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 शिवाजी विद्यापीठ, कोल्हापूर — 416004.

 दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग— २६०९०९४)

 फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

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दि. 17/12/2016

प्रति,

संचालक, तंत्रज्ञान अधिविभाग, शिवाजी विद्यापीठ, कोल्हापूर.

विषय :- Indo German Tool Room (IGTR) extension Centre अंतर्गत विविध कोर्सेसच्या अभ्यासक्रंमाबाबत

महोदय,

उपरोक्त विषयासंदर्भात आपणांस आदेशान्वये कळविण्यात येते की, शैक्षणिक वर्ष 2016–17 पासून तंत्रज्ञान अधिविभागात Indo German Tool Room (IGTR) extension Centre अंतर्गत विविध कोर्सेसच्या short Term/ Medium Term/Long Term Training Courses खालील अभ्यासक्रमांना विद्यापीठ अधिकार मंडळाने मान्यता दिली आहे.

Details of Duration and list of various courses at IGTR, Aurangabad

Phase I	
Short Term Training	Courses
Name of the Training Program	Duration(In hours)
1 . AutoCAD (Mech.)	72
2. Solidworks	72
3. Catia	96
4. Pro-E	96
5. Unigraphics	96
6. DelCAM	72
7. MasterCAM	96
8. Hypermesh	72
9. Ansys	72
10 .Auto CAD (Civil)	72
11. 3DS Max	72
12. Revit Architecture	72
13. Staad Pro	72
14 .CNC Programming	72
15. Electrical (CAD)	72
16. PLC Programming / SCADA	96
17. Embedded Systems / VLSI	96
18. Tool Design	48

(Source: IGTR, Aurangabad Training Calendar for 2016-17)

Phase II					
Medium Term Courses					
Name of the Training Program	Duration				
1.Master Certificate Course in Tool	06 Months				
Design	(24 weeks, 8 Hrs/day)				
2.Master Certificate Course in	06 Months				
CAD/CAM	(24 weeks, 8 Hrs/day)				



Phase III					
Long Term Courses					
Name of the Training Program	Duration				
Post Graduate Diploma in Tool Design	18 Months				
& CAD/CAM (1 ¹ / ₂ Years)					
Post Diploma in Tool Design &	12 Months				
CAD/CAM (1 Year)					

उपरोक्त बाब सर्व विद्यार्थी व शिक्षक यांच्या निदर्शनास आणावी.(सोबत सिडी.जोडली आहे.) तसेच सदर अभ्यासक्रम विद्यापीठाच्या www.unishivaji.ac.in या संकेतस्थळावर उपलब्ध करण्यात आलेले आहेत.

कळावे,

आपला विश्वासू,

सही ∕ −

उपकुलसचिव

सोबत :- वरीलप्रमाणे

7. आय. सी. टी. सेल

मा.संचालक बीसीयुडी मा. परीक्षा नियंत्रक		- यांना माहितीसाठी
1.समन्वयक, अभियांत्रिकी व तंत्रज्ञान विद्या 2. टेक्नॉलॉजी समन्वय समितीचे सदस्य	शाखा	
3. परीक्षक नियुक्ती विभाग		∠यांना माहितीसाठी व पुढील योग्य त्या कार्यवाहीसाठी
4. इत्तर परीक्षा विभाग–4		
5. पात्रता विभाग		
 संलग्नता विभाग 	,	J

