Suggested Turbine Questions

Posted by dkneyle - 2010/01/20 17:49

Michael Buhagiar has provided a list of approx. 90 questions he has used in the past to test the knowledge of turbine operators. I would appreciate feedback regarding which to include and which are not appropriate. Please see the attached file. http://gen.ee-oz.com.au/images/fbfiles/files/Turbine_Assessments_Questions_from_M_Buhagiar.doc

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Re:Suggested Turbine Questions

Posted by Melinda - 2010/01/20 21:02

As the attachment from David's last post re: Michael Buhagiar's questions does not seem to want to open I have listed the questions in this post:

1. What determines the amount of heat that is converted into kinetic energy within a turbine:
2. List the three ways turbines are classified:
3. Why is the axial flow type turbine preferred for electricity generation:
4. List three advantages of reverse flow turbine cylinders:
5. Draw the steam flow path through the tandem three cylinder turbine shown below:

6. Describe the operating principle of an impulse turbine blade:
7. Impulse blades are usually installed in which section of a steam turbine:

8. List two characteristic features of an impulse turbine:
9. Describe why nozzle plates are manufactured in two halves:
10. List three major components of a turbine diaphragm:
11. List three factors affecting turbine efficiency that operators have control over:
12. List six factors that influence condenser back pressure:
13. Describe why most modern turbine casings are constructed in two halves:
14. Describe the advantage of constructing a turbine cylinder with a double casing:
15. List two methods used in joining the top and bottom cylinder casings together:
16. Describe the procedure employed to ensure correct tensioning of turbine casing flange bolts or studs:
17. Describe why turbine casing flanges slower to heat than the casing itself:
18. Describe how the thermal stress of a turbine casing and casing flanges kept within limits during turbine run-up:
19. Describe the function of the turbine supervisory equipment.
20. List nine (9) parameters that are maintained under surveillance by the turbine supervisory system.
21. List three occasions when is it critical to monitor turbine speed:
22. Define the term “critical speeds” as applied to the steam turbine and describe the conditions of the turbine that make these speeds critical. Explain the operating procedures to be followed when approaching a turbine critical speed.
23. Explain, with the use of simple diagrams if required, the principle of operation of a mechanical over-speed tripping device.
24. Describe the principle of operation of an electrical over- speed tripping circuit consisting of two detection channels
25. Describe the phenomenon known as “Poisson’s Effect and explain how this phenomenon affects the differential expansion of a turbine during start-up and shutdown.
26. Explain the meaning of the term “differential expansion” as it related to a steam turbine.
27. List the conditions that can contribute to the occurrence of differential expansion within a steam turbine
28. Describe the action that should be taken as differential expansion approaches the expanded or contracted limit.
29. Explain the meaning of the term “eccentricity” as it is applied to a turbine rotor
30. Explain how excessive eccentricity can be caused and how this will effect the operation of the steam turbine
31. Detail the procedure that can be undertaken to ensure that the turbine shaft eccentricity is within limits prior to running up the turbine to synchronous speed.
32. Identify the normal location of eccentricity detectors on a steam turbine and describe how the eccentricity measurement is derived.
33. Explain the meaning of the term “HP Pedestal Displacement”
34. Describe the manner in which pedestal displacement (or lack of displacement) can affect the operation of a steam turbine

