Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: IV Marine Engineering

Regular Examination April – June 2015

2MR404-Heat Engines

Time: 3 Hours **Total Marks: 70**

Instruction: (1) Attempt all Questions.

(2) Assume suitable data if necessary.

(3) Figure to the right indicates full Marks.

(4) Start new Question on New Page.

Section – I

Que. – 1 (a) Derive an equation for the efficiency of Brayton cycle [6]

(b) Differentiate between Impulse and Reaction Turbine. [6]

OR

Que. – 1 (a) Derive an equation for the condition of maximum energy transfer in case of reaction turbines. [12]

(b) Define the followings: Stage efficiency, Overall efficiency & Reheat factor.

Que. – 2 (a) Draw the neat sketch of Pressure Compounded Impulse turbine and explain its working. [6]

(b) Write short note on Parson's Turbine. [5]

OR

Que. – 2 (a) Draw the neat sketch of Velocity Compounded Impulse turbine and explain its working. [11]

(b) Write short note on Francis Turbine.

Que. – 3 An open gas cycle power plant has maximum pressure ratio of 8 and temperature of air at entry of compressor are 1 atm. and 300 K. A regenerative heat exchanger having effectiveness of 0.6 is used to increase the temperature of air before entering into the combustion chamber. Air flowing through the compressor is 500 kg/min. Find: Thermal efficiency of the plant and saving in fuel consumption in kg/hr due to regeneration. Take Max. Temp in the cycle = 1100 K. C.V = 32,000 KJ/kg Turbine and compressor efficiency = 80%. $\gamma = 1.4$ and Cp = 1.005 KJ/kg K for both air and gas. [12]

Section – II

Que. – 4 (a) Describe the modified Rankin cycle. [6]

(b) Explain the Binary vapour cycle. [6]

OR

Que. – 4 Draw the line diagram of Combined cycle power plant and give the applications of Gas turbine power plant. [12]

Que. – 5 (a) Explain the efficiency of Rankin cycle [6]

(b) derive the Efficiency of Carnot cycle [5]

OR

Que. – 5 Explain the Regenerative cycle steam power plant? Find the efficiency of the Regenerative Cycle with Use of T-s, H-s and P-v diagram [11]

Que. – 6 Explain the Reheat cycle steam power plant? Find the efficiency of the Reheat Cycle with Use of T-s and H-s diagram. [12]

END OF PAPER