piston displaces from BDC to TDC.
55. What is engine displacement?
55. piston displacement times the no. of engine cylinders
56. Define compression ratio?
56. It is the comparison of cylinder volumes with piston at TDC and BDC
57. Define compression pressure?
57. amount of pressure produced in the engine cylinder on the compression stroke
58. How can you measure compression stroke pressure?
58. by compression gauge
59. Define Engine torque?
59. It is a rating of turning force at the engine crankshaft
60. What does bhp and ihp stands for?
60. brake horse power and indicated horse power
61. How can we measure horse power?

61. with engine dynamometer
62. Define engine efficiency?
62. It is the ratio of power produced by the engine and the power supplied to the engine.
63. What is volumetric efficiency?
63. is the ratio of actual air drawn in to the cylinder and the maximum amount of air that could enter the cylinder
64. Define Mechanical efficiency?
64. It compares bhp and ihp i.e. theoretical to practical
65. What is thermal efficiency?
65. is heat efficiency found by comparing fuel burned and horsepower output
66. What is vapor lock?
66. It is a problem created when bubbles in overheated fuel reduce or stop fuel flow.
67. What is a basic carburetor system
67. It is a network of passages and related parts that help control the air fuel ratio.
68. Define idle system
68. provides a small amount of fuel for low speed engine operation
69. Define off idle system
69. provides correct air fuel mixture slightly above idle speed
70. What is choke system
70. provides extremely rich air fuel mixture for cold engine starting
71. What is full power system
71. enriches fuel mixture slightly when engine power demands are high
72. Explain carburetor flooding?
72. It occurs when fuel pours out of top of carburetor
73. Define engine flooding?
73. It is a problem resulting from too much fuel in the intake manifold and combustion chamber
74. Write some advantages of gasoline injection ?
74. Improved atomization, better fuel distribution, smoother idle, more economical, increased engine power
75. What is EFI?
75. Electronic fuel injection
76. What is spark plug reach?
76. It is the distance between the end of the plug threads and the seat or sealing surface on the plug
77. Name main parts of spark plug?
77. central terminal, side electrode, ceramic insulator, steel shell
78. What is hot spark plug
78. has a longer insulator tip and operates at hot temperatures
79. What is cold spark plug?

79. has a shorter insulator and operates at cold temperature.
80. What is ignition timing?
80. Ignition or spark timing refers to how early or late the spark plug fires in relation to the position of the engine pistons.
81. What is timing advance
81. It occurs when spark plug fires sooner on engine's compression stroke
82. What is timing retard?
82. It occurs when the spark plug fires later on the compression strokes
83. Define engine firing order?
83. It refers to the sequence in which the spark plugs fire to cause combustion in each cylinder.
84. What is dead cylinder?
84. It is a cylinder (combustion chamber) that is not burning fuel on the power stroke
85. Explain spark intensity test?
85. Also called spark test, measures the brightness and length of electric arc produced by ignition system
86. What is backfiring?
86. Popping noise in induction system
87. Write some causes of engine over heating
87. low coolant level/stuck thermostat/retarded ignition timing, ice in coolant etc
88. Name some lubrication system problem
88. High oil consumption/low oil pressure/high oil pressure
89. Define misfiring?
89. It is a performance problem resulting from one or more cylinders failing to fire
90. What is vacuum leak?
90. It is a problem of rough idling
91. What is hesitation?
91. A condition where the engine does not accelerate normally?
92. What is surging?
92. A condition when engine power fluctuates up and down
93. What is dieseling?
93. When engine fails to shut off.
94. Name some engine test instruments?
94. Spark tester/compression gauge/cylinder leakage tester/vacuum gauge/pressure gauge/timing light/tachometer/ignition system tester/exhaust gas analyzer/dynamometer
95. What do you mean by engine tune up?
95. An engine tune up returns the engine to a condition of peak performance.
96. What is troubleshooting?

96. is the step-by-step procedure used to determine the cause of the fault and then select the best and quickest solution.
97. Explain overhauling?
97. the process of taking a part, inspecting, repairing, reassembling and testing an entire engine
98. Name some NDI and testing equipment
98. Magnaflux, ultrasonic, dye penetrant, eddy current etc
99. How rebuilt engine differs from overhauled engine. ?
99. A rebuilt engine must undergo all the steps described above. In addition the parts that are used in rebuilt engine must meet the same limitations and tolerances specified for new parts by engine manufacturer.
100. What is the function of structural inspection?
100. Is to determine the structural integrity of each part.