



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

SPECIAL MANUFACTURING PROCESS								
I SEMSTER: CAD/CAM								
Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
BCCD06	Elective	3	-	-	3	40	60	100
		Contact Classes:48		Tutorial Classes: Nil		Practical Classes: Nil		Total Classes:48
Pre requisites: Unconventional Machining Process (AMEC40)								

I. COURSE OVERVIEW:

This course is to introduce the concept of manufacturing process with the help of various processes widely employed in the industries. This course consists of surface treatment, processing of ceramics, development of geometrical modeling, e-manufacturing and rapid prototyping processes with the related details of equipment and applications. It introduces the different manufacturing processes.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. The manufacturing processes in surface treatment, types of surface coating and methods of coating.
- II. The important effects of manufacturing processes in ceramics, powder preparation, processing of composites.
- III. The concepts of fabrication of microelectronic devices, wafer preparation, bonding and packaging techniques and design in micro-electronic devices.
- IV. The perceptions of Nano manufacturing techniques, working principles and techniques of RPT.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

- CO1 Select suitable manufacturing processes to manufacture the products optimally.
- CO2 Develop simplified manufacturing processes with the aim of reduction of cost and manpower.
- CO3 Identify/control the appropriate process parameters, and possible defects of manufacturing processes in industries.
- CO4 Evaluate the required surface treatment necessary for a particular application
- CO5 Illustrate numerous stages involved in the processing of Ceramics
- CO6 Apply the knowledge of various techniques for the fabrication of Micro Electronic components.

IV. COURSE CONTENT:

MODULE -I: Surface Treatment (10)

Surface Treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapor deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

MODULE -II: Processing of Ceramics (10)

Processing of Ceramics: Applications, characteristics, classification Processing of particulate ceramics, Powder preparations, consolidation, Drying, sintering, Hot compaction, Area of application, finishing of ceramics. Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

MODULE -III: Fabrication of Micro Electronic Devices (09)

Fabrication of Microelectronic Devices: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards. Computer aided design in microelectronics, surface mount technology, Integrated circuit economics.

MODULE -IV: E-Manufacturing (09)

E-Manufacturing: Nano manufacturing techniques and micromachining, High Speed Machining and hot Machining.

MODULE -V: Rapid Prototyping (10)

Rapid Prototyping: Working Principles, Methods, Stereo Lithography, Laser Sintering, Fused Deposition Method, Applications and Limitations, Rapid tooling, Techniques of rapid manufacturing.

V. TEXT BOOKS:

1. Kalpakjian, “Manufacturing Engineering and Technology”, Pearson, 7th Edition, 2015.
2. R. A. Lindburg, “Process and Materials of Manufacturing”, PHI, 11th Edition, 1990.
3. R. Rao, Thummala , Eugene, J. Rymaszewski, Van Nostrand Renihold, “Microelectronic packaging handbook”, 2nd Edition, 1995.

VI. REFERENCE BOOKS:

1. Tai - Run Hsu, “MEMS & Micro Systems Design and Manufacture”, Tata McGraw Hill, 1st Edition, 2017.
2. V. K. Jain, “Advanced Machining Processes” , Allied Publications, 1st Edition, 2009.
3. John A Schey, “Introduction to Manufacturing Processes”, Tata McGraw Hill, 3rd Edition, 2012.

VII.WEB REFERENCES:

1. <http://nptel.ac.in/courses/112/107/112107219>

VIII. E-TEXT BOOK:

1. [http://www.fcusd.org/cms/lib/CA01001934/Centricity/Domain/4529/Fundamentals% 20 of% 20 Modern%20Manufacturing%20Materials%20Processes%20and%20Systems%20204th%20Edition.pdf](http://www.fcusd.org/cms/lib/CA01001934/Centricity/Domain/4529/Fundamentals%20of%20Modern%20Manufacturing%20Materials%20Processes%20and%20Systems%20204th%20Edition.pdf)

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Assignments
4. Model question paper – I
5. Model question paper – II
6. Lecture notes
7. PowerPoint presentation