SRI RAAJA RAAJAN COLLEGE OF ENGINEERING TECHNOLOGY,
AMARAVATHIPUTHUR. KARAIKUDI-630 301

DEPARTMENT OF MECHANICAL ENGINEERING

Skill development programme in CNC Operator

Course Contents - Theory

Course Code	Course Title	Theory / Practical
JSDCC NC001 - T	**STUDY OF CNC MACHINE - BASIC TRAINING**	**Theory**
Unit No		
I	**Unit Title:INTRODUCTION TO CNC MACHINE** **Introduction of NC and CNC, definition, working principle of a CNC system,** Technology, principles, features, advantages, applications,– Types of CNC Machines, CNC controllers, characteristics, interpolators– Difference between CNC and conventional lathes. Schematic diagram of CNC system. Axes convention.	**10**
II	**Unit Title: CNC MACHINE TOOL PROGRAMMING** CNC Machine building, **Components of CNC machine** .Cutting parameters - cutting speed, feed rate, depth of cut, constant surface speed, limiting spindle speed. **Manual part programming - coordinate system – Datum points: machine zero, work zero, tool zero - reference points - NC dimensioning – G codes and M codes – linear interpolation and circular interpolation - CNC program procedure - sub-program**	**10**
III	**Unit Title: CNC MACHINE MAINTENANCE & SAFETY** Introduction to Maintenance - Types – Procedure – Guideways, Stepper motors, Servo motors, Coolant Oil, Lubrication of moving parts - Troubleshoot & Overhauling - Safety & Health, Occupational Hazards - Accident & safety- housekeeping & good shop floor practices	**10**
	Total	**30Hrs**

Certificate Program in CNC Operator

CNC Operator				
S.No	Session Name	Objectives	Methodology (Theory / Practical)	Duration (in hrs)
1	Introduction to CNC	Understanding about Computer Numeric Control	Theory	1
2	Cartisian Coordinates & Unit Conversion	Develop the ability to understand different units used in Machine Shop	Theory	1
3	G Code & M Code	Program Creation	Theory	3
4	CNC lathe Introduction	Explain about Lathe machine parts and their functions	Theory	1
5	Facing	Identify the tools and perform the Facing Operation	Theory	3
6	Facing		Practical	
7	Turning	Identify the tools and perform the turning Operation	Theory	6
8	Turning		Practical	
9	Step Turning	Identify the tools and perform the Step turning Operation	Theory	
10	Step Turning		Practical	
11	Tapper Turning	Identify the tools and perform the appear turning Operation	Theory	
12	Tapper Turning		Practical	
13	Grooving	Identify the tools and perform the Grooving Operation	Theory	3
14	Grooving		Practical	
15	Drilling	Identify the tools and perform the Drilling Operation	Theory	2
16	Drilling		Practical	
17	Threading	Identify the tools and perform the Threading Operation	Theory	4
18	Threading		Practical	
19	Circular Interpolation Clock Wise (G02)	Identify the tools and perform the Circular Interpolation CW Operation	Theory	4
20	Circular Interpolation Clock Wise (G02)		Practical	
21	Circular Interpolation Counter Clock Wise (G03)	Identify the tools and perform the Circular Interpolation CCW Operation	Theory	4
22	Circular Interpolation Counter Clock Wise (G03)		Practical	
23	CNC Milling	Explain about milling machine parts and	Theory	1

	Introduction	their functions		
24	Absolute Coordinate	Explain How a Machine Coordinates Works	Theory	2
25	Increment Coordinate	How we can utilize program in a Batch method	Practical	
26	G01 Operation	Identify the tools and perform the Linear Operation	Theory	4
27	G01 Operation		Practical	
28	Circular Interpolation Clock Wise (G02)	Identify the tools and perform the Circular Interpolation CW Operation	Theory	8
29	Circular Interpolation Clock Wise (G02)		Practical	
30	Circular Interpolation Clock Wise (G02 IJ Mode)		Practical	
31	Circular Interpolation Counter Clock Wise (G03)	Identify the tools and perform the Circular Interpolation CCW Operation	Theory	
32	Circular Interpolation Counter Clock Wise (G03)		Practical	
33	Circular Interpolation Counter Clock Wise (G03 IJ Mode)		Practical	
34	Mirroring Operation	Identify the tools and perform the Mirroring Operation	Theory	2
35	Mirroring Operation		Practical	
36	Sub Program	Identify the tools and perform the Sub Program Operation	Theory	8
37	Sub Program		Practical	
38	Polar Coordinate	Identify the tools and perform the Polar Operation	Theory	2
39	Polar Cordinate		Practical	
40	Industry Orientations	Brief Explain about Industry Department	Theory	1
			Total Duration	60

