

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2171910

Date:10/05/2018

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 table is permissible.

- Q.1**
- (a) State the factors to be considered for selection of site for thermal power plant **03**
- (b) Explain in brief water circulation methods in boilers with neat sketch. **04**
- (c) Derive equation of critical pressure ratio of nozzle and explain its significance. Calculate its value for superheated steam. **07**
- Q.2**
- (a) Discuss the importance of condenser in thermal power plant. **03**
- (b) Explain the term, “Boiler Draught”. Also state the classification of boiler draught. **04**
- (c) Explain the effect of operating variables on the thermal efficiency of a gas turbine cycle. **07**
- OR**
- (c) Explain with neat sketch construction and working of CANDU type reactor. **07**
- Q.3**
- (a) What is the difference between fissionable and fertile materials? **03**
- (b) Explain the working principle of Turboprop engine with neat sketch. **04**
- (c) Define the following terms:- **07**
- (i) Peak load (ii) Average load
- (iii) Plant Capacity factor (iv) Connected load
- (v) Demand factor (vi) Diversity factor
- (vii) Plant use factor
- OR**
- Q.3**
- (a) Explain the statement:- “Coal handling system is called lifeline of the coal fired power plants”. **03**
- (b) How the Dalton’s law of partial pressure can be applied to condenser application? **04**
- (c) Explain Zeolite ion exchange process used in thermal power plant for water treatment. **07**
- Q.4**
- (a) What is sub-critical and super critical boiler? **03**
- (b) Explain in brief the out plant coal handling systems. **04**
- (c) Explain pulverized coal system and state its merits and demerits. **07**

OR

- Q.4** (a) Explain the necessity of feed water treatment. **03**
(b) Write short note on surface condenser. **04**
(c) In a 50% reaction turbine, the speed of rotation of blade group is 3000 rpm with min blade velocity of 120 m/sec. The velocity ratio is 0.8 and the exit angle of the blade is 20°. If the mean blade height is 30 mm, Calculate the total steam flow rate through the turbine. Neglect the effect of blade edge thickness of the annular area, but consider 10% of the total steam flow rate as the tip leakage loss. The mean condition of the steam in that blade group is found to be 2.7 bar and 0.95 dry. **07**
- Q.5** (a) Describe the unique features of high pressure boilers in brief. **03**
(b) Explain closed cycle gas turbine plant with figure. **04**
(c) Describe the term, “compounding of steam turbine” and explain Pressure-Velocity compounded impulse turbine with necessary diagrams. **07**

OR

- Q.5** (a) Define the term nozzle and diffuser. Also state its applications **03**
(b) Classify steam turbines. **04**
(c) Explain with schematic and temperature-entropy diagram, the gas turbine cycle with intercooling, regeneration, and reheating. **07**
