

## ***B.Tech Degree I & II Semester Examination in Marine Engineering June 2011***

### **MRE 107 FUNDAMENTALS OF ENGINEERING I**

#### **PART - A MECHANICAL ENGINEERING**

Time : 1 ½ Hours

Maximum Marks : 50

- I. (a) Name and define the law that forms the basis for temperature measurement. (4)  
(b) Derive the expression for work done for an isothermal process. (4)  
(c) An office worker claims that a cup of cold coffee on his table warmed up to 50°C by picking up energy from the surrounding air which is at 25°C. Is there any truth to his claim? Does this process violate any thermodynamic Laws? (9)
- OR**
- II. (a) Differentiate open and closed system with examples. (7)  
(b) A high altitude chamber, the volume of which is 30m<sup>3</sup>, is put into operation by reducing the pressure from 1.013 bar to 0.35 bar and temperature from 27°C to 5°C. How many Kg of air must be removed from the chamber during the process? Express this mass as volume measured at 1.013 bar and 27°C. Take R=287J/kg °K for air. (10)
- III. (a) Derive the expression for thermal efficiency of Diesel cycle. (10)  
(b) The following particulars refers to the German Mercedes “190 D” car operating on four stroke in-line diesel engine cycle:- (7)  
Compression ratio 21:1 and expansion ratio 10.5:1. Determine the cut off ratio and air standard efficiency.
- OR**
- IV. (a) Compare the two stroke and four stroke petrol engine. (7)  
(b) The peak pressure in an otto cycle is 210N/cm<sup>2</sup>, with a compression ratio of 5 and minimum pressure of 10N/cm<sup>2</sup>, determine (i) thermal efficiency (ii) Mean effective pressure. Assume the working substance as air with  $r = 1.4$ . (10)
- V. (a) What kind of steam is called wet saturated, dry saturated and super heated steam? (4)  
(b) Define quality and dryness fraction of steam. (4)  
(c) Determine the specific volume density, enthalpy and entropy of wet saturated steam at 20 bar pressure and 0.9 dryness fraction. (8)
- OR**
- VI. (a) Explain the differences between water tube and fire tube boilers. (8)  
(b) With the help of neat sketch explain Cochran Boiler. What is its special features? (8)