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3-Year Diploma Engineering Curriculum and
Syllabus for Mechanical Engineering (ME)

THIRD SEMESTER

Course Code	Course Title	Contact Hrs. / Week			Credit
		L	T	P	
Theory					
TIUSD-301	Career Advancement & Skill Development-III	2	1	0	3
TIUDEV-302	Environmental Engineering	2	1	0	3
TIUDCS-303	Programming in C	2	1	0	3
TIUDME-304	Mechanics of Materials	2	1	0	3
TIUDME-305	Heat Power – I	2	1	0	3
TIUDME-306	Machine Tool-I	2	1	0	3
Practical					
TIUDCS-391	Programming in C Lab	0	0	3	2
TIUDME-392	Mechanical Engineering Lab	0	0	3	2
TIUDME-393	Mechanical Engineering Drawing	0	0	3	2
TIUDME-394	Mechanical Engineering Workshop – I	0	0	3	2
Sessional					
TIUCSL-381	Entrepreneurship & Skill Development-III	0	0	2	2
Total Credits					28

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Environmental Engineering
TIUDEV-302

L-T-P: 2-1-0 **Credit: 3**

GROUP – A AIR & ENVIRONMENT

Module 1 INTRODUCTION

Man & Environment: Overview (socio-economic structure & occupational exposures) – Scope of Environmental Engineering – pollution problem due to urbanisation & industrialisation

Module 2 AIR POLLUTION

Causes of air pollution – types & sources of air pollutants – Climatic & Meteorological effect on air pollution concentration – formation of smog & fumigation

Module 3 ANALYSIS OF AIR POLLUTANTS

Collection of Gaseous Air Pollutants – Collection of Particulate Pollutants – Analysis of Air Pollutants like: Sulphur dioxide – Nitrogen oxide – Carbon monoxide – Oxidants & Ozone – Hydrocarbons – Particulate Matter

Module 4 AIR POLLUTION CONTROL MEASURES & EQUIPMENT

Control of Particulate Emission – Control of Gaseous Emission – Flue Gas Treatment Methods: Stacks Gravitational and Inertial Separation, Settling Chambers, Dynamic Separators, Cyclones, Filtration, Liquid Scrubbing, Spray Chambers, Packed Towers, Orifice and Venturi Scrubbers, Electrostatic Precipitators, Gas/solid Adsorption, Thermal Decomposition

Module 5 METHODS & APPROACH OF AIR POLLUTION CONTROL

Controlling smoke nuisance — Develop air quality criteria and practical emission standards — creating zones suitable for industry based on micrometeorology of air area — Introducing artificial methods of removal of particulate and matters of waste before discharging to open atmosphere

GROUP – B WATER & ENVIRONMENT

Module 6 WATER SOURCES

Origin of wastewater — Type of water pollutants and their effects

Module 7 DIFFERENT SOURCES OF WATER POLLUTION

Biological Pollution (point & non-point sources) – Chemical Pollutants: Toxic Organic & Inorganic Chemicals – Oxygen demanding substances – Physical Pollutants: Thermal Waste –

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Radioactive waste – Physiological Pollutants: Taste affecting substances – other forming substances

Module 8 WATER POLLUTION & ITS CONTROL

Adverse effects on**:** Human Health & Environment, Aquatic life, Animal life, Plant life — Water Pollution Measurement Techniques – Water Pollution Control Equipments & Instruments – Indian Standards for Water Pollution Control

GROUP – C SOIL & ENVIRONMENT

Module 9 SOIL POLLUTING AGENCIES & EFFECT OF SOLUTION

Liquid & Solid Wastes – Domestic & Industrial Wastes – Pesticides – Toxic**:** Inorganic & Organic Pollutants – Soil Deterioration – Poor Fertility, Septicity, Ground Water Pollution, Concentration of Infecting Agents in Soil

Module 10 SOLID WASTE DISPOSAL

Dumping domestic & Industrial Solid Wastes: Advantages & Disadvantages – Incineration: Advantages & Disadvantages – Sanitary Land Field: Advantages & Disadvantages – Management of Careful & Sanitary Disposal of Solid Wastes

GROUP – D NOISE & ENVIRONMENTAL MANAGEMENT SYSTEM

Module 11 NOISE POLLUTION & CONTROL

Noise Pollution: Intensity, Duration – Types of Industrial Noise – Ill effects of Noise – Noise Measuring & Control – Permissible Noise Limits