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Sivagangai Dist. Tamil Nadu

Certificate Program in Shielded Metal ARC Welding (SMAW)

Shielded Metal ARC Welding (SMAW				
S.No	Session Name	Objective	Methodology (Theory / Practicals)	Duration(in hrs)
1	Introduction to Welding	Understanding about Welding	T	1
2	Introduction to SMAW	Brief know ledge on SMAW	T	1
3	Introduction to Electrodes & its various types	Electrodes and its types	T	1
4	Equipments used in Welding	Importance of welding equipments	T	1
5	Safety Measures in Welding	Identification of PPE	T	1
6	Types of Weld - Fillet & Groove	Identify different types of weld	T	1
7	Types of Welding Joints - Butt joint	Different types of joining processes	T & P	4
8	Types of Welding Joints - TEE joint		T & P	4
9	Types of Welding Joints - Corner joint		T & P	4
10	Types of Welding Joints - Lap joint		T & P	4
11	Types of Welding Joints - Edge joint		T & P	4
12	Welding positions	Different welding positions	T & P	4
13	Flat or Down Hand		T & P	4
14	Horizontal		T & P	4
15	Vertical		T & P	4
16	Overhead		T & P	4
17	Material Preparation	Different methods of cleaning and cutting metals	T&P	3
18	Edge Preparation	Types and Methods of Edge preparation	T&P	3
19	Fit Up	To form the component as per the drawing	T&P	3
20	Basic Welding Symbols	Groove and Fillet Welding Symbols - survey	P	1
21	Practical Exam	Exam		4
			Total Duration	60

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Course Contents – Practical Exercises

Course Code	Course Title	Theory / Practical	
JSDCCNC 001 - P	**CNC OPERATOR - Practical Training Exercises**	**Practical**	
Exercise No	**Modules (Practical)**	**P (Hrs.)**	**H (Hrs.)**
1	Program execution in different modes like single block, manual and auto. Tool and work offsets setting.	5	3
2	Program for Linear interpolation, Circular interpolation, Work offset & tool offset measurement & entry in CNC control.	5	3
3	CNC turning exercises - Part program preparation by absolute & incremental programming.		
4	Manual Data Input(MDI) mode operations & zero offsets & tool off	5	4
5	Part program preparation, CNC machining exercises-stock removal cycle		
6	Auto mode execution of CNC machine exercises sub program Circular& rectangular pockets. Drilling, Milling patterns etc.		
	Total	**15**	**10**

Certificate Programme in CNC Machining

Course Contents - Theory

Course Code	Course Title	Theory / Practical
JSDCC NC001 - T	**STUDY OF CNC MACHINE - BASIC TRAINING**	**Theory**
Unit No		
I	**Unit Title:INTRODUCTION TO CNC MACHINE** **Introduction of NC and CNC, definition, working principle of a CNC system,** Technology, principles, features, advantages, applications,– Types of CNC Machines, CNC controllers, characteristics, interpolators– Difference between CNC and conventional lathes. Schematic diagram of CNC system. Axes convention.	**10**
II	**Unit Title: CNC MACHINE TOOL PROGRAMMING** CNC Machine building, **Components of CNC machine** .Cutting parameters - cutting speed, feed rate, depth of cut, constant surface speed, limiting spindle speed. **Manual part programming - coordinate system – Datum points: machine zero, work zero, tool zero - reference points - NC dimensioning – G codes and M codes – linear interpolation and circular interpolation - CNC program procedure - sub-program**	**10**
III	**Unit Title: CNC MACHINE MAINTENANCE & SAFETY** Introduction to Maintenance - Types – Procedure – Guideways, Stepper motors, Servo motors, Coolant Oil, Lubrication of moving parts - Troubleshoot & Overhauling - Safety & Health, Occupational Hazards - Accident & safety- housekeeping & good shop floor practices	**10**
	Total	**30Hrs**

