

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Mechatronics (Branch Code - 47)

Year – II (Semester – III) (W.E.F. July 2013)

Subject: Rapid Prototyping & Tooling (734704)

Sr. No.	Content	Hours
1	INTRODUCTION “:Need - Development of RP systems – RP process chain - Impact of Rapid Prototyping and Tooling on Product Development – Benefits- Applications – Digital prototyping – Virtual prototyping	8
2	LIQUID BASED AND SOLID BASED RAPID PROTOTYPING SYSTEMS Stereo lithography Apparatus, Fused deposition Modeling, Laminated object manufacturing, three dimensional printing: Working Principles, details of processes, products, materials, advantages, limitations and applications - Case studies.	10
3	POWDER BASED RAPID PROTOTYPING SYSTEMS Selective Laser Sintering, Direct Metal Laser Sintering, Three Dimensional Printing, Laser Engineered Net Shaping, Selective Laser Melting, Electron Beam Melting: Processes, materials, products, advantages, applications and limitations – Case Studies.	10
4	REVERSE ENGINEERING AND CAD MODELING Basic concept- Digitization techniques – Model Reconstruction – Data Processing for Rapid Prototyping: CAD model preparation, Data Requirements – geometric modeling techniques: Wire frame, surface and solid modeling – data formats - Data interfacing, Part orientation and support generation, Support structure design, Model Slicing and contour data organization, direct and adaptive slicing, Tool path generation	11
5	RAPID TOOLING & APPLICATIONS Classification: Soft tooling, Production tooling, Bridge tooling; direct and indirect – Fabrication processes, Applications. Case studies - automotive, aerospace, Mechanical and electronic industries	11
6	RAPID PROTOTYPING (RP) PROCESSES Photopolymerisation-based technologies (SL, SGC, PolyJet, PerFactory, etc.), selective laser sintering (SLS), ballistic particle modeling (BPM), selective adhesive and hot press (SAHP), three-dimensional printing (3DP), drop-on-demand jet (DODJET), and multi-jet modeling (MJM).	6
	TOTAL	56

Reference Books:

1. Rapid prototyping: Principles and applications, second edition, Chua C.K., Leong K.F., and Lim C.S., World Scientific Publishers, 2003

2. Rapid Tooling: Technologies and Industrial Applications, Peter D.Hilton, Hilton/Jacobs, Paul F.Jacobs, CRC press, 2000.
3. Rapid prototyping, Andreas Gebhardt, Hanser Gardener Publications, 2003
4. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W.Liou, Frank W.Liou, CRC Press, 2007.
5. Rapid Prototyping: Theory and practice, Ali K. Kamrani, Emad Abouel Nasr, Springer, 2006