Module 12 ENVIRONMENTAL LEGISLATIONS, AUTHORITIES & SYSTEMS

Air & Water Pollution Control Acts & Rules (Salient Features only) – Functions of State / Central Pollution Control Boards – Environmental Management System: ISO 14 000 (Salient Features only)

REFERENCE BOOKS:

1. Concept of Ecology / Kormondy / Prentice Hall of India, New Delhi
2. Fundamental of Ecology / Odum
3. Environmental Science / J. Turk & A. Turk
4. Human Rights – A Source Book Eds. / R. Dev & S. Das / NCERT
5. Environmental Pollution / Dix
6. Pollution Control Acts, Rules and Notification / Central Pollution Control Board, New Delhi

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Programming in C
TIUDCS-303

L-T-P: 2-1-0 **Credit: 3**

GROUP – A

Module 1 OVERVIEW OF PROGRAMMING

1.1 STEPS IN PROGRAM DEVELOPMENT: Problem identification – Task analysis – Data analysis inputs and outputs

1.2 Use of flow chart, program coding, testing, debugging and executing

1.3 Place of C in computer language

Module 2 DATA TYPES & VARIABLES

2.1 DATA TYPES: Constants – Variables

2.2 Variable declaration

2.3 STORAGE CLASS SPECIFICATION: Auto – Static – Extern – Register

2.4 Type modifiers

Module 3 EXPRESSIONS, OPERATORS & ASSIGNMENT STATEMENTS

3.1 OPERATORS: Arithmetic – Increment – Decrement – Relational – Logical – Conditional – Bit Wise

3.2 Precedence of operators

3.3 Expressions and type conversion in expressions – Type casting

3.4 Assignment statements

Module 4 CONTROL STATEMENTS

4.1 If – Nested if – The if-else-if ladder

4.2 The '?' operator as an alternative to 'if'

4.3 Loop Control Structure: while – for – do-while – Nesting of loops

4.4 Switch

4.5 Break and continue statements

4.6 Exit( ) function

4.7 goto.

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Module 5 CONSOLE I / O

5.1 UNFORMATTED CONSOLE I / O FUNCTIONS: getchar ( ) – getch ( ) – getche ( ) – putchar ( ) – putch ( ) – gets ( ) – puts ( )

5.2 FORMATTED CONSOLE I / O: printf ( ) – sprintf ( ) – scanf ( ) – sscanf ( ).

GROUP – B

Module 6 ARRAYS

6.1 Declaration and initialisation – One-dimensional – Two dimensional

6.2 Array element access and display

Module 7 FUNCTIONS

7.1 Utility of function

7.2 Declaration and prototypes

7.3 Function arguments – The return statement

7.4 FUNCTION CALL: Call by value – Call by reference – Recursive function

7.5 Scope rules of functions

Module 8 POINTERS

8.1 '&' and '*' operators

8.2 Pointer expressions – Pointer assignments – Pointer arithmetic

8.3 DYNAMIC ALLOCATION FUNCTIONS: Malloc and Calloc

8.4 Pointer versus Array

8.5 Arrays of pointers

8.6 Pointers to pointers.

Module 9 STRUCTURES, UNIONS & USER DEFINED VARIABLES

9.1 BASICS OF STRUCTURE: Declaring a structure – Referring structure elements – Array of structure

9.2 Passing a structure to a function — Structure within structure

9.3 Structure pointers

9.4 UNION BASICS: Declaration – Referring union elements

9.5 Uses of structure and unions

9.6 Enumerated data type and type definition

9.7 Function returning pointer

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Module 10 FILE HANDLING

10.1 File pointer

10.2 FILE ACCESSING FUNCTIONS: fopen ( ) – fclose ( ) – fputc ( ) – fgetc ( ) – feof ( ) – ferror ( ) – fprintf ( ) – fscanf ( ) – fgets ( ) – fputs ( ) – fflush ( ).

10.3 fseek ( ) – ftell ( ).