MSME TOOL ROOM INDO GERMAN TOOL ROOM AURANGABAD MSME TOOL ROOM AURANGABAD

INDO GERMAN TOOL ROOM AURANGABAD

Subject			Total Hrs.			
	AUTOCAD		72			
UNITS	TOPICS		SUB - TOPICS			
		Introduction & Revie Capability of Auto Ca	ew of Previous knowledge ad			
		Starting AUTOCAD				
		Various Visulisation	commands			
1	INTRODUCTION TO AUTO CAD	Documentation Quic	* tour			
		Creating and Access	sing documentation			
		Layout and plotting				
		Concept of bardware	e & software			
		Starting ALITOCAD				
		ALITOCAD & interfa				
2	GETTING STARTED	Setting new drawing				
-	(PRINCIPLE & CONCEPT	Accessing comman	d			
		Opening & saving e	xisting file & function keys etc.			
		Co-ordinates system	and their type.			
3	CREATING OBJECTS (CO ORDINATE	Drawing line objects				
	SYSTEM)	Drawing curve object	ts and solid filled areas.			
		Working with named	lobjects			
4	EDITING METHODS AND CONTROLLING	Editing objects using	the object property tool bar and various method			
	DRAWING DISPLAY	Zooming & Panning	drawing, redrawing screen, regenerating the drawing			
	DRAWING WITH	Adjusting snap & Gr	id alignment using ortho modes			
5	PRECISION	Using object snap a	nd object tracking methods.			
		Understanding the c	oncept and use of layers			
0	LATER MANAGEMENT	Working with Layer				
		Need for Dimension	ing			
-	BASIC DIMENSIONING, GEOMETRIC	Detailed disscussion	on Dimensioning and tolerancing method in AUTOCAD			
/	TOLERANCING. ADDING TEXT TO DRAWING	Editing method				
		Adding text with vari	ous engineering symbols			
		Concept of block, fo	rmation of block, Attribute definition			
8	AND DEFINING BLOCK	DD attribute and edi	t block			
		Insert, Modify, renan	ning block			
		Concept of Isometric	Drawing,axes and planes			
9	ISOMETRIC DRAWING LAYOUT & PLOTTING	Defining the paper s	etting			
		View ports				
10	GETTING STARTED	Overview of 3D mod	lel			
10	WORKING IN 3D SPACE	Solid modelling in Au	utocad(creating,editing and modification technique)			
11	CREATING SURFACE	Surface modelling in	Autocad(creating,editing and modification technique)			
	MODEL	Converting wire fram	ne models in to surface model			

	TERM WORK		Minimum Pass Marks			
PRACTICAL EXERCISES (50 Marks)	PRESENTATION (25 Marks)	ORAL (25 Marks)		SESSIONAL (40 % of Term work) (40 Marks)	FINAL EXAM (60 Marks)	
No of exercises are given during the training and marks are awarded for effective & efficient performance	 Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning. 	• At the end of the course faculty may ask 10 questions from various chapters / topics.	TOTAL MARKS			
 Averages of marks obtained in various exercises are considered for final evaluation. 	 Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded. 	 Each question carry 2.5 marks 	(100 Marks)	20 Marks	30 Marks	
Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5-6 minutes.	 Average of various presentations are considered for final evaluation 	 Total marks obtained will be considered for final evaluation. 	1			

MSME TOOL ROOM AURANGABAD

INDO GERMAN TOOL ROOM AURANGABAD

Subject			Total Hrs.
	AUTOCAD		72
UNITS	TOPICS		SUB-TOPICS
		Introduction & Revie	w of Previous knowledge
		Capability of Auto Ca	ad
		Starting AUTOCAD	
	INTRODUCTION TO	Various Visulisation	commands
	AUTO CAD	Documentation Quic	k tour
		Creating and Access	ing documentation
		Layout and plotting	
		Concept of hardware	& software
		Starting AUTOCAD.	
		AUTOCAD & interfa	ce
2	GETTING STARTED (PRINCIPLE & CONCEPT	Setting new drawing	
		Accessing comman	d
		Opening & saving e	xisting file & function keys etc.
		Co-ordinates system	and their type.
3	3 (CO ORDINATE	Drawing line objects	
	0.0.2)	Drawing curve object	ts and solid filled areas.
		Working with named	objects
4	CONTROLLING DRAWING DISPLAY	Editing objects using	the object property tool bar and various method
		Zooming & Panning	drawing, redrawing screen, regenerating the drawing
5	DRAWING WITH	Adjusting snap & Gr	d alignment using ortho modes
5	PRECISION	Using object snap a	nd object tracking methods.
6	LAYER MANAGEMENT	Understanding the c	oncept and use of layers
		Working with Layer	
		Need for Dimensioni	ng
7	GEOMETRIC DIMENSIONING &	Detailed disscussion	on Dimensioning and tolerancing method in AUTOCAD
	TOLERANCING. ADDING TEXT TO DRAWING	Editing method	
		Adding text with vari	bus engineering symbols
	WORKING WITH BLOCK	Concept of block, for	mation of block, Attribute definition
8	AND DEFINING BLOCK ATTRIBUTES	DD attribute and edit	block
		Insert, Modify, renan	ing block
		Concept of Isometric	Drawing,axes and planes
9	ISOMETRIC DRAWING LAYOUT & PLOTTING	Defining the paper se	etting
		View ports	
10	GETTING STARTED WITH 3D &	Overview of 3D mod	el
	WORKING IN 3D SPACE	Solid modelling in Au	tocad(creating,editing and modification technique)
11	CREATING SURFACE	Surface modelling in	Autocad(creating,editing and modification technique)
MODEL	MODEL	Converting wire fram	e models in to surface model

