BT MRE – I & II – 08– 020 (A)

B.Tech. Degree I & II Semester Examination in Marine Engineering May 2008

MRE 107 FUNDAMENTALS OF ENGINEERING I
A – MECHANICAL ENGINEERING

Time: 1½ Hours Maximum Marks: 50

I	a)	In order to increase the efficiency of a carnot engine, it is possible to increase T_1, keeping T_2 constant or to decrease T_2 keeping T_1 constant, where T_1 and T_2 are the temperatures of higher and lower energy reservoirs respectively. Prove which is more effective.	(8)
	b)	Does heat transfer inevitably cause a temperature change? Explain.	(4)
	c)	Briefly explain the various components of internal energy stored in a molecule.	(5)
		OR	
II	a)	The following data refer to a 2 cylinder, single acting, two stroke marine diesel engine. Speed 150 rpm, cylinder dia. 0.8m, stroke of piston 1.2m. Area of indicator diagram 5.5.X10^{4}m^2, height of indicator diagram 0.06m, spring value 147MPa/m. Find the net rate of work transfer from the gas to the pistons in KW.	(12)
	b)	Derive an expression to calibrate the thermometer based on two reference point method.	(5)
III	a)	With the help of P-V and T-S diagrams, compare the air standard efficiencies of otto cycle, diesel cycle and dual cycle.	(8)
	b)	Derive an expression for the air standard efficiency of otto cycle.	(9)
		OR	
IV	a)	A diesel engine has a compression ratio of 14 and cut off takes place at 6% of the stroke. Find the air standard efficiency.	(6)
	b)	What do you mean by the term "thermal efficiency"? How can it be related to mechanical efficiency of an IC engine?	(6)
	c)	What are the different heat transfers that are to be considered while preparing a heat balance sheet?	(5)
V	a)	Steam initially at 1.5 MPa, 300°C expands reversibly and adiabatically in a stream turbine to 40°C. Determine the ideal work output of the turbine per Kg of steam. (Use of steam table permitted)	(8)
	b)	What is scaling in boilers? What are the modern methods adopted to avoid scaling?	(4)
	c)	Explain the working principle of a throttling calorimeter, with a help of a T.S and L – S diagram.	(4)
		OR	
VI	a)	Draw a neat working sketch of a Babcock-wilcox boiler and name the various accessories and explain its working.	(10)
	b)	How will you start a 25,000 BHP marine diesel engine? Explain with a circuit diagram.	(6)

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