GROUP – C

Module 11 C PRE-PROCESSOR

11.1 Macro directives

11.2 Inclusive directives

11.3 Conditional compilation directives: #ifdef – #ifndef – #else – #endif – #if – #elif

Module 12 C STANDARD LIBRARY & HEADER FILES

12.1 HEADER FILES: stdio.h – ctype.h – string.h – math.h – stdlib.h – stdarg.h – conio.h (uses of these files)

12.2 Standard library functions (names of the categories and utilities)

12.3 MATHEMATICAL FUNCTIONS: abs ( ) – cos ( ) – sin ( ) – exp ( ) – log ( ) – pow ( ) – sqrt ( ) – tan ( ).

12.4 STRING FUNCTIONS: strcat ( ) – strcmp ( ) – strcpy ( ) – strlen ( ) – strstr ( ) – strrev ( ) – strset ( ) – strupr ( ) – strlwr ( ).

REFERENCE BOOKS:

1. The C Programming Language / Kernigham & Ritchie / McGraw-Hill
2. C Programming and Practices / Tim Grady / McGraw-Hill
3. Let us C / Y.T. Kanetkar / BPB
4. C Made Easy / H. Schieldt / McGraw Hill
5. A first course in programming with C / T. Jeyapoovan / Vikash Publishing House
6. Programming in ANSI C (edition 2.1) / E Balaguruswamy / Tata McGraw-Hill

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Mechanics of Materials

TIUDME-304

L-T-P: 2-1-0 **Credit: 3**

GROUP – A

Module 1 ***Stress and strain***

1.1 Lateral strain, poisons ratio, volumetric strain, bulk modulus

1.2 Shear stress- shear strain, modulus of rigidity

1.3 Elastic constants and their relationship

1.4 Problem connecting lateral and linear deformation

Module 2 ***Thin cylinder and spherical shells***

2.1 Definition of thin & thick shells, failure of thin cylinder shells subjected to internal pressure, failure of spherical shell subjected to internal pressure

2.2 Derivation of hoof stress and longitudinal stress

2.3 Problem considering efficiency of longitudinal and circumferential joints of the shell.

GROUP – B

Module 3 ***Deflections of beams***

3.1 Deduction of maximum deflection and slope for cantilevers with: —

(a) point load at free ends,
(b) point load at any position,
(c) uniformly distributed load throughout the length.

3.2 Deduction of maximum deflection and slope of simple supported beam with: —

(a) point load at mid span,
(b) uniformly distributed load throughout the length,
(c) combination of (a) & (b) using standard formula.

3.3 Problems

Module 4 ***Columns and struts***

4.1 Problems using Euler's formula for long column (no deduction)

4.2 Problems using Rankine – Gordon's formula (no deduction).

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G R O U P – C

Module 5 ***Torsion of solids and hollow circular shafts***

5.1 Introduction – theory of torsion and assumptions, derivation of torsion formula, polar modulus, torsional rigidity

5.2 Power transmission

5.3 Strength and stiffness of shafts

5.4 Comparison of hollow and solid shafts – advantage of using a hollow shaft

5.5 Problems

Module 6 ***Springs***

6.1 Types of springs, uses

6.2 Closely coiled helical spring subjected to axial load, shear stress, deflection, stiffness, strain energy stored for closely coiled helical spring

6.3 Spring in series & parallel

6.4 Simple problem.

Heat Power-I
TIUDME-305

L-T-P: 2-1-0 **Credit: 3**

G R O U P – A

Module 1 ***Introduction – Definition of heat power, definition of thermodynamics -***

1.1 Sources of energy used in heat power – a) coal, b) oil, c) gases

1.2 Development of Heat engines (brief discussion) – a) external combustion engines, b) internal combustion engines

1.3 Fundamental concept – system – boundary – surrounding a) closed system, b) open system, c) isolated system, flow system , non-flow system

1.4 State of a system – properties – intrinsic and extrinsic properties

1.5 Path - process

1.6 Equilibrium – a) Mechanical, b) Thermal, c) Chemical, d) Thermodynamic equilibrium.

1.7 Cycle – Thermodynamic cycle, Mechanical cycle

1.8 Units – Absolute & gravitational system of units – a) S.I. units, b) M.K.S. Gravitational units – Weight

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1.9 Pressure – Definition, Units – S.I. and M.K.S. – Pascal, bar, torr – Kgf/cm^2 standard atmospheric pressure – gauge pressure, absolute pressure – simple problems.

1.10 Temperature - Definition, units – Zeroeth Las of Thermodynamics, Instruments used for measuring temperature.

1.11 Meaning of N.T.P. and S.T.P.

1.12 Work – Definition of work from thermodynamic point of view - representation of work on P-V diagram and units

1.13 Power – Definition – KW and HP, relation between KW and HP

1.14 Energy – Definition – Stored energy – units i) Potential, ii) Kinetic, iii) Internal energy – b) transitional energy – Heat and Work.