	TERM WORK		Minimum Pass Marks		
PRACTICAL EXERCISES (50 Marks)	PRESENTATION (25 Marks)	ORAL (25 Marks)		SESSIONAL (40 % of Term work) (40 Marks)	FINAL EXAM (60 Marks)
No of exercises are given during the training and marks are awarded for effective & efficient performance	 Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning. 	• At the end of the course faculty may ask 10 questions from various chapters / topics.	TOTAL MARKS		
 Averages of marks obtained in various exercises are considered for final evaluation. 	 Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded. 	 Each question carry 2.5 marks 	(100 Marks)	20 Marks	30 Marks
Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5-6 minutes.	 Average of various presentations are considered for final evaluation 	 Total marks obtained will be considered for final evaluation. 			

MSME TOOMS TOOM APPRANGABAD

INDO GERMAN TOOL ROOM AURANGABAD

Subject				Total Hrs.			
CAD (SO	OLIDWORKS)			72			
	PRACTICE						
UNIT NO	TOPIC SUB-TOPICS						
		Overview of Solidwork	ks essentials				
		Getting started in Soli	dworks				
1	Introduction to	Command Manager.					
	Solidworks	Dimensioning standar	ds and units for dimensioning.				
		Important terms and t	heir definitions.				
		Open a new part docu	ument.				
		Understand the requir	ement of the sketching environmen	t			
		Open a new part docu	ument.				
		Understand the variou	us terms used in sketching environm	nent.			
		Work with various ske	etching tools.				
		Use the drawing displ	ay tools.				
		Delete the sketched e	entities.				
		Sketching in Solidwor	ks, creating & constraining a sketch				
	Sketcher &	Edit the sketches usin	ig various editing tools.				
2	Modification of	Creating and Modifyin	othe rectangular patterns of the ske	atched entities.			
	Sketches	Creating and Modifyin	othe circular patterns of the sketche	ad entities			
		Creating and Modifyin	othe circular patterns of the sketche	ad entities			
		Add geometric relation	ns to the sketch				
		Dimension the sketch					
		Modifyingthe dimension	es.				
		View and eventing the	ept of fully defined sketch.				
		View and examine the	e relations applied to the sketches.	r00			
		Creating and Modifyin	igsolid base and thin extruded feature	res			
		Dura ani a liu mouliyin	igsoliu base and thin revolved reatu				
		Dynamically rotate the	e view to display the model from all o	directions.			
		Modifyingthe orientation	on of the view.				
		Change the display m	odes of the solid model.				
		Apply material and tex	ctures to the models.				
3	Solid Modeling &	Creating and Modifyin	igFeatures -Holes, Draft,Shell, Wrap	o, Pre-form Features.			
	Editing	Creating and ModifyingLinear and circular Patterns/Mirror					
		Apply simple and advanced fillets.					
		Chamfer the edges and vertices of the model					
		Faces and bodies.					
		Creating and ModifyingCurves					
		Creating and Modifyingreference Geometry - Plane, Axis, Co-ordinate System, Point.					
		Creating and Modifyingmodel using the contour selection technique.					
		Creating and Modifyin	lifying and thin extruded surface				
	Surface Modeling &	Creating and Modifyin	eating and Modifying revolved surface				
4	Editing	Creating and Modifyin	ig sweep surface				
		Creating and Modifying lofted surface					
		Surface Editing and m	nodification - triming, extending etc				
		Overview of assembli	es, the assembly command manage	er.			
		Bottom-up assemblies	s, reference sets				
5	Assembly Modeling	Bottom-down assemb	lies, filtering, mating conditions				
		Component pattern , e	exploding views and components				
		Assembly drawings, a	ssembly projects, Simulation setting	g, simulation.			
		Generate standard th	ree views, Model view, and predefin	ed view,standard section views			
		Crafting drawings, Cre	eating dimensions,Annotations,Note	es and Surface Finish Symbols			
6	Drafting	Add Geometric Tolera	ance to the Drawing Views.				
		Add Center Marks and	d Center Lines to the Drawing Views	S			
		Add Center Marks and	d Center Lines to the Drawing Views	5			
		TE	RM WORK		Minimum	Pass Marks	
PRACTICAL					DRACTICAL	DRESENTATION	
EXERCISES	PRESEN	TATION	ORAL		EXERCISES	*RESENTATION	
(50 Marks)	(25 M	arks)	(25 Marks)	EXERCISES (50%)		ORAL(50%)	
No of	Randomly students are	e selected by faculty to					
exercises are given during	explain about the learn	ing of the previous	At the end of the course faculty				
the training	class during beginning of new class. This may be repeated at the end of each week fo better learning. Grasping & presentation skill and knowledge ore occupated by feaulty and marks are		chapters / topics.				
and marks are awarded for				TOTAL MARKS			
effective &			Each question carry 25 marks	(100 Marks)			
erricient performance	awarded.	y and marks afe	Laon question carry 25 marks		25 Marks	25 Marks	
Averages of	Learnings of the previo	ous class are to be	Tatal marks of the local sector				
marks obtained in	explained precisely by	3 or more students	considered for final evaluation.				
various	eacn given time of 5-6	minutes.					
exercises are considered for	Average of various pre	sentations are					
final	considered for final eva	aluation					

