(ii) Diagram (rotor) efficiency.

(iii) Axial force on the wheel.

(iv) Energy converted to heat by blade friction per second. **20**

7. (a) What is difference between jet condenser and surface condenser explain with neat sketch ? **10**

(b) What is air leakage in the condenser, its disadvantages and remedies to prevent air leakage in the condenser ? **10**

8. (a) A multistage air-compressor is to be designed to elevate the pressure 1 bar to 125 bar such that stage pressure ratio does not exceed 4. Determine :

(i) No. of stages

(ii) Exact stage pressure ratio

(iii) Intermediate pressure **12**

(b) What is need of perfect inter cooling and its utility in the multistage compression ? Justify your compressor. **4**

(c) Why the compressor under isothermal process is desirable and need for obtaining higher isothermal efficiencing ? **4**

No. of Printed Pages : 4 **Roll No. .....**

435

B. Tech. EXAMINATION, May 2019

(Fourth Semester)

(Old Scheme) (Re-appear Only)

ME

ME210

ENERGY CONVERSION

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. All questions carry equal marks. Steam tables are allowed. Scientific calculators are also allowed.

1. Explain the classification of solid, liquid and gases fuel indicating the characteristics of such fuel. **20**

2. Explain with neat sketch the principle of working of Benson High Pressure Boilers. Explain the advantage and limitation of this boilers. **20**

3. What is difference between Carnot and Rankin cycles ? Explain with drawing PV and TS diagram of each cycle. Determine the thermal efficiencies of both cycles. **20**

4. (a) Prove that under critical pressure ratio, the velocity of a compressible fluid at the exit of a convergent nozzle is given by :

$$C_2 = \sqrt{\frac{2}{r+1}}\, a_1$$

where a_1 is the sonic velocity Corresponding to the initial conditions. Assume critical pressure Ratio = $\left(\frac{2}{r+1}\right)^{\frac{r}{r+1}}$ where r is the adiabatic index. **10**

(b) Explain the nozzle efficiency under saturated steam and superheated steam by drawing neat sketch and the factors on which nozzle efficiening depends. **10**

5. (a) Explain the difference between impulse steam turbine and reaction steam turbine. **10**

(b) Explain pressure compounding and velocity compounding of impulse steam turbine by drawing the neat sketch. **10**

6. The velocity of steam exiting the nozzle of impulse stage of turbine is 400 m/sec. The blades operates under maximum efficiencing. The nozzle angle $\alpha = 20°$. Considering equiangular blades i.e. inlet blade angle and outlet blade angle are equal i.e. $Q = \phi$. Neglecting blade friction i.e. K = 1, Mass flow rate is 0.6 kg/sec. Calculate :

(i) Diagram power i.e. power generated by rotor blades.