

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII (old) - EXAMINATION – SUMMER 2018

Subject Code:181904

Date:09/05/2018

Subject Name:Thermal Engineering

Time:10:30 AM to 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) Describe the governing of steam turbine? State different methods of governing and explain the throttle control governing of steam turbine with neat sketch. **07**
- (b) Write short note on following:- **07**
- (i) Back pressure turbine
- (ii) Ramjet engine
- Q.2** (a) Derive an equation of critical pressure ratio of nozzle and explain its significance. Calculate its value for superheated steam. **07**
- (b) Write a short note on- various requirements of a typical combustion chamber of the gas turbine plant. **07**
- OR**
- (b) State and explain in brief the different sources of losses in steam turbines. **07**
- Q.3** (a) Explain super saturated flow of steam through a nozzle and plot the process on h- s diagram. Also explain in brief the significance of Wilson's line. **07**
- (b) Define the term "Degree of Reaction". Explain Parson's reaction turbine. **07**
- OR**
- Q.3** (a) Explain the effect of varying the back pressure in convergent divergent nozzle and state when maximum flow occurs in the nozzle. **07**
- (b) Enlist the various methods of attachment of blades to turbine rotor. Explain any one of them with neat sketch. **07**
- Q.4** (a) Enlist different methods used to improve efficiency and specific work output of open cycle gas turbine plant and explain any two with neat sketches and with T-S diagram. **07**
- (b) Derive a general expression for the blade efficiency of a simple impulse turbine with a single row wheel. Also discuss the influence of the speed ratio on the efficiency of the system. **07**
- OR**
- Q.4** (a) Explain the working principle of Turboprop engine with neat diagram and state its merits and demerits. **07**
- (b) For maximum work out put in actual Brayton Cycle, derive an expression of optimum pressure ratio. **07**
- Q.5** (a) Describe the term, "compounding of steam turbine" and explain pressure compounded impulse turbine with necessary diagrams. **07**
- (b) Air enters the compressor of a simple gas turbine unit at 1 bar and 300 °K. The turbine inlet temperature is limited to 950 °K. The gases expand down to atmospheric pressure. Compare the thermal efficiency and the work ratio of the ideal cycle when the pressure ratio is 5 and 8. **07**

OR

- Q.5** (a) Explain in brief “Back Pressure Steam Turbine” with neat sketch and h-s diagram. **07**
- (b) In a 2-row velocity compounded impulse turbine, the steam leaves the nozzle at 800 m/s. The moving blade tip angles are 30° and the blade velocity coefficients for fixed and moving blades are 0.9. Estimate the blade speed when the nozzle angle is 16° and the discharge is axial. **07**
