

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-V • EXAMINATION – WINTER 2013

Subject Code: 151906**Date: 09-12-2013****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.**
- 4. Use of steam tables is permitted**

- Q.1 (a)** A generating unit of 10MW capacity supplies the following loads: **07**
(a) Domestic consumers with a maximum demand of 6MW at a load factor of 20%.
(b) Small industrial load with a maximum demand of 3.6 MW at a load factor of 50%.
(c) Street-light load with a maximum demand of 400 kW at 30% load factor.
Find the overall cost of energy per kWh for each type of consumer using the following data:
Capital cost of the plant = Rs 10,000 per kW
Total running cost = Rs 36,00,000 per year
Annual rate of interest and depreciation on capital cost = 10%.
- (b)** In an impulse turbine (with a single row wheel) the mean diameter of the blades is 1.05m and the speed is 3000 r.p.m. The nozzle angle is 18° , the ratio of blade speed to steam speed is 0.42 and the ratio of the relative velocity at outlet from the blades to that at inlet is 0.84. The outlet angle of the blade is to be made 3° less than the inlet angle. The steam flow is 10 kg/s. Draw the velocity diagrams for the blades and determine the following : **07**
(i) Tangential thrust on the blades (ii) Axial thrust on the blades
(iii) Resultant thrust on the blades (iv) Power developed in the blades
(v) Blading efficiency.
- Q.2 (a)** List essential requirements of steam power plant and explain factors to be considered in site selection for steam power plant. **07**
- (b)** Why is compounding required in steam turbine? Explain with neat sketch any one method of compounding in steam turbine. **07**
- OR**
- (b)** Explain following terms: blade efficiency, stage efficiency, blade speed ratio, blade velocity coefficient, degree of reaction. **07**
- Q.3 (a)** State purpose of lubrication in diesel engine? Sketch following lubrication systems. **07**
i. Wet sump Lubrication system.
ii. Splash lubrication system
iii. Dry sump lubrication system
- (b)** Explain any two methods of improving efficiency of gas turbine plant. **07**
- OR**
- Q.3 (a)** With neat sketch explain outline of diesel power plant and list various systems of diesel power plant. **07**

- (b) Compare open cycle and closed cycle gas turbine plant. Derive expression for calculating thermal efficiency of gas turbine plant. **07**
- Q.4** (a) Explain detailed classification of hydro-electric power plant. **07**
(b) Compare hydro-electric and thermal power plant. **07**
- OR**
- Q.4** (a) Draw neat sketch of Pelton turbine and list design features of pelton turbine. **07**
(b) Why is governing required in steam turbine? Explain governing in impulse turbine. **07**
- Q.5** (a) Write brief note on status and prospects of nuclear power plants in India. **07**
(b) List essential components of nuclear reactor, with neat sketches. **07**
- OR**
- Q.5** (a) With neat sketch explain PWR and state its advantages and limitations **07**
(b) Define following terms: Connected load, maximum load, Peak load, base load, load factor, Plant use factor, Demand factor. **07**
