

**CENTRE FOR ACADEMIC COURSES**  
**ANNA UNIVERSITY**  
CHENNAI – 600 025

**Dr. PREMALATHA RAJAN**  
**DIRECTOR**

18.04.2013

**FOR KIND ATTENTION OF THE HODS OF THE UNIVERSITY DEPARTMENTS**  
**ANNA UNIVERSITY, CHENNAI – 600 025.**

It is hereby informed that the following **REVISED CODE & TITLE** shall be followed for the **B.E. / B.Tech. (FULL – TIME)** Degree Programmes of the University Departments, Anna University, Chennai – 25, under **REGULATION 2012.**

Sl.No.	Branch	Existing Code & Title	Revised Code & Title
<b>Faculty of Electrical Engineering</b>			
1.	Electrical and Electronics Engg.	EI 8751 Bio Medical Instrumentation	EE8025 Medical Instrumentation
2.	Electronics and Instrumentation Engineering	EI 8751 Bio Medical Instrumentation	EI 8703 Bio Medical Instrumentation
<b>Faculty of Mechanical Engineering</b>			
3.	Industrial Engineering	ME 8077 Marketing Management	IE8019 Principles of Marketing Management
		ME 8751 Computer Integrated Manufacturing Systems	IE8018 Computer Integrated Manufacturing Systems
		MF 8074 Industrial Robotics	IE8020 Robotics Engineering
4.	Manufacturing Engg.	MF 8005 Production of Automotive Components	PR8652 Production of Automotive Components
5.	Mechanical Engg.	ME 8751 Computer Integrated Manufacturing Systems	ME8701 Computer Integrated Manufacturing
6.	Aeronautical Engg.	AE 8351 Solid Mechanics	AU8352 Mechanics of Solids
7.	Automobile Engg.	AE 8351 Solid Mechanics	AU8352 Mechanics of Solids
		AU8651 Manufacturing of Automotive Components	AU8018 Manufacturing of Automotive Components
8.	Production Engineering	AU8651 Manufacturing of Automotive Components	PR8652 Production of Automotive Components
		PR8701 Computer Integrated Manufacturing	PR8701 Computer Integrated Production System

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Faculty of Technology			
10.	Chemical Engg.	CY8451 Physical Chemistry	CY8401 Physical Chemistry
	Leather Technology	CY 8351 Instrumental Methods of Analysis	CY8303 Instrumental Methods of Analysis for Leather Technologists
		CY 8451 Physical Chemistry	CY8402 Physical Chemistry for Leather Technology
11.	Rubber & Plastics	AE 8351 Solid Mechanics	AU8352 Mechanics of Solids

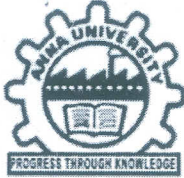
*Premalatha Rajan*  
DIRECTOR (AC)

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**Copy to :**

1. The Chairman, Faculty of Mechanical Engineering, Anna University, Chennai 25.
2. The Chairperson, Faculty of Electrical Engineering, Anna University, Ch-25.
3. The Chairman, Faculty of Technology, A.C.Tech. Anna University, Chennai 25.
4. The HOD's of Electrical / Electronics & Instrumentation Engg. MIT, / Production, MIT / Manufacturing / Automobile, MIT / Leather / Rubber & Plastics / Chemical / Mechanical / Industrial / Aeronautical, Anna University, Chennai.
5. ACOE, Anna University, Chennai 25.
6. DCOE, Anna University, Chennai 25.
7. The – DD/CAC University Department / The Stock File, CAC



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**ANNA UNIVERSITY**  
CHENNAI – 600 025

**Dr. PREMALATHA RAJAN**  
**DIRECTOR**

18.04.2013

**FOR KIND ATTENTION OF THE HOD'S OF THE UNIVERSITY DEPARTMENTS**  
**ANNA UNIVERSITY, CHENNAI – 600 025.**

It is hereby informed that **the following REVISED SYLLABUS shall be followed** for the **B.E. / B.Tech. (FULL – TIME)** Degree Programmes of the University Departments, Anna University, Chennai – 25, under **Regulation 2012.**