1.15 Flow work or energy of flow

1.16 Heat - Definitions and units – similarities between heat and work

1.17 Specific heat at constant pressure (Cp) and Specific heat at constant volume (Cv), Adiabatic Index (Cp/Cv)

1.18 Enthalpy

1.19 First Law of thermodynamics - Mechanical equivalent of heat, - perpetual motion machine of first kind (PMMI)

1.20 General Energy - equation for steady flow system and associated energy terms – S.F.E.E. – applicable to - a) nozzle, b) boiler, c) steam turbine, d) compressor (No Problem)

1.21 Simple energy equation for non-flow process (Q – W) = E

1.22 Limitation of 1st. Law of thermodynamics – a) heat engine and b) heat pump – efficiency of heat engine, C.O.P. and E.P.R.

1.23 2nd law of thermodynamics – statement (Clausius & Kelvin-Planck)

1.24 Perpetual motion M/c of 2nd (PMM-II)

G R O U P – B

Module 2 PROPERTIES OF GASES

2.1 Difference between gas and vapour – critical temperature and pressure, difference between perfect gas and real gas

2.2 Equation of state – PV = MRT - characteristic gas constant – units, Physical significance of characteristic gas constant – universal gas constant.

2.3 Relation between two Specific heats with characteristic gas constant.

2.4 Entropy – concept – analogy of heat energy with work – concept of T – Q plane – units of entropy. Entropy change of a perfect gas in terms of a) T – V , b) P – V and c) P and T.

2.5 Non-flow process of perfect gas, P-V and T-Q diagram, relation between pressure and temperature, volume and work done , change of I.E., heat transfer, change of entropy for the following processes

(a) Isochoric process

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(b) Isobaric process
(c) Isothermal process
(d) Adiabatic process
(e) Polytropic process

2.6 Problems on processes

GROUP – C

Module 3 STEAM

3.1 Formation of steam, change of state, T-S diagram

3.2 BASIC TERMS AND PROPERTIES OF STEAM: Saturation temperature, saturation pressure, dry, wet and superheated steam, dryness fraction, degree of superheat, sensible heat or liquid enthalpy, enthalpy of evaporation or latent heat of evaporation, enthalpy of dry saturated, wet, superheated steam, specific volume, entropy of water, evaporation and steam (dry, wet & superheated)

3.3 Throttling of steam (concept only)

3.4 Steam table – its use, problems using steam tables

3.5 Enthalpy- Entropy chart (Mollier – chart) – its use

3.6 Steam calorimeters, types, principle for calculation of dryness fraction in:
(a) throttling calorimeter
(b) separating and combined calorimeter

Module 4 BOILERS (STEAM GENERATOR)

4.1 Classification

4.2 Fire tube & water tube boiler, working principle, difference, applications

4.3 Basic requirements for running a boiler, draught types, calculation of chimney heights, problems

4.4 Important boiler mountings and accessories – name, functions

4.5 Feed pump, super heater, economizer, air pre-heater, functions

4.6 Feed water treatment

4.7 Boiler performance – problems

4.8 Modern high pressure boiler & its characteristics

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Machine Tool-I

TIUDME-306

L-T-P: 2-1-0 **Credit: 3**

GROUP – A

Module 1 GENERAL INTRODUCTION

1.1 Metal cutting machine tools – definitions, classifications, elements, purpose and accuracy
1.2 Machine tool drives – elements, classifications, individual vs group drive

Module 2 METAL CUTTING

2.1 Cutting tools materials – Properties and uses – Cutting tool life – Equation for cutting tool life – Factors for cutting tool life.
2.2 Cutting tool classifications, nomenclature of a single point cutting tool, tool angles and its influence
2.3 Forces acting on a single point cutting tool, orthogonal and oblique cutting
2.4 Concept of chip formation, types of chips
2.5 Coolant used in metal cutting

GROUP – B

Module 3 LATHE AND LATHE WORKS

3.1 LATHE- working principle, types, specifications
3.2 Centre lathe – principal parts and their functions
3.3 Lathe drives – cone pulley, back gear, all geared drive
3.4 Lathe attachment and accessories
3.5 Different mechanisms – apron mechanism, feed mechanism
3.6 Different operation on lathe
3.7 Taper turning methods, working principle and calculations, simple problems
3.8 Thread cutting – gear calculation, tool setting, measurement of thread sections, arrangement in cutting, problems
3.9 Cutting speed, feed, depth of cut – definitions, machining time calculation, depending factors, simple problems.