MSME TOOL ROOM AURANGABAD

INDO GERMAN TOOL ROOM AURANGABAD

SYLLABUS					
Subject			Total Hrs.		
	CATIA V5R19 (CAD)		96		
UNITS	TOPICS		SUB-TOPICS		
		Introduction to	various workbenches		
		Catia user inter	face		
		Tool Bar Custo	mization		
		Various Visulis	ation commands		
1		Sketching in Ca	atia		
		Creating and constraining various sketch profile			
	SKETCHER WORKBENCH	Operations on sketch Geometry viz. corner, quick trim, break, chamfer			
		Project 3D Elements, Intersect 3D Elements, Isolate sketch profile			
		Various sketch	Various sketch based projects		
		Various workbe	ench based features viz. pad, pocket, shaft, Groove, Hole etc.		
		Boolean Operations Add, Remove, Intersect, Remove Lump.			
2	PART DESIGN WORKBENCH	Transformation Features Translate, Rotate, Mirror, R/C pattern, Scale etc.			
		Surface Based	Features split, close surface, sew surface		
		Various advanc	ce tasks power copy, catalogs, design table etc.		
		Various wire fra	ame geometries		
3	WIREFRAME AND SURFACE DESIGN WORKBENCH	Various surface	e creation methods methods extrude, revolve, offset, swept, loft		
		Operation on s	hape geometry join, healing, trim, extract geometry projects		
		Various Assem	bly constraints		
4		Working with b	ottom up and top down assembly		
4	ASSEMIDLI DESIGN WORRDENGI	Design in context			
		Generating bill	of material		

	Generating bill of material							
		Creating variou	us views through wizard	ł				
5 GENERATIVE & INTERACTIVE	Creating various section views							
	Add a B.O.M.							
	Adding text and	d labels						
		Dimensioning						
		Various engine	ering symbols					
		Translators	Translators					
TERM WOR			ЗК		Minim	um Pass Marks		
PRACTICAL EXERCISES	PRESENTATION		ORAL		PRACTICAL	PRESENTATIN &		
(50 Marks)	(25 Marks)		(25 Marks)		(50%)	ORAL(50%)		
No of exercises are given during the training and marks	Are Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning.		At the end of the course faculty may ask 5 questions from various chapters / topics.					
are awarded for effective & efficient performance	awarded ffective & ient ormance Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded.		Each question carry 25 marks	TOTAL MARKS (100 Marks)	25 Marks	25 Marks		
Averages of marks obtained in various	ages of Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5-6 minutes.		Total marks obtained will be considered for final evaluation.					
exercises are considered for final evaluation.								