* T = Theory, P=Practical, H=hands on training / task oriented activities

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CERTIFICATE COURSE IN TWO- WHEELER & FOUR WHEELER SERVICING

Course Contents – Theory

Course Code	Course Title	Theory / Practical
JSDCTFW S001- T	**CONVENTIONAL AUTOMOBILES**	**Theory**
Unit No	**Modules (Theory)**	**T (Hrs.)**
I	**VEHICLE STRUCTURE AND ENGINES** Types of automobiles vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines –components-functions and materials, variable valve timing (VVT).	**3**
II	**ENGINE AUXILIARY SYSTEMS** Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system - Electronic ignition system, Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).	**3**
III	**TRANSMISSION SYSTEMS** Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints, Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.	**3**
IV	**STEERING, BRAKES AND SUSPENSION SYSTEMS** Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control	**3**
V	**ALTERNATIVE ENERGY SOURCES** Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell	**3**
	Total	**15 Hrs**

Course Code	Course Title	Theory / Practical
JSDCTF WS002- T	**AUTOMOTIVE ELECTRONICS**	**Theory**
Unit No	**Modules (Theory)**	**T (Hrs.)**
I	**BATTERIES AND ACCESSORIES** Principle and construction of lead acid battery, characteristics of battery, rating capacity and efficiency of batteries, various tests on batteries, maintenance and charging. Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator.	3
II	**STARTING SYSTEM** Condition at starting, behavior of starter during starting, series motor and its characteristics, principle and construction of starter motor, working of different starter drive units, care and maintenances of starter motor, starter switches.	3
III	**CHARGING SYSTEM** Generation of direct current, shunt generator characteristics, armature reaction, third brush regulation, cutout. Voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers, new developments.	3
IV	**FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS** Current trends in automotive electronic engine management system, electro magnetic interference suppression, electromagnetic compatibility, electronic dashboard instruments, onboard diagnostic system, security and warning system	3
V	**SENSORS AND ACTIVATORS** Types of sensors: sensor for speed, throttle position, exhaust oxygen level, manifold pressure, crankshaft position, coolant temperature, exhaust temperature, air mass flow for engine application. Solenoids, stepper motors, relay.	3
	Total	**15 Hrs**

T= Theory, P=Practical, H=hands on training / Aptitude / Project work / task oriented activities

CERTIFICATE COURSE IN TWO- WHEELER & FOUR WHEELER SERVICING

Course Contents – Practical

Course Code	Course Title	Theory / Practical
JSDCTFW S001 - P	AUTOMOBILE SERVICING & MAINTENANCE	Practical
Unit No	**Modules (Theory)**	**P (Hrs.)**
I	**AUTOMOTIVE COMPONENTS** study of Multi-cylinder Petrol Engine -- Dismantling and Assembling - Study of petrol engine fuel system - Study of diesel engine fuel system - Study, dismantling and assembling of front and rear Axles - Study, dismantling and assembling of Clutch - Study, dismantling and assembling of Gear Box - Study of steering system	**10**
II	**AUTOMOTIVE ELECTRICAL AND ELECTRONICS** Testing of batteries and battery maintenance -. Testing of starting motors and generators - Testing of regulators and cut – outs -. Diagnosis of ignition system faults - Study of Automobile electrical wiring - Fault Diagnosis of various sensors	**10**
III	**AUTOMOTIVE FUELS AND LUBRICANTS** Study of International and National standards for fuels and lubricants.- Flash and Fire points of petrol and diesel.- Cloud & Pour point Test. - Temperature dependence of viscosity of lubricants & Fuels by Redwood Viscometer. - Viscosity Index of lubricants & Fuels by Saybolt Viscometer	**10**
IV	**ENGINE PERFORMANCE AND EMISSION TESTING** Study of hydraulic, electrical and eddy current dynamometers -. Valve timing and port timing diagrams - Performance and emission test on two wheeler SI engine -. Performance and emission test on automotive multi-cylinder SI engine - Engine cylinder pressure measurement P-θ and P-V diagrams for IC engine	**10**
V	**VEHICLE MAINTENANCE** Tools and instruments required for maintenance - Safety aspects with respect to man, machine and tools - General procedures for servicing and maintenance schedule - Wheel Alignment procedure	**10**
	Total	**50 Hrs**

