B.TECH. SEM -I (2007 COURSE) (ALL BRANCHES) : WINTER - 2017

SUBJECT: ELEMENTS OF MECHANICAL ENGINEERING

Day: Tuesday **Time:** 10.00 AM TO 01.00 PM
Date: 16/01/2018 **W-2017-2344** **Max. Marks: 80**

N.B:

1) **Q. No.1** and **Q. No 5** are **COMPULSORY.** Out of the remaining attempt **ANY TWO** questions from Section-I and **ANY TWO** questions from Section-II.
2) Answer to the two sections should be written in **SEPARATE** answer books.
3) Neat diagram must be drawn **WHEREVER** necessary.
4) Figures to the **RIGHT** indicate full marks.
5) Use of Non-Programmable electronic pocket **CALCULATOR** is allowed.
6) Assume suitable data, if necessary.

SECTION-I

Q.1 **a)** Explain the various types of thermodynamic systems with suitable examples for each. **(05)**

b) Explain with neat sketch the principle and working of Household Refrigerator. **(05)**

c) Explain hydroelectric power plant with neat sketch. **(04)**

Q.2 **a)** Write short note on: Quasi-static process. **(05)**

b) A turbine operating on air has inlet conditions as 10 bar, 750K and 200 m/sec. While exit condition are 1.25 bar and 40m/sec. The mass flow rate of air is 1000 kg/hr. The flow of air is assumed to be reversible adiabatic, calculate **(08)**

i) Temperature of the air at exit

ii) The power output of the turbine, Assume C_p = 1.053 KJ/Kg.K and adiabatic index K = 1.375.

Q.3 **a)** Explain the working of two stroke petrol engine with help of neat sketch. **(07)**

b) Explain with neat sketch compressed air motor. **(06)**

Q.4 **a)** Calculate the rate of heat transfer by convection between roof of area 20 x 20 m^2 and the ambient air, if the roof temperature is 10^0C and air temper is 40^0C. Consider the heat transfer coefficient for convection 10 W/m^2K. **(06)**

b) Explain with the help of sketch working of the nuclear power plant. **(07)**

SECTION-II

Q.5 **a)** Explain the formation of steam using T-H diagram. **(05)**

b) Classify different types of keys and explain any one with sketch. **(05)**

c) Explain the soldering and brazing process with applications. **(04)**

Q.6 **a)** Explain the CNC machine with neat sketch. **(06)**

b) Steam at a pressure of 25 bar and 0.95 dryness fraction occupy a volume of 0.26m^3. It expands according to low $PV^{1.25}$ = constant to final pressure of 8 bar. Find. i) Mass of steam ii) Final quality of steam **(07)**

Q.7 **a)** Explain with sketch different types of gear pairs and their applications. **(07)**

b) Write short note on Electro-discharge machining. **(06)**

Q.8 **a)** Explain with sketch the various operations performed on drilling machine. **(08)**

b) Explain with sketch i) Butterfly valve and ii) Axles **(05)**

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