

II B.Tech I Semester(RR) Supplementary Examinations, May/June 2010
PRIME MOVERS AND MECHANICAL MEASUREMENTS
(Instrumentation & Control Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are the types of draft tubes ? With which type of turbines are they used?
(b) A Francis turbine develops 400 bhp under a head of 24m. The inlet and exit diameters of the runner are 1.5m and 90 cm respectively. The angle of the guide vanes is 18 degrees and the runner blades are radial at inlet. Velocity of flow is constant and no whirl velocity exists at the outlet. Find the specific speed of the turbine. [6+10]
2. (a) Explain the working of a centrifugal pump with the help of a neat sketch
(b) The outer diameter of an impeller of a centrifugal pump is 45cm. The blade angle at outlet is 90 degrees. The speed of impeller is 1500 rpm. The pump works at a manometric efficiency of 0.75. Calculate the head developed. [10+6]
3. What is a condenser? Name the different types of condensers and describe the operation of surface condenser with a neat sketch? [16]
4. (a) What are the advantages of a regenerative feed heating in steam power cycle.
(b) Steam at 28 bar and 50°C super heat is passed through a turbine and expanded to a pressure where the steam is dry and saturated. It is then reheated at constant pressure to its original temperature and then is expanded to the pressure of 0.2 bar passing through the second stage turbine. Assume the expansions are isentropic. Determine the work done per Kg steam and the thermal efficiency with and without reheat. [6+10]
5. (a) What are different operating variables affect the thermal efficiency of gas turbine power cycle? Explain.
(b) Discuss different methods to improve the efficiency of gas turbine power cycle? [6+10]
6. With reference to the mechanism of a Bourdon-tube pressure gauge explain how the tube functions and why the curved tube tends to straighten out when the pressure is applied inside? Mention the materials used for the tube and operating range of the particular material. [16]
7. (a) With a neat diagram, explain the working of a resistance potentiometer accelerometer.
(b) List the basic types of lever balances and compare between them. [8+8]
8. (a) Sketch the schematic arrangement of an oscilloscope for frequency and phase measurements and explain its working principle.
(b) An oscilloscope displays a sine wave and the distance between the first and fourth peaks is found to be 5.4cm. If the time base setting is 20×10^{-03} make calculations for the periodic time and frequency of the sine wave. [8+8]