Sl.No.	Branches	Revised Syllabus & New Code
1.	B.E. Manufacturing Engineering	1. ME 8073 Design for Manufacturing (Syllabus of Mechanical Engineering has to be followed) 2. ME8074 Design of Jigs, Fixtures and Press Tools (Syllabus of Mechanical Engineering has to be followed) 3. <b>PR8652</b> Production of Automotive Components (Syllabus of Production Engineering has to be followed)
2.	B.E. Industrial Engineering	MF8073 Flexible Manufacturing Systems (Syllabus of Manufacturing Engineering has to be followed)

The copies of the same are enclosed herewith for taking necessary action at your end.

*Premalatha Rajan*  
DIRECTOR (AC)  
18.4.13

**Encl : as above**

**Copy to :**

1. The Chairman, Faculty of Mechanical Engineering, Anna University, Chennai 25.
2. The HOD, Mechanical Engineering, CEG Campus, Anna University, Chennai 25.
3. The HOD, Manufacturing Engineering, CEG Campus, Anna University, Chennai 25.
4. The HOD, Industrial Engineering, CEG Campus, Anna University, Chennai 25.
5. The ACOE, Anna University, Chennai - 25
6. The DD – University Department
7. The Stock File, CAC.



**OBJECTIVES:**

- To understand the principles of design such that the manufacturing of the product is possible.
- To educate students on various design aspects to be considered for manufacturing the products using different processes.

**UNIT I MANUFACTURING METHODOLOGY AND PROCESSES 9**

Methodologies and tools, design axioms, design for assembly and evaluation, minimum part assessment, Taguchi method, robustness assessment, manufacturing process rules, designer's tool kit, Computer Aided group Technology, failure mode effects analysis, Value Analysis, Design for minimum number of parts, development of modular design, minimizing part variations, design of parts to be multi-functional, multi-use, ease of fabrication, Poke Yoke principles.

**UNIT II GEOMETRIC ANALYSIS 9**

Surface finish, review of relationship between attainable tolerance grades and different machining processes, part features-feature of size-control from-placement material condition – MMC – LMC

**UNIT III FORM DESIGN OF CASTINGS AND WELDMENTS 9**

Redesign of castings based on parting line considerations, minimizing core requirements, redesigning cast members by welded structure, use of welding symbols.

**UNIT IV MECHANICAL ASSEMBLY 9**

Selective assembly, deciding the number of groups, control of axial play, examples, Grouped datum systems, different types, geometric analysis and applications, design features to facilitate automated assembly, Assembly analysis worst case Arithmetic method, Monte - Carlo method.

**UNIT V TRUE POSITION THEORY 9**

Virtual size concept, floating and fixed fasteners, projected tolerance zone, assembly with gasket, zero true position tolerance, functional gauges, paper layout gauging, examples. Operation sequence for typical shaft type of components. Preparation of process drawings for different operations, tolerance worksheets and centrality analysis, examples.

**TOTAL : 45 PERIODS****TEXT BOOKS :**

1. Harry pack, "Designing for Manufacture", Pitman Publications, 1983.
2. Matousek, "Engineering Design, - A Systematic Approach" – Blackie & Son Ltd, London, 1974

**REFERENCE BOOKS:**

1. Spotts M.F., "Dimensioning and Tolerance for Quantity Production, Prentice Hall Inc.1983.
2. Oliver R. Wade, "Tolerance Control in Design and Manufacturing ". Industrial Press Inc. New York Publications. 1967.
3. James G. Bralla. "Hand Book of Product Design for Manufacturing". McGraw Hill Publications, 1983.
4. Trucks H.E. "Design for Economic Production". Society of Manufacturing Engineers, Michigan, 2nd edition, 1987.

