VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF PHYSICS
Open elective Course
THIN FILM TECHNOLOGY AND APPLICATIONS

L : T : P	Credits	CIE		SEE		Course Code
		Marks	Exam Duration	Marks	Exam Duration	
03 :0 :0	03	40	90 min	60	3hours	U19OE520PH

Course Objectives	Course Outcomes
Students are able to	***The students acquire the ability to***
1. Learn the fundamental atomistic mechanisms. 2. Know thin film deposition techniques 3. Acquire knowledge on thin film devices 4. Acquaint with thin film devices 5. Appreciate applications of thin films	1. acquire range of basic knowledge fundamental definitions of thin film technology 2. narrate various thin film deposition techniques 3. list various thin film devices and their use 4. insights in possibilities and the importance of different thin films and coatings for a variety industrial applications

UNIT-I: THIN FILM GROWTH

Classification of films- formation of thin films- Condensation and nucleation, growth and coalescence of islands, -nucleation theories: capillarity and atomistic models, sticking coefficient, adhesion, substrate effect, film thickness effect.

UNIT-II: DEPOSITION TECHNIQUES

Thin film deposition techniques- simple thermal evaporation- Chemical vapor deposition technique-Advantages and disadvantages of Chemical Vapor deposition (CVD), physical vapour deposition electron beam evaporation- RF sputtering, flash evaporation, Laser ablation- spin coating- molecular beam epitaxy (MBE), Spin coating,Film thickness measurement-ellipsometry, quartz crystal oscillator techniques, structure and microstructure of thin films.

UNIT-III: THIN FILM MATERIAL CHARACTERIZATION TECHNIQUES

Characterization techniques: X-Ray Diffraction (XRD), working principles of Scanning Electron Microscopy (SEM), working of Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM).

UNIT-IV: PROPERTIES OF THIN FILMS

Electrical conduction in continuous and discontinuous metallic thin films. Transport and optical properties of metallic, semiconducting and dielectric films.

UNIT-V: THIN FILM DEVICES AND APPLICATIONS

Anti-reflection coatings, fabrication of thin film resistor, capacitor, diode, gas sensors and temperature sensors. Thin film solar cells, Quantum well and Quantum dot solar cells. Application of thin films in different areas such as electronics, medical, defense, sports, automobiles, applications of thin films in various fields etc.

Learning resources:

1. Kasturi Chopra Thin Film Device Applications, Mac Graw Hill, New York, 2012
2. A. Goswami, thin film fundamentals, New age international, 2006

Prof. C. Prasad
OU nominee, OU

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Subject Expert, IIT-H

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