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CERTIFICATE PROGRAMME IN MECHANICAL AND ELECTRICAL PLUMBING

Job Role	**MECHANICAL AND ELECTRICAL PLUMBING DESIGNER**
Sector	**CONSTRUCTION**
NSQF level	**3**
QP Code	**JSDMEP001**
Total number of hours and break up	**125Hrs (P: 50 Hrs., H: 75 Hrs.)***
Occupational Standards	• **To understand the construction of pipe line in HAVC** • **To understand construction of pipe line mechanical and electrical plumbing.**
Expected Learning outcome	**After completing this programme participants will be able to:** • **Knowledge in MEP** • **Knowledge in architecture** • **Knowledge in HAVC**
Skills focused	**MECHANICAL AND ELECTRICAL PLUMBING**
Course approved by	**Bharathidasan University**
Placement areas	• **MEP Designer** • **Heating, ventilation, and air conditioning** • **Electrical Power And Lighting** • **Fire Alarm Expertise**

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Course Outline

Course Code	Paper Title	Theory / Practical	Internal Marks	External Marks	Total
JSDC MEP001-P	REVIT ARCHITECTURE	Practical	25	75	100
JSDC MEP002-P	REVIT MEP	Practical	25	75	100
				Total	**200**

CERTIFICATE PROGRAMME IN MECHANICAL AND ELECTRICAL PLUMBING

Course Contents – Practical

Course Code	Course Title	Theory / Practical	
JSDC MEP001-P	**REVIT ARCHITECTURE – Practical**	**Practical**	
Exercise No	**Modules (Practical)**	**P** (Hrs.)	**H** (Hrs.)
1	Introduction i) About BIM ii) Introduction to Revit iii) User Interface iv) Create Levels and grids	4	6
2	Building Elements i) Wall and Edit type ii) Door and windows iii) Columns and edit type iv)Floor and Roof	4	6
3	Circulation i)Staircase ii)Railing iii)Ramp	4	6
4	Model i)Model Text ii)Model line iii)Model Group	4	6
5	Opening i)Wall, floor, roof	3	5
6	Import DWG, JPEG	1	1
	Total	**20**	**30**

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CERTIFICATE PROGRAMME IN MECHANICAL AND ELECTRICAL PLUMBING

Course Code	Course Title	Theory / Practical	
JSDC MEP002-P	**REVIT MEP**	**Practical**	
Exercise No	**Modules (Practical)**	**P** (Hrs.)	**H** (Hrs.)
1	Introduction • MEP Design • Revit MEP • Graphical User Interface i) Ribbon ii) Quick Access Toolbar iii) Options Bar iv) Properties Palatte v) View Control Bar vi) Status Bar vii) Info Centre viii) User Interface Control ix) Menu and Settings x) Keyboard Shortcuts xi) Context Menus	6	6
2	• Worksharing • Link Revit • Shared Coordinates • Controlling Visibility • Copy/Monitor • Link CAD	4	6

3	• Family Creation
	  • Solid Modeling
	  • Symbols & Annotations
	  • Creating Equipment
	  • Creating Light Fixture
	  • Creating Devices
		5	6

4	• Mechanical Design
	  • Space Modeling
	  • Zones
	  • Building Construction
	  • Heating and cooling Load Analysis
	  • Report
	  • Air Systems
	  • Mechanical system & duct work
		6	6

	• Mechanical Piping System • Pipe Fittings		
5	• Electrical Design i) Spaces and Lighting ii) Lighting Analysis iii) Schedule Key iv) Light Fixtures v) Site Lighting • Power and communication i) Modeling ii) Creating Circuits iii) Creating Fire Alarm System Model iv) Creating Power Distribution Systems v) Modeling Conduits and Cable Tray vi) Panels vii) Wiring	5	6
6	• Plumbing Fire Protection	2	3
7	• Drafting and Detailing i) Line Style ii) Regions iii) Detail Component iv) CAD Details v) Drafting Views vi) Detail Library vii) Detail Views	6	6
8	• Sheet Setting i) Title Block Creation ii) Sheet Creation iii) Placing Views in a Sheet iv) Sheet Revisions • Printing • Export to CADC	6	6
	Total	**40**	**45**

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