**OBJECTIVES:**

- To understand the functions and design principles of Jigs, fixtures and press tools
- To gain proficiency in the development of required views of the final design.

**UNIT I LOCATING AND CLAMPING PRINCIPLES****8**

Objectives of tool design- Function and advantages of Jigs and fixtures – Basic elements – principles of location – Locating methods and devices – Redundant Location – Principles of clamping – Mechanical actuation – pneumatic and hydraulic actuation Standard parts – Drill bushes and Jig buttons – Tolerances and materials used.

**UNIT II JIGS AND FIXTURES****10**

Design and development of jigs and fixtures for given component- Types of Jigs – Post, Turnover, Channel, latch, box, pot, angular post jigs – Indexing jigs – General principles of milling, Lathe, boring, broaching and grinding fixtures – Assembly, Inspection and Welding fixtures – Modular fixturing systems- Quick change fixtures.

**UNIT III PRESS WORKING TERMINOLOGIES AND ELEMENTS OF CUTTING DIES****10**

Press Working Terminologies - operations – Types of presses – press accessories – Computation of press capacity – Strip layout – Material Utilization – Shearing action – Clearances – Press Work Materials – Center of pressure- Design of various elements of dies – Die Block – Punch holder, Die set, guide plates – Stops – Strippers – Pilots – Selection of Standard parts – Design and preparation of four standard views of simple blanking, piercing, compound and progressive dies.

**UNIT IV BENDING AND DRAWING DIES****10**

Difference between bending and drawing – Blank development for above operations – Types of Bending dies – Press capacity – Spring back – knockouts – direct and indirect – pressure pads – Ejectors – Variables affecting Metal flow in drawing operations – draw die inserts – draw beads- ironing – Design and development of bending, forming, drawing, reverse re-drawing and combination dies – Blank development for axisymmetric, rectangular and elliptic parts – Single and double action dies.

**UNIT V OTHER FORMING TECHNIQUES****7**

Bulging, Swaging, Embossing, coining, curling, hole flanging, shaving and sizing, assembly, fine Blanking dies – recent trends in tool design- computer Aids for sheet metal forming Analysis – basic introduction - tooling for numerically controlled machines- setup reduction for work holding – Single minute exchange of dies – Poka Yoke.

**TOTAL: 45 PERIODS**

Note: (Use of P S G Design Data Book is permitted in the University examination)

**TEXT BOOK:**

1. Joshi, P.H. "Jigs and Fixtures", Second Edition, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2004.
2. Joshi P.H "Presstools – Design and Construction", wheels publishing, 1996.

**REFERENCES:**

1. K. Venkataraman, "Design of Jigs Fixtures & Press Tools", Tata McGraw Hill, New Delhi, 2005.
2. Donaldson, Lecain and Goold "Tool Design", III rd Edition Tata McGraw Hill, 2000.
3. Kempster, "Jigs and Fixture Design", Hoddes and Stoughton – Third Edition 1974.
4. Hoffman "Jigs and Fixture Design" – Thomson Delmar Learning, Singapore, 2004.

5. ASTME Fundamentals of Tool Design Prentice Hall of India.
6. Design Data Hand Book, PSG College of Technology, Coimbatore.



**OBJECTIVES:**

- To impart knowledge in various manufacturing methods in developing automotive components.
- To study the principle of automobile engineering.

**UNIT I ENGINE****9**

Working principle of two strokes, four stroke and wankel engines – wet and dry liners – Piston and Piston rings – types – classification. Production of – Cylinder block, Cylinder head, liners, oil pan, piston and piston rings and testing.

**UNIT II ENGINE PARTS****8**

Working principle of crank shaft – Cam shaft – valve operating mechanisms – carburetors – spark plug Production of – Connecting rod – Crankshaft – push rod and rocker arm – valves – tappets – carburetors and spark plugs

**UNIT III FUEL AND TRANSMISSION SYSTEM****10**

Working principle of – Fuel pumps – fuel injection pumps of diesel engines – multi point fuel injection system – Gear Box – clutch system – differential mechanism – steering system – braking system. Production of – Friction lining materials for clutch and brakes – propeller shaft – gear box housing – steering column – Energy absorbing steering column.

