Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

SEVENTH SEMESTER B.TECH (INSTRUMENTATION AND CONTROL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: POWER PLANT INSTRUMENTATION AND CONTROL [ICE 437]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.

1A Correlate and explain *figure 1A* with the *modified* Rankine cycle. 5

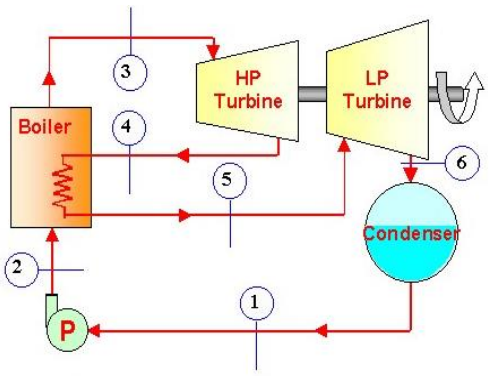

Figure 1A

1B 5

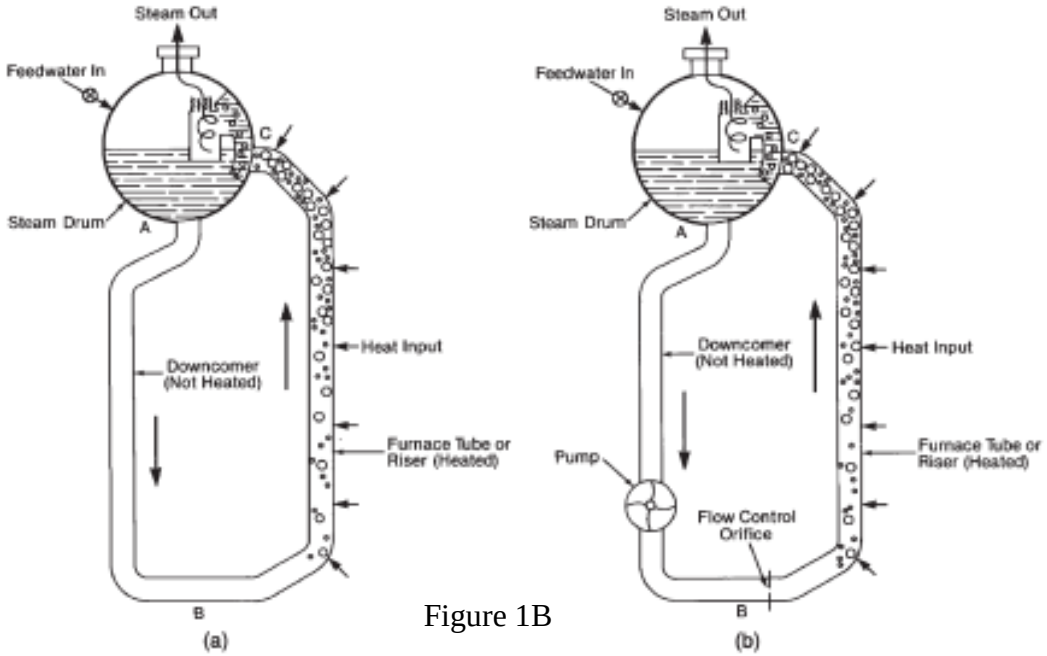

Figure 1B

Figure 1B illustrates boiler water circulation methods. Interpret them and explain the factors which determine the *design* and *choice* of a particular mode of circulation.

2.

