Fourth Semester B. Tech. (Bio–Tech.) (C.B.S.) Examination

PLANT UTILITY

Time : Three Hours] [Max. Marks : 80

N. B. : (1) All questions carry marks as indicated.
(2) Answer **Six** questions.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Assume suitable data wherever necessary.
(5) Illustrate your answers wherever necessary with the help of neat sketches.
(6) Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1. (a) Explain the laws of thermodynamics. 6

(b) A system contains $0.15\,m^3$ of a gas at a pressure of 3.8 bar and 150^0C. It is expanded adiabatically till the pressure falls to 1 bar. The gas is then heated at a constant pressure till its enthalpy increases by 70 kJ. Determine the total workdone. Take $C_P = 1$ kJ/kgK, $C_V = 0.714$ kJ/kgK. 7

OR

2. (a) Define the following :—

(a) Internal Energy.

(b) Enthalpy.

(c) Entropy. 6

(b) Explain Macroscopic and Microscopic approaches. 7

3. (a) Explain the following terms :—

(1) Evaporative Capacity.

(2) Equivalent Evaporation.

(3) Boiler Efficiency. 6

(b) Write the Comparison between Natural and Artificial Draught. 7

OR

4. (a) Explain with neat sketch Cochran Boiler. 6

(b) Establish a condition for maximum discharge of flue gases through a chimney of given height. 7

5. (a) How steam turbine are classified ? Write difference between Impulse and Reaction turbine. 7

(b) Why are steam turbines compounded ? Explain. 7

OR

6. (a) What are the different Methods used to improve efficiency of a steam turbine plant ? Explain any one method with neat sketch. 7

(b) Draw the velocity triangle diagram for an impulse turbine blades and derive the expression for workdone and axial thrust. 7

7. (a) Write the classification of internal Combustion Engines. 6

(b) Compare two stroke and four stroke engine. 7

OR

8. (a) A four cylinder, four stroke petrol engine develops indicated power of 14.7 kw at 1000 rpm. The mean effective pressure is 5.5 bar. Calculate the bore and stroke of the engine, if the stroke is 1.5 times the bore. 6

(b) Explain the working of four stroke petrol engine. 7

9. (a) What is the function of a cooling tower in a modern steam power plant ? Describe with neat sketch the working of any Mechanical type cooling tower. 6

(b) Describe various water cooling systems and classify cooling tower. 7

OR

10. (a) Discuss the cooling water Conditioning and Management for the smooth running of power plant and chemical plant. 6

(b) Explain with neat sketch 'Cooling Pond' 7

11. (a) Discuss different criteria for power plant site selection. 7

(b) Explain the different causes of environmental hazards. 7

OR

12. Write short notes on (Any **Two**) :—

(a) Environmental monitoring and Assessment.

(b) Natural resource management.

(c) Recovering from disaster. 14