

Subject Code: 1ET4020301	Subject Title: Manufacturing Engineering-I
Pre-Requisite	----

RATIONALE:

This subject of Manufacturing Engineering provides knowledge regarding different types of manufacturing processes used to produce variety of metal products. It also develops understanding to different manufacturing processes so that the high quality component may be produced at low cost and in minimum time, this is important if we want to compete in today's global market. It also provides information about behavior of metal and change in it during different manufacturing process. As a technician the knowledge and practical skills in different manufacturing processes are essential and hence emphasis is also given in this course towards skills development. Further the technician should be able to handle machine, equipment, tools and accessories in the recommended manner and also follow safety precautions.

Course Objective:

1. To produce different job of casting, forming, joining using process parameters and safe working procedures.

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment
3	--	4	5	60	40	40	60

SR. NO.	TOPIC	TOTAL HOURS	WEIGHTAGE (%)
1.	Introduction to manufacturing processes Describe various mechanical properties Explain the basic manufacturing processes. Role of forming, casting and joining processes in manufacturing of industrial components.	06	12
2.	Metal Forming Processes Concept, principles and differences of hot and cold working processes. Classification of forming processes. Rolling, Forging, Spinning, Drawing, Extrusion, Swaging. Types, Working principle, Equipment used and their specifications, Major parts of equipment and their construction of materials and functions, Process parameters, Applications	12	30
3.	Metal joining processes Introduction and classification. Welding: working principle, specifications of equipment and consumables, functions of each element, process parameters for various materials, applications and safety precautions for: i. Gas welding ii. Arc welding (Carbon arc, metal arc, MIG (Metal Inert Gas), TIG (Tungsten Inert Gas), flux coated arc and submerged arc). iii. Resistance welding (butt, spot, seam, projection and percussion). iv. Thermit welding. v. Forged welding. Welding defects -types, causes, effects and remedies. Soldering and Brazing.	12	30

4.	Metal casting processes The need of casting process. Basic concept of foundry process. Types of foundries. Pattern: Importance, Types and materials of construction, Allowances, their need and normal values, Drawings and color codes, Making process, Applications. Cores: Need, Types, Making materials and its properties, Testing methods, Sintering, Applications. Types, working and applications of furnaces. Molding sand: Sand properties, Sand mixing, Sand binders. Molding equipment, their major specifications and applications Types of mould, mould making, mould sintering and applications of mould. Casting processes: basic principle, working, process parameters and applications. Centrifugal, Die, Investment, Shell molding Casting defects -types, causes, effects and remedies. Safety precautions in foundry	12	28
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Course Outcome:

The students will be able to

1. Understand the basic concept of Manufacturing Engineering.
2. Know about the basic manufacturing engineering and their applications.
3. Understand Forming, Joining and Casting process and their parameters.

List of Practical/Experiments:

- 1 Visit a nearby Rolling mill/Hot-Cold material processes, allied manufacturing processes industry and prepare a two page report comprises of details(type, material, process, etc) of items produced, quantities, different sections, equipments used with specification, process parameters being used and consumables.
2. Demonstration of metal melting, metal pouring, metal casting and casting finishing.
3. Prepare a pattern drawing, pattern and core from the given component/drawing.
4. Prepare a mould using prepared pattern, core and moulding sand. Also pour molten metal and get the casting.
5. Prepare a jobs using metal arc welding.
6. Prepare a jobs using spot welding.
7. Prepare two jobs, one using soldering and another using brazing.
8. Prepare a jobs using hot forging/hot smithy process.

List of References:

1. Production Technology, R.K. Jain and S.C. Gupta, Khanna publication
2. Workshop Technology I & II, Raghuwanshi, Dhanpat Rai and Sons
3. Foundry Engineering , P. L. Jain, Tata MacGraw Hill Education
4. Principle of Foundry, Jain & Gupta, National Book Trust, India

List of Software/Learning Websites:

1. http://thelibraryofmanufacturing.com/forming_basics.html
2. http://www3.nd.edu/~manufact/MPEM%20pdf_files/Ch07.pdf
3. www.ielm.ust.hk/dfaculty/ajay/courses/ieem215/lecs/3_forming.pdf
4. www.youtube.com/watch?v=HkjDMdp9KVU
5. <http://www-old.me.gatech.edu/jonathan.colton/me4210/casting.pdf>
6. [http://www.youtube.com/watch?v=6xnKmt_gsLs\(HotRolling\)](http://www.youtube.com/watch?v=6xnKmt_gsLs(HotRolling))
7. [http://www.youtube.com/watch?v=9MU0vSN_w-A\(Coldrollforming\)](http://www.youtube.com/watch?v=9MU0vSN_w-A(Coldrollforming))
8. [http://www.youtube.com/user/IGEJohannesen?feature=watch\(ChannelForweldingvideos\)](http://www.youtube.com/user/IGEJohannesen?feature=watch(ChannelForweldingvideos))
9. [http://www.youtube.com/watch?v=SDJdiNeDXto\(IntroductiontoWelding\)](http://www.youtube.com/watch?v=SDJdiNeDXto(IntroductiontoWelding))
10. [http://www.youtube.com/watch?v=CJ42scaWFnw \(Brazing video\)](http://www.youtube.com/watch?v=CJ42scaWFnw (Brazing video))