Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Examination January 2010

Subject code: 711002 Subject Name: Vacuum Engineering

Date: 22 / 01 / 2010 Time: 12.00 – 2.30 pm

Total Marks: 60

Instructions:

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

Q.1	**(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.	**06**
	(b)	Define vacuum. Give classification of various mechanical vacuum pump and their working pressure ranges. Also mention their application.	**06**
Q.2	**(a)**	Describe with neat sketch the working and construction of water ring pump. State its applications and also its limitations.	**06**
	(b)	Describe with a neat sketch construction and principle of operation of a turbomolecular pump. State its applications.	**06**
		OR	
	(b)	What are the advantages of turbomolecular pump? What are the precautions to be taken while it is in use? Explain why backing pump is necessary for turbomoleculars pump?	**06**
Q.3	**(a)**	Classify the vacuum gauges according to the principle of operation and indicate their ranges.	**06**
	(b)	Describe with a neat sketch the construction and principle of operation of cold cathode ionization gauge. What are the special features of this gauge? State their limitations if any.	**06**
		OR	
Q.3	**(a)**	Describe with a neat sketch the construction and principle of operation and operational range of hot cathode ionization gauge.	**06**
	(b)	State the modification and constructional features required for the above hot cathode ionization gauge to measure UHV.	**06**
Q.4	**(a)**	Write a note on applications of the following material in vacuum system. (i) Ceramics (ii) Polymers	**06**
	(b)	State the important requirements to be met by vacuum material.	**06**
		OR	
Q.4	**(a)**	Explain the working principle, operation and construction of Mass Spectrometer Leak Detection.	**06**
	(b)	What do you mean by sorption and desorption? Explain adsorption and absorption phenomenon.	**06**
Q.5	**(a)**	Write note on space simulation chamber.	**06**
	(b)	Explain vacuum application in thin film coating.	**06**
		OR	
Q.5	**(a)**	What is mean free path? Explain permissible start up pressure, ultimate pressure.	**06**
	(b)	Explain the selection criteria of demountable vacuum joints for vacuum system. Explain requirements of vacuum valve in system.	**06**

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