

GANPAT UNIVERSITY**B. Tech. Semester: III (Marine) Engineering****Regular Examination November – December 2015****2MR304 Applied thermodynamics-I****Time: 3 Hours****Total Marks: 60**

- 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) Describe the absolute or Kelvin temperature scale. | 5 |
| (b) Equivalence of Kelvin and Clausius Statement | 5 |

OR

- Que. – 1**
- | | |
|---|---|
| (a) An Engine is to be designed to produce 0.735 kW by taking continuously 6000 kJ/h from heat source which is at 505 K. The heat sink is atmosphere i.e sink temperature is atmospheric. the atmosphere temperature varies from 38°C in summer to 0°C in winter. Comment on performance of the engine. | 6 |
| (b) Difference between Heat pump and Heat engine. | 4 |

- Que. – 2**
- | | |
|--|---|
| (a) Explain Carnot vapor cycle with net diagram. | 5 |
| (b) What is indicated power? Determine the indicator power for single acting and double acting cylinder. | 5 |

OR

- Que. – 2**
- | | |
|--|---|
| (a) Explain the tandem compounding method of compounding steam engine with net diagram | 5 |
| (b) Explain the Carnot cycle | 5 |

Que. – 3

- | | |
|---|----|
| Explain the Rankine cycle steam power plant. Find the Efficiency of Rankine cycle steam power plant with use of T-S, H-S and P-V diagram. | 10 |
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Section – II

- Que. – 4**
- | | |
|--|---|
| (a) In a double acting steam engine, the cylinder diameter is 60 cm and stroke is 70 cm. the mean piston speed is 20m/min. The intake pressure is 10 bar and exhaust pressure is 1.3 bar. The cut off occurs at 25% of the stroke. Neglecting clearance, find the i.p of the engine for a diagram factor of 0.78. Neglect the piston rod area. | 5 |
| (b) What is the advantage of compounding steam engine? | 5 |

OR

Que. - 4 (a) A steam engine has a stroke equal to 1.3 times the diameter and a diagram factor of 0.80. Dry and saturated steam is supplied at 10 bar and exhaust at 1.05 bar. If the speed is 250rpm and ratio of expansion 2.5, indicated power 185 KW, calculate the dimension of the cylinder 5

(b) Explain the Modified Rankin cycle for steam Engines. 5

Que. - 5 (a) Explain the First Law of thermodynamics with limitation and application. 5

(b) Explain the working of vane type compressor with neat sketch. 5

OR

Que. - 5 (a) Explain the FAD in compressor in detail 3

(b) A single cylinder, single acting reciprocating compressor takes in air $6 \text{ m}^3/\text{min}$ at 1 bar and 15°C and compresses air to a delivery of 5 bar gauge. The possible compression process are: 7

Isentropic compression, $n=1.4$

Polytropic compression $=1.25$

Find for each case neglecting clearance, calculate:

- 1) Temperature at the end of compression
- 2) work done during suction
- 3) work done on air during compression
- 4) Net work done

Que. - 6

(a) Explain the work done of Single acting reciprocating compressor. 5

(b) What is the advantage of compounding steam engine? 5

END OF PAPER