

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER V • EXAMINATION – WINTER - 2012****Subject code: 151904****Date: 16-01-2013****Subject Name: Power Plant Engineering****Time: 02:30 pm to 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)** A diesel power plant consists of two units of 500 K W capacity of each and one unit of 200 KW capacity. The fuel has a calorific value of 40,000K J/Kg and fuel consumption is 0.25 Kg/K W hr. Determine the quantity of fuel required a month of 30 days and its cost if the fuel cost is Rs 4000 per ton, also find overall efficiency of the plant. **07**
- (b)** How is the total annual cost of electricity estimated? How does the fuel cost relate to the load and cost of power generation? **07**
- Q.2 (a)** The following details refer to a boiler plant consisting of economizer, a boiler and super heater **07**
Mass of water evaporated per hour =5940 Kg, mass of coal burnt per hour =675Kg, L.C.V of coal =31600K J/Kg, pressure of steam at boiler stop valve =14 bar, temperature of feed water entering the economizer =32 °C, temperature of feed water leaving economizer =115 °C, dryness fraction of steam leaving the boiler and entering super heater is 0.96 temperature of steam leaving the super heater=260°C specific heat of super heater steam =2.3K J / Kg K.. Determine :
i. Percentage of heat in coal utilized in economizer, boiler and super heater
ii. Overall efficiency of boiler plant.
- (b)** With neat sketch explain different types of super heaters. **07**
- OR**
- (b)** Discuss status of Fluidized bed combustion boilers worldwide and list its advantages and disadvantages. **07**
- Q.3 (a)** List requirements of good coal handling plant and list various stages of coal handling. **07**
- (b)** Write brief note on Electrostatic precipitator. **07**
- OR**
- Q.3 (a)** Explain principle of overfeed stoker with neat sketch. Compare under feed stoker and overfeed stoker. **07**
- (b)** Discuss requirements of oil burners? With neat sketch explain long flame, turbulent burners and tangential burners. **07**
- Q.4 (a)** With neat sketch explain engine lubrication system of a typical diesel power plant. **07**
- (b)** Describe working of hot sodium zeolite process with neat sketch and chemical reactions. List advantages and disadvantages over ion exchange system. **07**

OR

- Q.4 (a)** With neat sketch explain engine cooling system of diesel power plant **07**
- (b)** The following readings were taken during a test on a surface condenser: Mean condenser temperature = 35 °C, Hot well temperature = 30 °C, condenser vacuum = 69 cm Hg, barometer reading 76 cm Hg, condensate collected 16 Kg/min. Cooling water enters at 20 °C and leaves at 32.5 °C, flow rate being 37500 Kg/hr. Calculate **07**
- Mass of air present per cubic meter of condensate
 - Quality of steam at condenser inlet
 - Vacuum efficiency
 - Condenser efficiency

- Q.5 (a)** Draw neat sketches of following: **07**
- Gas cooled reactor
 - CANDU reactor
- (b)** With usual notations derive an expression for estimation of height of chimney and condition of maximum discharge. **07**

OR

- Q.5 (a)** State effects of different pollutants emitted from different types of power plants. **07**
- (b)** Compare the following **07**
- Nuclear power plant and thermal power plant
 - Diesel power plant and thermal power plant