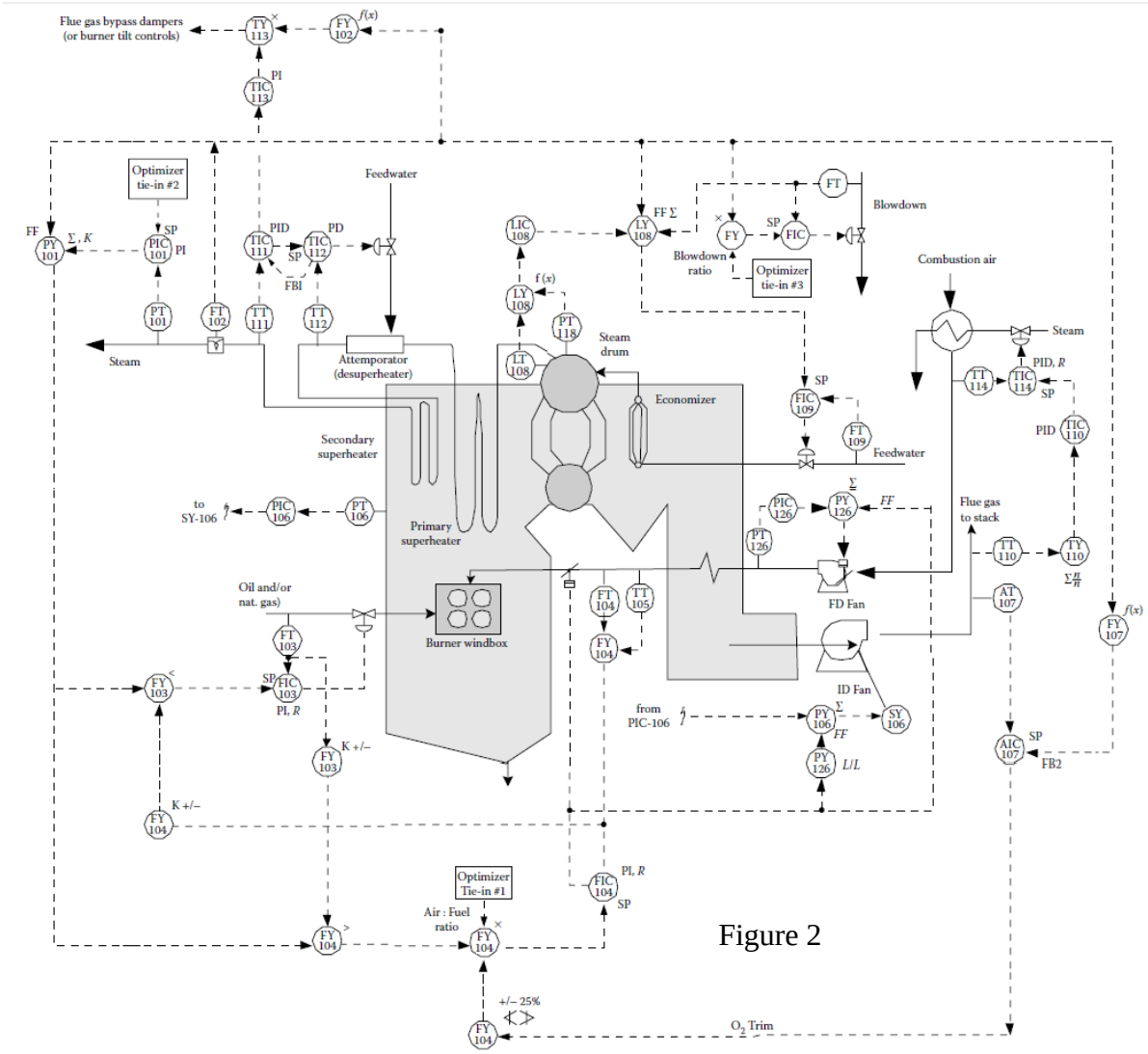

Figure 2

Study the P&ID *carefully*. 4

Isolate, Draw and ***Describe*** from ***figure 2***.: 3

3

A> The *cascade* level control loop
B> any *one* flow control loop and
C> any *one* pressure control loop

(Explain each block, control variable, manipulated variable and signal transmission mode in each of ***your*** *figures*).

1

3. Identify the Figure alongside (Fig. 3).

3A. What do you mean by a pass, what do multiple passes indicate? 1

3B. What are the routine steps required to bring *such* a boiler on line after regular maintenance 3

3C. State the advantages and limitations of FBC boilers over *such* types. 3

3D. State and explain a pressure *safety* interlock used in *such* a boiler. 2

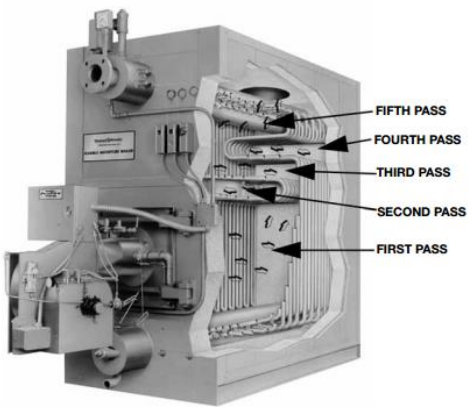

Figure 3

4.