Module 4 CAPSTAN AND TURRET LATHE

4.1 Comparison between capstan and turret lathe
4.2 Specifications of capstan and turret lathe

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4.3 Capstan lathe parts – turret with indexing mechanism, turret slide & base only
4.4 Job holding devices – chucks, collets, bar feeding mechanism
4.5 Tool holding devices – roller steady box, knee tool holder & self-opening die.

GROUP – C

Module 5 DRILLING MACHINE

5.1 Specifications and types
5.2 Constructions – pillar drill and radial drill only
5.3 Different operation in drilling machine
5.4 Drill – nomenclature of twist drill, types
5.5 Reamers – types, nomenclature
5.6 Tap drill size, calculation only
5.7 Cutting speed, feed, depth of cut, drilling time, calculations
5.8 Work holding devices – drill jig, vice, v-block, direct clamping on table

Module 6 BORING MACHINE

6.1 Principle, types, constructional features, accuracy achieved & uses
6.2 Boring machines – operations, tool required
6.3 Tool holding and job holding devices

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Programming in C Lab
TIUDCS-391

L-T-P: 0-0-3 **Credit: 2**

1. To do exercise on data type conversion, use of variable of different types.
2. To write simple program using expression, assignment statements and different types of operators.
3. To write simple programs using control statements**:** if, switch, conditional operator, for, while, do-while, break and continue statements.
4. Familiarity with formatted and unformatted console I / O with simple programs.
5. To write program using 1D and 2D arrays, sorting and matrix manipulation.
6. Write programs on function, using function prototype declaration, function definition, with or without arguments, returning value or no value, call by value and call by reference, recursive functions.
7. To write program using pointer (int, float and character type) using malloc and calloc functions, pointer to pointer, pointer to function.
8. To write program using structure, accessing structure elements, array of structure, passing structure to function and using structure pointers, using unions, accessing union elements, using structure and union in same function, to write programs on enunciated data type and familiarity with type definition.
9. To write program using different file function.
10. To write program using different macro definition, file inclusion and conditional compilation.
11. To write program using string function and math function.
12. To realize Int86 functions.

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Mechanical Engineering Lab - I
TIUDME-392

L-T-P: 0-0-3 **Credit: 2**

LIST OF EXPERIMENTS:

1. Tension test on a mild steel rod
2. Double shear test on Mild steel and Aluminium rods
3. Torsion test on mild steel rod
4. Impact test on metal specimen
5. Hardness test on metals - Brinnell and Rockwell Hardness Number
6. Deflection test on beams
7. Compression test on helical springs
8. Strain Measurement using Rosette strain gauge
9. Effect of hardening- Improvement in hardness and impact resistance of steels.
10. Tempering- Improvement Mechanical properties Comparison

(i) Unhardened specimen

(ii) Quenched Specimen and

(iii) Quenched and tempered specimen.

11. Microscopic Examination of Hardened samples and

(ii) Hardened and tempered samples.

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Mechanical Engineering Drawing
TIUDME-393

L-T-P: 0-0-3 **Credit: 2**

PLATE NO. 1

- SECTIONAL VIEWS**:** To draw different (Front view, Side view & Top view) Orthographic & sectional views from given isometric views of casting & machine parts (At least 6 problems).
- INTERPRETATION OF VIEWS**:** To draw different view including sectional views from given orthographic views (at least 4 problems)

PLATE NO. 2

- Development of surface like hopper, funnel, tray, oblique pyramid, oblique cone & oblique cylinder.

PLATE NO. 3 THREADS NUTS AND BOLTS

- To draw free hand sketch of a screw thread showing various parts and conventional representation, the method of designating and dimensioning of metric screw threads.
- To draw free hand sketch mentioning proportion and use of following thread profile
  I.S.O metric screw thread – internal and external ii) B.S.W iii) B.S.P iv) B.A v) Square vi) ACME vii) Knuckle viii) Buttress
- To draw three views of a hexagonal bolt of given diameter fitted with washer and nut
- To draw free hand sketch of the following bolts (any one)
  i) Square headed bolt with square neck; ii) Cheese headed bolt; iii) Tee headed Hook; iv) Lifting eye; v) Stud; vi) Foundation.
- To show by means of neat sketch & sectional views of: i) the drilled hole ii) tapped hole
- To draw free hand sketch of the following nuts: i) lock; ii) castle; iii) wing; iv) flange; v) dome.

