4233 Fabrication Process - I

Lectures	Practical	Credits	Assessment		Theory		Practical Ex.	Total
3	2	5	25	25	3Hrs	100	-	150

Pre-requisite	Source	Semester	Theory	Test	Total	TW	PR	Gr Total
2008	FAB	4	75	25	100	25	-	125

RATIONALE: - The technician engaged in Fabrication and Erection Industry is required to use a variety of measuring instruments during the manufacture and inspection of jobs. He must also be well versed in the skill of marking of, different types of sections and ensure proper alignment during the assembly and erection. He should possess the knowledge of metal sawing and flame cutting processes, which the material has to undergo before further processing. The curriculum is designed to provide the knowledge and skill required in handling the instruments, besides developing practical skill in marking, metal sawing and flame cutting. The course is a pre-requisite for further practice of fabrication.

COURSE CONTENTS	Hrs	Mks
1. MEASUREMENT	20	40

Introduction: Physical measurements, precision and accuracy, sources of errors, calibration and classification of measurements. Standard of measurements: Introduction to standards, line standards, end standards, wave length standards, angular standards. Direct eye measurements. Linear measurements: Engineer's rule, steel tapes, use of steel rule and tape, possible error with eye measurement. Vernier Calliper: Principle of Vernier Calliper, application of Vernier Calliper, precaution in usage. Vernier height gauge: Description, use of height gauge, precaution in usage. Vernier depth gauge. Micrometers (Internal and external): Principle of micrometer, use of micrometer, precaution in usage. Radius gauges. Feeler gauges. Engineers tape, wire and thickness gauge. Pitch gauges. Bore gauge. Angular measurements: Engineer's protractor, Vernier protractor, Universal level protractor, use of spirit level for angular measurement. Datum measurement: Vertical datum: plumb line, use of plumb line. Horizontal datum: Spirit level, water line, use of spirit level, use of water line. Alignment testing: Use of tensioned wire, alignment telescopes, surveyors level. Geometric shape: Introduction, straightness testing: Straight edge method, spirit level method. Flatness testing: Comparison with flat surface, use of spirit level. Squareness testing: Engineer's square, block square, methods of testing. Roundness measurement: Fixture and dial indicator method. Dial Indicators or Dial gauges- Introduction, types of dial indicators, requirements of good dial indicator. Advantages of good dial indicators. Care of dial indicators. Bore gauge: Construction, use. Limits and fits: Requirements for system of limits and fits to be successful, basic dimension, different ways of expressing tolerances, definitions: nominal size, zero line, actual size, limits, tolerance, fit and types of fits. ISO system of designation of limits and fits. Limit gauges: Plain plug gauges, snap gauges and contour gauges.

2. MARKING 18 35

Tools used in marking: Scriber, use of scriber, possible error when using scriber. Scribing block: Parts of scribing block, use of scribing block. Scratch gauge: Construction, use of scratch gauge. The bevel: Construction, use of bevel. Dividers and compasses: Various sizes of dividers, use of dividers. Beam trammels: Construction, use of beam trammels. Pencils. Ink markers. Angle plates. 'Vee' block. Engineer's square. Pipe square. Box angle plate, Adjustable swivel angle block, Nipple punch, Dot punch. Marking methods for large size plates. Methods of marking out bolt holes for flanges. Data for marking out pipe flanges, constant for bolt hole location (flanges), procedure for marking. Marking out from datum & centre lines: Procedure for marking out a bracket from a datum surface, procedure for marking out an instrument panel. Use of chalk line for marking long straight line. The need of templates. Materials used for templates. Information given on templates. Use of templates. Templates as a means of checking. Protection and storage of templates and tools. Templates for setting out sheet

metal fabrication. Templates for copper plates. Box templates. Steel templates (ordinary and bushed). Marking of holes in angle sections. Marking of holes in channel sections. Marking of holes in "Tee" sections. Marking of holes in column or beams. Basic method of laying out templates. Comparison of the method of direct marking and use of templates.	4	10
3. METAL SAWING Brief description of sawing and abrasive cutting machines: Reciprocating power hacksaws, circular metal saw, table sawing machine, band sawing, and abrasive cutting disc. Practical examples of use. Advantages and disadvantages of each method. Safety precautions during operation.	6	15
4. INTRODUCTION TO FLAME CUTTING Basic principles of flame cutting. Flame cutting equipment: Outlet pressure of oxygen, fuel gas used- Propane, and natural gas acetylene, LPG. Cutting torch details for each type of fuel gas. Nozzle mix cutting torch. Flame adjustment: Procedure for lighting the cutting torch, adjustment of flame, procedure to extinguish the flame. Factors influencing the quality of cut. Comparison of flame cutting with shearing.		
Total	48	100

TERM WORK

Job	Hrs
Study of various measuring instruments mentioned in the syllabus.	2
Measurement of actual parts with the measuring instruments studied in job 1.	1
Study of various marking tools mentioned in the syllabus	2
Study of Power hacksaw machine, marking to exact length a given rolled section and cutting it on the power saw.	2
Marking bolt holes on job 4 to exact given dimensions and drilling the holes.	1
Marking a wooden templates of a given gusset plate sketch and marking the same on the steel plate.	1
Study of oxy-acetylene flame cutting set.	1
Exercise on opening of the flame cutting set, lighting of the cutting torch, adjusting the flame, putting off the torch, and closing the set.	1
Practice of flame cutting on steel scrap.	1
Cutting the marked gusset plate in job 6 with flame cutting and drilling the holes	1
One job involving marking, hand sawing, filling, drilling and gas cutting, with inspection report.	3
Total	16

Notes- The student should maintain a journal for each job done, in which, the procedure adopted and whatever studied during practical classes should be clearly and systematically recorded. Undue weightage for a particular sub-topic should be avoided

REFERENCE BOOKS

1. Basic Fabrication and Welding Engineer by Smith F.J.M. Longman
2. Technician Fabrication and Welding by Coóper K. J. Greenwood (Cassell series)
3. Basic Welding and Fabrication by Kenyon W. Pitman
4. Workshop Technology by Hajara Choudhary S.K. (Asia)
5. Technician Manufacturing Technology by Shotbolt C.R. Cassell
6. Engineering Metrology by R. K Jain
7. Modern Welding by A. D. Althouse, C.M. Twrnquist, and W.A. Bowditch
8. Welding Skills and Technology by Dave Smith

4234 - FABRICATION DRAWING		
Teaching Schedule Per Week	Progressive	Examination Schedule (Marks)