35. Identify the normal location of pedestal displacement detectors on a steam turbine.
36. Explain what is meant by the term “casing top to bottom differential” when applied to a steam turbine
37. Describe how excessive top to bottom differentials can occur and the consequence of allowing these differential to reach or exceed the normal operating limits
38. Detail the operating techniques which may be used to minimise HP/IP Turbine Top to bottom casing differentials
39. Explain why it is necessary to constantly monitor the level of turbine shaft and bearing vibration.
40. List three (3) operating conditions that, if changed, may cause a corresponding change in the level of bearing vibration.]
41. List seven (7) areas that may be checked to identify the possible cause of an increase in bearing vibration.
42. Detail typical normal, high and trip values for turbine bearing vibration
43. Explain the need to constant monitor the turbine thrust bearing position and the consequence of the thrust bearing position moving outside of its limits.
44. Explain how the an increase in back pressure will effect turbine performance
45. Explain the correlation between LP Turbine Exhaust pressure and temperature
46. Explain why it is considered necessary to constantly monitor LP Exhaust Temperature
47. Explain the function and mode of operation of the LP Exhaust Hood Spray System.
48. Define the function of bearings with relation to rotating shaft machinery
49. Define the function of a journal bearing.
50. Describe the components of a plain and tilting pad type journal bearing.
51. Define the function of a thrust bearing
52. Describe the principle of operation of a Mitchell or Kingsbury Thrust bearing.
53. List five different types of rolling element type bearing and describe the type of application most suitable for each.
54. Describe the function of a lubricant.
55. Explain the manner in which Hydrostatic lubrication is established and give an example of the application of Hydrostatic lubrication to machinery within a power station.
56. Explain the manner in which following properties enhance the suitability of an oil to be used as a machinery lubricant:
• Suitable viscosity
• Oxidation stability
• Demulsibility
• Corrosion inhibition
57. Explain the manner in which each of the following conditions can lead to deterioration of a lubricant:
• High Temperature
• Entrained Water and Emulsification
• Oxidisation
• Ingress of Contaminants
58. Draw a simple sketch of a typical steam turbine lubricating oil system showing all components.
59. Describe the function of each of the components within the sketch.
60. List the conditions which have to be met before the steam turbine lubricating oil system can be removed from service
61. Describe the “oil ring” method of lubrication.
62. Describe the “oil bath” method of lubrication
63. Describe the function of an inverted cup oil reservoir.
64. Describe the composition of lubricant grease.
65. List three different metallic acid based greases and describe the typical application for each of these greases.
66. List three types of Main Cooling Water Systems
67. Describe the main method of Heat Transfer that occurs in a Cooling Tower.
68. List three Types of Cooling Tower based on the method of air flow through the tower.
69. Describe why it is necessary to have a makeup water supply in a Cooling Tower in a Closed System.
70. List three (3) causes of water quality contamination found within a Closed Cooling Water System.
71. Describe the purpose of using wetdeck or fill within a cooling tower.
72. List two types of fill used in cooling towers
73. List five (5) Heat exchangers commonly served by the Auxiliary Cooling Water System
74. When placing a Turbine Lubricating Oil Cooler in Service which system would normally be pressurised first. The Lubricating Oil or the Auxiliary Cooling Water.
75. Explain the consequence of the following happening:
76. The steam turbine is not placed on barring gear immediately following a unit trip
77. Water or cold vapour is allowed to enter the steam turbine through open casing drains soon after the unit is taken out of service
78. The superheater desuperheater spraywater valve fails open resulting in a sudden reduction in superheated steam temperature to the HP turbine
79. Explain the function of the LP Rupture Diaphragms
80. Explain the function of the LP Exhaust Hood sprays
81. Describe the major function of a turbine speed governor
82. Explain what is meant by the term “governor droop characteristic”
83. List the 3 functions of a speeder gear when used in conjunction with a turbine governor
84. Describe the function and operation of the bled steam forced closed non return valves

85. Describe the function of the Turbine Gland Steam System
86. Explain the consequence of the loss of gland sealing steam on the Turbine while the condenser is still under a vacuum condition.
87. List the main functions of the Condenser Air Extraction System
88. Draw a simple sketch of the “Rankin Cycle” of the plant where you work showing all major components and major controlling devices
89. List the consequences associated with the following abnormal turbine operating conditions arising during turbine operation:
v Loss of a Main Cooling Water Pump
v Loss of a Condensate Pump
v Loss of Main Oil Pump
v Turbine Oil Fire
v Loss or partial loss of Condenser Vacuum
v Loss of Unit Electrical Supplies
90. Name three main factors on which turbine cycle efficiency depends.
91. Name five main losses which affect turbine cycle performance.
92. Describe the manner in which stress is induced by heating a body of material
93. List the terms associated with the mechanical properties of matter

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