PLATE NO: 4

- To draw free hand sketch of different types of key such as: i) shunk taper; ii) saddle; iii) gib head; iv) pin; v) wood ruff; vi) spline shaft and spindle hole.
- Isometric view of the followings to be provided. Draw three views with bill of materials i) knuckle joints; ii) socket and spigot joint.

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PLATE NO. 5

- To draw**:** i) sectional front view, and, ii) side view of a protected type rigid shaft coupling having given diameter " D" (prepare a bill of material)

To draw**:** i) half sectional front view, and, ii) side view of a C.I pulley from given dimension (shaft diameter, hub diameter, length of the hub, outside diameter of pulley, dimensions of arms etc. are given)

Mechanical Engineering Workshop-I
TIUDME-394

L-T-P: 0-0-3 **Credit: 2**

MODULE-1 IS COMPULSORY AND CHOOSE ANY TWO MODULES FROM THE REST

MACHINE SHOP-I :

LATHE WORK

i) Every student must be familiar with the operation, safety, general maintenance of a lathe machine.
ii) Students to be familiarized with lathe parts, accessories and attachments used on lathe.
iii) Students to be familiarized with the measuring instruments and measurement transferring devices.
iv) Students to be familiarized with the safety while working on lathe machine.
v) Familiarization with lathe tools and their mountings and speed and feed to be adopted.

B. i) Find out the centre of a round job with hermaphrodite caliper, and mount the job in Between centers.

ii) Straight turning with turning tool.
iii) Holding a round job in a 4-jaw chuck, making concentric with the lathe axis, facing the free face and then centering with a centre drill.
iv) Reverse the job, do the same operation on other face also.

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C. EXERCISE:

i) A job having facing, centering and step turning as per drawn exercise.
ii) A job having step turning, chamfering, grooving, shouldering, recessing, knurling etc as per drawn sketch.
iii) A job with external taper turning.
iv) Thread cutting practice –external only.

D. DRILLING MACHINE:

i) Study of a pillar and radial drill, including accessories, attachments and holding devices.
ii) Study of different drills available in the workshop.
iii) Exercise on drilling operation on flat surface, curved surface
iv) Drilling, reaming and tapping operation.

E. SHAPER M/C

i) Study of shaper m/c, speed, feed, adjustment, tool holding devices & job holding devices, length stoke adjustment & adjustment of position.
ii) Making surfaces like horizontal, vertical & angular (external).
iii) V-block making.

Module 1 BENCH WORK AND FITTING SHOP

Purpose of Bench Work & Fitting Shop:

a) Study of different types of hand tools & their uses with specifications, care & maintenance of different hand tools & accessories e.g. files, chisels, hammers, hacksaw with frames, vice, divider, try square, surface plate, spirit level etc.
b) Use of different measuring instruments & accessories e.g. micrometer, vernier calipers, height gauge, etc.

Basic fitting shop practice

a) Filing practice
b) Marking & measuring practice
c) Drilling & tapping practice
d) Joining practice(male & female)

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Practice job:

a) Making regular triangle, square, pentagonal, hexagonal flat stepped – at least two jobs covering all of the shapes.

ADVANCE WELDING SHOP:

1. Welding by arc/gas welding process in:
   a) Flat position
   b) Vertical position
2. Fillet welding
3. Preparation of different joints' jobs (at least two) : (by arc/gas welding) – a) performance of job comprising of i) flat position, ii) vertical position; b) Preparation of different joints (by arc) i) ;lap ii) double
4. Gas cutting practice
5. MIG welding practice on 4 mm thick plate areas.

SHEET METAL SHOP:

1. Purpose of the shop, application.
2. Development of paper templates of rectangular container without lid & with lid, circular drum, funnel, rectangular tray, hopper (any three).
3. Cutting the sheet as per development previously done in sl. no. 2 above.
4. Cutting, bending, rolling, shearing, etc. as related to the job.
5. Soldering or clipping.
6. Checking the manufactured item as per dimension.