

4236 - FABRICATION PROCESS –II										
Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)					
Lectures	Practical	Credits			Theory		Practical Ex.		Total	
3	4	7	25	50	3Hrs	100	50		225	
Pre-requisite		Source	Semester	Theory						
4233		FAB		Theory	Test	Total	TW	PR	Gr Total	4
				75	25	100	50	50	200	

RATIONALE: - This course is a continuation of Fabrication Process-I. The course lays stress on straightening and cutting operations both manual and using machinery. Operations of drilling, milling, shaping and grinding are also included in this course as they also fall under the broad category of cutting or removal of the material. The course is intended to bring the students nearer to the fabrication industrial situation, enabling him to develop an appreciation of the real life experiences, which he would encounter later in his day to day work.

COURSE CONTENTS		Hrs	Mks
-----------------	--	-----	-----

1. STRAIGHTENING METHODS	3	6
Mechanical straightening- Manual straightening- Use of different tools and techniques with respect to different materials (Aluminium, stainless steel, carbon steel, etc.); Machine straightening- Use of presses.		
2. CUTTING PROCESS	4	8
Principle of shearing: Shearing angle, rake angle of blades, clearance between cutting edges, actuation of moving machines (brief description). Straight cutting machines (brief description)- Bench shearing machine, treadle guillotine machine, power guillotine machine. Setting of guillotine (demonstration). Operations on the guillotine (demonstration). Safety precautions during operations.		
3. ROTARY SHEARING MACHINE	3	4
Advantages of rotary shearing machines. Types of rotary shearing machines: Parallel shaft machine, inclined shaft machine. Shearing essential features.		
4. NIBBLERS	2	4
Portable Nibblers (brief description and use), shear type and punch type.		
5. CROPPING AND NOTCHING MACHINE	2	4
Meaning of cropping. Necessity for notching in angle sections. Universal steel shearing, for cropping angles, Tee, round, square bars, punching holes and cutting, notches. Safety precautions in use.		
6. CENTRE LATHE	4	8
Size of lathe, cutting tools used, holding tools used, operations on lathe, work suited, finishes and methods of obtaining them and safety precautions.		
7. DRILLING AND BORING MACHINES	6	12
Brief description of types of drilling machines: Radial, vertical, gang. Work suited to above each type. Types of holes and drill bits: Stepped, countersunk, spot face, reaming, tapping. Different types of drill bits used for materials such as wood, metal and concrete. Cutting speeds and feeds. Portable drilling machine- Electrical, pneumatic, rotary, rotary – percussion. Types of boring machines: Vertical, horizontal, line boring. Work holding devices. Safety aspects.		
8. MILLING MACHINE	4	8
Types (brief description and uses): Horizontal type, vertical type, bed type, knee and column type. Brief description of cutting action. Types of cutters. Mounting of milling cutters. Milling techniques. Safety in working.		
9. SHAPING MACHINE	3	6
Brief description of standard shaper. Work holding devices (plates and structural shapes). Tools used. Shaper operations. Cutting speed, feed, depth of cut. Safety in operation.		
10. PLANNING MACHINE	2	6
Brief description of machine. Tools used. Planner operations. Cutting speed, feed and depth of cut. Comparison of shaper with planner.		
11. GRINDING MACHINE	5	12
Types (brief description): Surface grinding machine, cylindrical grinding machine, taper grinding machine, work holding methods, finish, surface texture and accuracy obtainable, portable grinding machine, electrical, pneumatic, types of grinding wheels, specification, angle grinder, sanders, buffing and polishing machines, safety precautions.		
12. FLAME CUTTING – APPLICATIONS AND MACHINES	5	12
Applications of flame cutting by hand. Technique of cutting thick plates near edges. Technique of cutting away from edge. Technique of cutting of round bar. Use of		

attachments in hand cutting to ensure steady rate and to cut along desired lines, such as cutting along straight lines, small circles, large circles and other shapes. Rivet removal. Removal of defective weld by gouging. Flame cutting machines (brief description and use). Portable cutting machine with one or more cutting torches. Profile cutting machine. Template allowance. C.N.C. cutting machines. Optical tracing. Computer tapes.

13. PLASMA ARC CUTTING	3	5
Principle: Equipment and supplies. Procedure.		
14. SPECIAL CUTTING AND BEVELLING MACHINES	2	5
Portable sawing machines, rotary, reciprocating. Plate edge preparation machines (Bevellers). Pipe end-bevelling machines.		
Total	48	100

TERM WORK

Job

Cutting an angle 70 mm x 70 mm x 6 mm and of length one meter, straightening it, cutting notches at its ends and piercing slots and holes by hand flame cutting, drilling holes and grinding as per drawing.

One simple turning job involving operations like facing, stepping turning, taper turning and threading.

One shaping job involving straight and inclined shaping of a block.

Use of portable flame cutting machine.(demonstration only).

One milling job involving plain and angle milling of 10-mm thick plate.

Practice of bevelling of edges by hand flame cutting and a job involving bevel edge preparation and drilling of holes as per drawing.

One job involving marking, shearing and drilling a Gusset plate as per drawing.

Practice of cutting 2mm thick sheet on a marked contour by using portable nibbling machine.

Notes: Each student should maintain a journal in which reports of each job done and experience gained should be systematically recorded. Practical examination will be of 3 hours duration on a composite job/jobs involving different machining operations mentioned in the curriculum and bevelling of edges by hand flame cutting.

REFERENCE BOOKS

1. Basic Fabrication and Welding Engineer by Smith F.J.M. Longman
2. Technician Fabrication and Welding by Cooper K.J. Greenwood (Cassel series)
3. Basic Welding and Fabrication by Kenyon W. Pitman
4. Workshop Technology by Hajra Choudhary S. K. (Asia)
5. Technician Manufacturing Technology by Shotbolt C.R. Cassell
6. Machine Manuals from manufacturers
7. Modern Welding by A. D. Althouse, C. H. Turnquist & W. A. Bowditch, The Good heart, Willcox Co

