Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –Ist SEMESTER–EXAMINATION – JULY- 2012

Subject code: 711002N **Date: 07/07/2012**

Subject Name: Vacuum Engineering

Time: 2:30 pm – 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Show the following as per standard ISO and DIN graphical symbols : **07**
Two stage rotary pump, Three stage oil diffusion air cooled pump, needle valve, LN2 trap, cold cathode ionization gauge, McLeod gauge, pirani gauge.

(b) Explain the stepwise procedure for the start and shut down of a vacuum module. **07**

Q.2 **(a)** Explain the following: **07**
Adsorption and desorption of gases, Permeation and permeability of gases, flow regimes in vacuum system.

(b) Define through put of the system and through put of the pump. State its unit. Sketch electrical analogous circuit of a simple vacuum system and label various quantities. Explain conductance and mention its unit. **07**

OR

(b) Prove that Se = (Sp . U) / (Sp + U) , where the symbols have their usual meaning. Discuss the situation if the pipe work conductance is very low. **07**

Q.3 **(a)** Explain with a neat sketch construction and working of double vane type oil sealed rotary vacuum pump. What are the factors that decide the ultimate pressure of such a pump? **07**

(b) Distinguish and explain back streaming and back migration as applied to oil diffusion pump. What are the two main sources of back streaming? What care should be taken to keep both as low as possible? What will be the effect of higher water temperature on the operation of oil diffusion pump? **07**

OR

Q.3 **(a)** Describe in brief the construction, working, field of application and salient features of a turbo molecular pump. **07**

(b) Distinguish between cryopump and cryosorption pump. State main features of a cryosorption pump. What ultimate pressure can be achieved? **07**

Q.4 **(a)** Classify vacuum gauges. State briefly principle of working of each and mention their operating limits of pressure. **07**

(b) Explain linear and square scale method of operation of Mcleod gauge. Also mention the limits of this gauge. **07**

OR

Q.4 **(a)** Describe in brief the principle of operation, construction and working of any one type of thermal conductivity gauge with the help of a neat sketch. How is the sensitivity of this gauge defined? **07**

Q.4 **(b)** Explain briefly the following : **07**
Ionization, Thermionic ionization, Ionization by electric discharge.

Q.5	**(a)**	Name the different types of leak detection techniques and their concerned applications indicating minimum detectable leak.	**07**
	(b)	Discuss in detail the important properties of materials used for the construction of vacuum system.	**07**

OR

Q.5	**(a)**	Describe leak testing method by halide leak detector and gauge method of leak hunting	**07**
	(b)	Discuss demountable joints having non metallic and metallic gaskets.	**07**

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