

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – WINTER • 2014****Subject Code: 151906****Date: 08-12-2014****Subject Name: Conventional Power Engineering****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Draw a General layout of a thermal power plant and discuss the various circuits. Also explain the working of steam power plant. **07**
- (b) State the various methods of improving the efficiency and work output of a gas turbine plant. With schematic and T-S diagram explain the regeneration process. **07**
- Q.2** (a) A gas turbine operates on Brayton cycle. The temperature range is 877°C and 15°C . Find pressure ratio for maximum power output. Also determine thermal efficiency, work ratio and power output, if the mass flow rate of air is 20 kg/sec. Take $C_p = 1.005 \text{ kJ/kg}$ and $\gamma = 1.4$ for compression and expansion process. **07**
- (b) Explain the process in simple Rankine Cycle on p-v and T-S diagrams and derive an expression for thermal efficiency. Name the significant parameters to improve thermal efficiency of the power plant. **07**
- OR**
- (b) Derive an equation maximum blade efficiency for single stage Impulse turbine. And hence derive the equation for maximum power output per kg of steam. **07**
- Q.3** (a) With a neat sketch draw an outline diagram of a diesel power plant and state the functions of different systems. **07**
- (b) Define “degree of reaction” of steam turbine. Derive an expression for calculating degree of reaction in terms of velocities. Give a brief comparison of impulse and reaction turbines? **07**
- OR**
- Q.3** (a) State the various methods of governing of steam turbines. Explain nozzle control Governing with neat sketch & Compare with the Throttle governing. **07**
- (b) State the requirement of a fuel injection systems in a Diesel engine and explain with neat sketch Common rail fuel injection system. **07**
- Q.4** (a) Write advantages and disadvantages of Hydraulic power plant Also write the classification for hydraulic turbines. **07**
- (b) Describe CANDU type nuclear reactor with help of neat sketch .Give names of various nuclear fuels used in nuclear power plants. **07**
- OR**
- Q.4** (a) Differentiate between Nuclear fission and fusion process. Explain Nuclear fission and chain reaction. **07**
- (b) What is axial flow turbine? Explain construction and working of Kaplan turbine and compare with the Francis Turbine. **07**
- Q.5** (a) Define load factor, Diversity factor and plant use factor. A thermal power plant consists of two units of 30 MW each running for 8200 hours and one unit of 10 MW running for 2000 hours in a year. The energy produced by the plant $400 \times 10^6 \text{ kWh}$ per annum. Determine the plant load factor and plant use factor. The maximum demand is equal to the plant capacity. **07**
- (b) What is present status of power generation in India? **07**
Explain the difference in working of three different types of Hydro turbines ?

OR

- Q.5 (a)** Describe the significance of load curves in planning and determining the size of Units in power plants. Define base load, Intermediate load and peak loads, with load curves. **07**
- (b)** List various nuclear power plants in India. Explain in detail Nuclear waste and its disposal. **07**