**UNIT IV CHASSIS AND SUSPENSION SYSTEM****8**

Working principle of – Suspension system – leaf spring and shock absorbers – wheel housing – design concepts of chassis (aerodynamics and cross worthiness) Production of – Brake shoes – leaf spring – wheel disc, wheel rim – usage of non metallic materials for chassis components.

**UNIT V RECENT ADVANCES****10**

Application of sensors and actuators – Emission control system – catalytic converter – Hydro forming of exhaust manifold and lamp housing – stretch forming of Auto body panels – MMC liners – thermal barrier coating of Engine head and valves – Selection of materials for Auto components.

**TOTAL: 45 PERIODS****TEXT BOOKS:**

1. Heldt.P.M, High speed combustion engines, Oxford publishing Co., New York, 1990.

**REFERENCES:**

1. Kirpal Singh, Automobile Engineering ., Vol.I & II, Standard Publishers, New Delhi, 1997.
2. Newton and steels, the motor vehicle, ELBS, 1990
3. Serope Kalpakjian and Steven R. Schmid, Manufacturing Processes for Engineering Materials, Fourth Edition – Pearson Education publications – 2003.
4. Gupta K.M. Automobile Engineering Vol.I & II, Umesh Publishers, 2000.

**OBJECTIVES:**

- To understand the Modern manufacturing systems
- To understand the concepts and applications of flexible manufacturing systems

**UNIT I PLANNING, SCHEDULING AND CONTROL OF FLEXIBLE MANUFACTURING SYSTEMS 9**

Introduction to FMS– development of manufacturing systems – benefits – major elements – types of flexibility – FMS application and flexibility –single product, single batch, n – batch scheduling problem – knowledge based scheduling system.

**UNIT II COMPUTER CONTROL AND SOFTWARE FOR FLEXIBLE MANUFACTURING SYSTEMS 9**

Introduction – composition of FMS– hierarchy of computer control –computer control of work center and assembly lines – FMS supervisory computer control – types of software specification and selection – trends.

**UNIT III FMS SIMULATION AND DATA BASE 9**

Application of simulation – model of FMS– simulation software – limitation – manufacturing data systems – data flow – FMS database systems – planning for FMS database.

**UNIT IV GROUP TECHNOLOGY AND JUSTIFICATION OF FMS 9**

Introduction – matrix formulation – mathematical programming formulation –graph formulation – knowledge based system for group technology – economic justification of FMS- application of possibility distributions in FMS systems justification.

**UNIT V APPLICATIONS OF FMS AND FACTORY OF THE FUTURE 9**

FMS application in machining, sheet metal fabrication, prismatic component production – aerospace application – FMS development towards factories of the future – artificial intelligence and expert systems in FMS – design philosophy and characteristics for future.

**TOTAL: 45 PERIODS****TEXT BOOK:**

1. Jha.N.K., "Handbook of flexible manufacturing systems", Academic Press Inc., 1991.

**REFERENCE BOOKS:**

1. Radhakrishnan P. and Subramanyan S., "CAD/CAM/CIM", Wiley Eastern Ltd., New Age International Ltd., 1994.
2. Raouf A. and Daya B.M., "Flexible manufacturing systems: recent development", Elsevier Science, 1995.
3. Groover M.P., "Automation, production systems and computer integrated manufacturing", Prentice Hall of India Pvt., New Delhi, 1996.
4. Kalpakjian S., "Manufacturing Engineering and Technology", Addison-Wesley Publishing Co., 1995.
5. Ohno T., "Toyota production system: beyond large-scale production", Productivity Press (India) Pvt. Ltd., 1992.