

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 KWhr 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
