

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- Vth SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 151904****Date: 05/06/2012****Subject Name: Power Plant Engineering****Time: 02:30 pm – 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of steam tables is permitted

- Q.1** (a) Sketch layout of modern thermal power plant and explain different circuits. **07**
- (b) Calculate the cost of generation per kWhr for a power station having following data: **07**
 Installed capacity of plant =200MW
 Capital cost=Rs400 crores
 Rate of interest and depreciation =12%
 Annual cost of fuel , salaries and taxation=Rs 5 crores
 Load factor=50%
 Also estimate the saving in cost per KW hr if annual factor is raised to 60%.
- Q.2** (a) (i) Explain how thermal power plant leads to acid rain? **03**
 (ii) Define following terms: Diversity factor, Load factor, Demand factor, Connected load. **04**
- (b) What is meant by overfeed and under feed principle of coal firing? Which is preferred for high volatile coal and why? **07**
- OR**
- (b) With neat sketch explain Pneumatic ash handling system. List its advantages and disadvantages. **07**
- Q.3** (a) With neat sketch explain construction and working of Fluidized bed combustion boiler and list its advantages and limitations. **07**
- (b) Derive an expression for maximum discharge through a chimney. **07**
- OR**
- Q.3** (a) A 40 m high chimney is discharging flue gases at 350 °C, when the ambient temperature is 30 °C. The quantity of air supplied is 18Kg/ Kg of fuel burnt. Determine **07**
- (i) Draught produced in mm of water
 - (ii) Equivalent draught in m of hot-gas column
 - (iii) Efficiency of chimney if minimum temperature of artificial draught is 150 °C mean specific heat of flue gases is 1.005K J/Kg K,
 - (iv) Percentage of heat spent in natural draught system if Calorific value of fuel supplied is 30600K J/Kg
 - (v) Temperature of chimney gases for maximum discharge in given time and what will be corresponding draught in mm of water produced.
- (b) Sketch Schmidt-Hartmann boiler and explain its construction and working. **07**

- Q.4**
- (a) The air leakage into a surface condenser operating with a steam turbine is estimated 84kg/hr. the vacuum near the inlet of air pump is 70mm of Hg when barometer reads 76mm of Hg. The temperature at the inlet of vacuum pump is 20 °C Calculate **07**
- (i) Minimum capacity of pump in cu-meters per hour
 - (ii) Dimensions of reciprocating air pump to remove air if it runs at 200rpm
 - (iii) L:D=3:2 and volumetric efficiency=80%
 - (iv) Mass of vapour extracted per minute with air
- (b) List different impurities found in feed water and their effects on performance of thermal power plant. **07**
- OR**
- Q. 4** (a) Explain following terms pertaining to cooling tower: Drift, Fill, Approach, Range and Cooling efficiency of cooling tower **07**
- (b) Write short note on sodium zeolite ion exchange process. **07**
- Q.5**
- (a) List application, advantages and disadvantages of diesel power plants. **07**
- (b) Write short notes on : **07**
- (i) Fast breeder reactor
 - (ii) Problems in disposal of nuclear waste.
- OR**
- Q.5** (a) Sketch layout of diesel power plant and explain any two circuits? **07**
- (b) Compare the following: **07**
- a) Nuclear power plant and thermal power plant
 - b) Diesel power plant and thermal power plant
