Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –I Examination Feb. - 2012

Subject code: 711002N **Date: 13/02/2012**

Subject Name: Vacuum Engineering

Time: 10.30 am – 01.00 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)**	Classify vacuum pump based on the principle of operation. State their operating limits of pressure and applications.	**07**
	(b)	With neat sketch explain water ring vacuum pump, its limitations and applications.	**07**
Q.2	**(a)**	Define speed of exhaust, pumping speed and conductance of a vacuum system. Derive the mathematical equation relating these parameters and give physical interpretation of the equation.	**07**
	(b)	Mention three commonly used arrangements of oil-sealed vacuum pump. Explain with neat sketch construction and working of any one oil-sealed rotary vacuum pump. What are the factors that decide the ultimate pressure of such a pump?	**07**
		OR	
	(b)	Explain with a neat sketch construction and working of a fractioning type oil-vapor diffusion pump. Explain Back streaming and Back migration. What are the two main source of Back streaming? How can Back Migration be prevented?	**07**
Q.3	**(a)**	Write short note on Turbomolecular pump.	**07**
	(b)	Mention different processes taking place whenever a gas comes in contact with a solid. What are the factors that control these processes? Explain two kind of absorption process.	**07**
		OR	
Q.3	**(a)**	Write short note on Crysorption pump.	**07**
	(b)	What is the principle of operation of Hot Cathode Getter Ion pump? With neat sketch explain the construction and characteristics of it. Also mention about its use and care.	**07**
Q.4	**(a)**	With neat sketch explain principle of operation, construction of cold cathode ionization gauge. Also mention its use and care.	**07**
	(b)	State the principle of measurement of vacuum by a McLeod gauge. Explain with the help of sketch linear and square scale methods of measurement of vacuum.	**07**
		OR	
Q.4	**(a)**	State important requirements to be met by materials used in vacuum systems. Also write the use of ceramics and polymers in vacuum system.	**07**
	(b)	Explain in brief the principle of operation of thermal conductivity gauges. Discuss the factors which limit its upper and lower values of measurement of pressure.	**07**
Q.5	**(a)**	Explain the use of helium as search gas in MSLD and calibration of MSLD.	**07**
	(b)	Explain the selection criteria of demountable vacuum joints for vacuum system. Explain requirements of vacuum system.	**07**
		OR	
Q.5	**(a)**	Discuss how vacuum is useful in thin film coating.	**07**
	(b)	Briefly explain methods of measuring through put of a vacuum system.	**07**

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