Seat No.: _____ Enrolment No._____

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 stroker. **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 reading were taken during a test on a surface condenser Mean condenser temperature =35 °C , Hot well temperature=30 °C, condenser vacuum=69cm Hg , barometer reading 76cm Hg, condensate collected 16Kg/min. Cooling water enters at 20 °C and leaves at 32.5 °C, flow rate being 37500 Kg/hr calculate i. Mass of air present per cubic meter of condensate ii. Quality of steam at condenser inlet iii. Vacuum efficiency iv. Condenser efficiency	**07**
Q.5	**(a)**	Draw neat sketches of following: • Gas cooled reactor • CANDU reactor	**07**
	(b)	With usual notations derive an expression of 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 i. Nuclear power plant and thermal power plant ii. Diesel power plant and thermal power plant	**07**

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