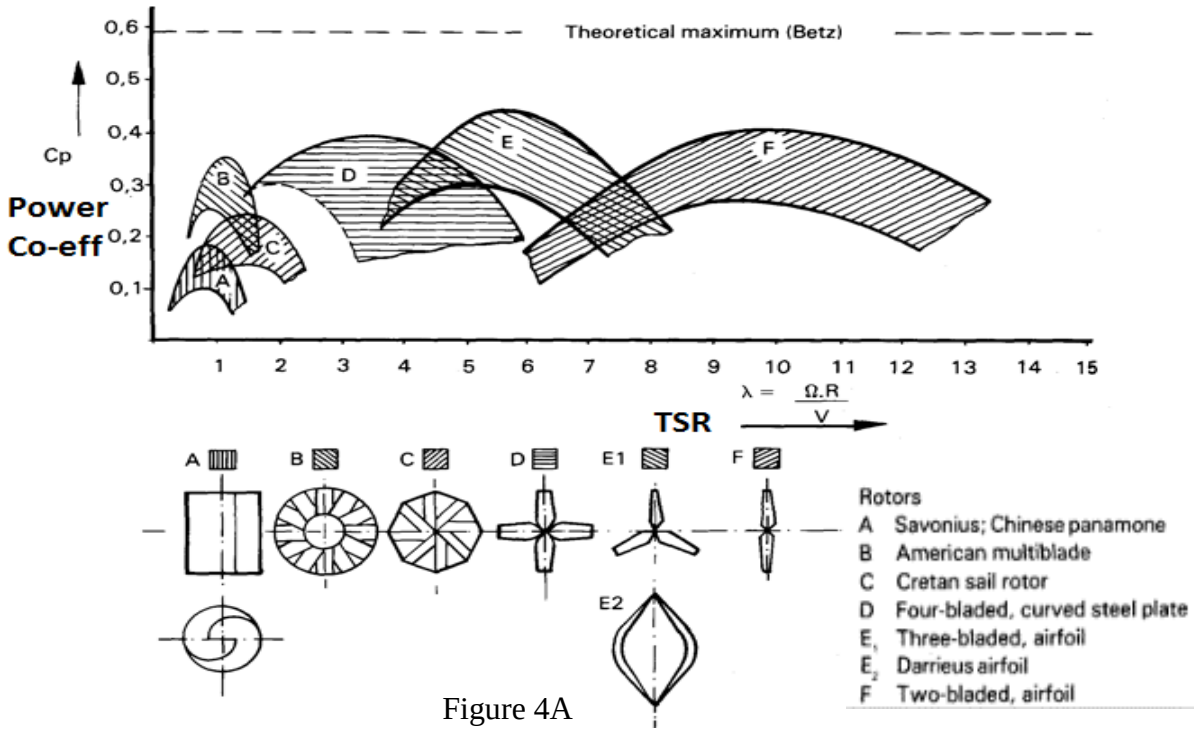

Figure 4A

4A. Interpret the Figure 4A What do you understand by theoretical maximum (betz)? Prove it. 3

4B. With a neat vector diagram state and explain the thrust and moment producing forces acting on a horizontal axis, airfoil type wind turbine. 3

4C. Does a horizontal wind turbine adjust to changes in the direction of wind? If yes, Justify with a control scheme. 2

4D. With a neat diagram, explain the *control scheme* of a pressurized water type of nuclear reactor? 2

5A. 4

Interpret the graph shown in Figure 5A.

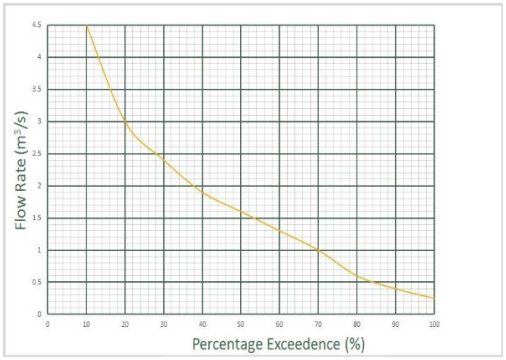

Figure 5A

5B. Classify hydel-power plants on the basis of available head; State the type of turbine each uses 2

5C. Define load factor? What is the nominal range of load factor for large hydel power units? 2

5D. State and Explain a scheme of flow measurement for small turbulent streams. 2

6A. Explain mathematically why arced blades and not straight blades are used in turbines. 3

6B. The height of chimney of a thermal power plant is 35m. Determine the draft produced by the chimney if flue gas temperature is 300°C. Assume ambient air temperature as 25°C 2

6C. Why is vibration and eccentricity measurement in a turbine important? State any method by which it is done. 3

6D. With the help of a neat flowchart explain the steps involved in monocrystalline solar cell fabrication 2