

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING
(Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of Physics
VACUUM TECHNOLOGY AND APPLICATIONS

SYLLABUS FOR B.E. V-SEMESTER

(Open elective Course)

L : T : P (Hrs./week): 03 : 0 : 0	SEE Marks :60	Course Code : U19OE510PH
Credits :03	CIE Marks :40	Duration of SEE : 03Hours

COURSE OBJECTIVES		COURSE OUTCOMES <i>On completion of the course, students will be able to</i>	
1	Learn basic terms and definitions of vacuum technology	1	Define various vacuum ranges and terms related to vacuum technology
2	Acquire knowledge on vacuum pump parameters	2	List out vacuum pump parameters
3	Gain insight of various vacuum production methods	3	Narrate working of various types of vacuum pumps
4	Learn measurement of vacuum	4	Explain working of different vacuum measuring devices
5	Known various applications of vacuum.	5	List our application and use of vacuum in various fields of engineering and technology.

UNIT-I: FUNDAMENTALS OF VACUUM

Vacuum Nomenclature and Definitions, units of vacuum, Vacuum ranges, Types of flow: turbulent flow, viscous or laminar flow, molecular flow, Knudsen flow Vacuum Physics-out gassing, Mean free

path of the molecules, adsorption, desorption, evaporation theory-rate of evaporation, Hertz- Knudsen equation, types of evaporation.

UNIT-II: VACUUM TERMINOLOGY

Methods of production of vacuum, vacuum pump function basics, throughput, pumping speed, conductance, evacuation rate, fore vacuum and high-vacuum pumping, Pump Choice, valve less, valved pumping system, Positive Displacement Vacuum Pumps, Momentum Transfer Vacuum Pumps, Entrapment Pumps, traps and baffles. Function of the oil in oil-sealed vacuum pumps. Effects of condensable vapours on mechanical pump performance, Water vapour tolerance of a pump, Back-streaming

UNIT-III: VACUUM PUMPS

Systems construction and working of vacuum pumps: Roots vacuum pumps, Rotary vane pump, multi stage rotary pumps, diffusion pump, Turbomolecular pumps, cryo-pump, ion getter pumps,

UNIT-IV: VACUUM MEASUREMENT

Overview of gauges, direct reading and indirect reading gauges, classification of pressure gauge, Vacuum gauges: thermocouple gauge, Pirani gauge, cold cathode and hot cathode ionization gauge, Penning gauge, leak detection, Leak detection methods-leak rate.

UNIT-V: VACUUM APPLICATIONS

Deposition of thin films, Vacuum technology in the semiconductor industry, Vacuum technology in metallurgical processes, Vacuum technology in the chemical industry.

Learning resources:

1. Dorothy M. Hoffman and Bawa Singh, Handbook of Vacuum Science and Technology, Academic Press, 1998
2. M. N. Avadhanulu and P.G. Kshirsagar, Textbook of Engineering Physics, Revised Edition, S.Chand, 2015
3. David J. Hucknall, Vacuum Technology and Applications, Butterworth-Heinemann Ltd, 1991
4. John F. O'Hanlon A User's Guide to Vacuum Technology, John Wiley and sons, 2006

The break-up of CIE : Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	<input type="text" value="2"/>	Max. Marks for each Internal Test	:	<input type="text" value="30"/>
2	No. of Assignments	:	<input type="text" value="3"/>	Max. Marks for each Assignment	:	<input type="text" value="5"/>
3	No. of Quizzes	:	<input type="text" value="3"/>	Max. Marks for each Quiz Test	:	<input type="text" value="5"/>

Duration of Internal Tests : 1 Hour 30 Minutes

Asaf Khan
11/7/19