MSME TOOL ROOM MSME TOOLR ROOM RAURANGABAD

INDO GERMAN TOOL ROOM AURANGABAD

SYLLABUS					
Subject		Total Hrs.			
PROE (CAD)		72			
UNITS	TOPICS	SUB-TOPICS			
	INTRODUCTION TO PRO E	Introduction to various workbenches Pro e user interface Tool Bar Customization			
1	SKETCHER	Various Visulisation commands Sketching in pro e Creating and constraining various sketch profile Operations on sketch Geometry viz. corner, quick trim, break, chamfer Project 3D Elements, Intersect 3D Elements, Isolate sketch profile Various sketch based projects			
2	PART DESIGN	Various workbench based features viz. pad, pocket, shaft, Groove, Hole etc. Transformation Features Translate, Rotate, Mirror, R/C pattern, Scale etc. Surface Based Features split, close surface, sew surface Various advance tasks power copy, catalogs, design table etc.			
3	SURFACE & ADVANCED COMMANDS	Tweak features Various surface creation methods methods extrude, revolve, offset, swept, loft Operation on shape geometry join, healing, trim, extract geometry projects Advanced commands e.g. boundry blend, bend solid,toroidal bend etc			
4 ASSEMBLY DESIGN WORKBENCH		Various Assembly constraints Working with bottom up and concept of top down assembly Degrees of freedom Editing Assembly Modify Dimensions & Edit Defination			
5	GENERATIVE & INTERACTIVE DRAFTING WORKBENCH	Drawing templates Creating various section views Add a B.O.M. Adding text and labels Automatic Dimensioning Various engineering symbols Translators			

	TERM W	Mini	mum Pass Marks			
PRACTICAL EXERCISES	PRESENTATION	ORAL	-		PRESENTATIN & ORAL (50%)	
(50 Marks)	(25 Marks)	(25 Marks)		(50%)		
No of exercises are given during the training and marks are awarded for	Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning.	At the end of the course faculty may ask 5 questions from various chapters / topics.			25 Marks	
effective & efficient performance	Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded.	Each question carry 25 marks	TOTAL MARKS (100 Marks)	25 Marks		
Averages of marks obtained in various	Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5- 6 minutes.	Total marks obtained will be considered for final evaluation.				
exercises are considered for final evaluation.	Average of various presentations are considered for final evaluation					

MSME TOOL ROOM ,AURANGABAD

INDO GERMAN TOOL ROOM AURANGABAD

SYLLABUS						
	Subject		Total Hrs.			
	UNIGRAPHICS		72			
UNITS	TOPICS			SUB-TOPICS		
1	INTRODUCTION TO UNIGRAPHICS	OverviewGetting s	v of Unigraphics essenti started in Unigraphics	als		
		 History o 	f cad & UG			
		Short-cut	t Commands			
3	CURVES	 Basic cur 	rves, splines & conics			
		Curve from	om curves, Curves from	bodies		
		Sketchin	g in Unigraphics, creatir	ng & constraining a sketch		
4	SKETCHER	Dragging	& animating a sketch			
		Transform	mation of sketch			
5	FEATURING MODELING	 Getting s pockets pa Extruded 	started, blocks, cylinders ads I body, revolved body, s	s, cones, spheres, tubes, Boolear weep along	operation, holes, slo	its, bosses, grooves,
		• Datum pl	lane, datum axes, hollow	v, edge blends, chamfers, tapers	, instance feature, sc	ale body
		Free form	n features			
		Through	points, from poles,			
		• From poi	nt cloud, through curves	s, ruled, Through curve mesh		
6	FREE FORM FEATURES	Swept, section body, bounded plane				
		Offset sheet, quilt, thicken sheet, editing surfaces				
		Mid-surface, trimmed sheet				
		Overview of assemblies, the assembly navigator				
		Bottom-up assemblies, reference sets				
		Concept of Top-down assemblies, mating conditions				
7	ASSEMBLY MODELING	Component arrays, exploding views and components.				
		• Sequencing				
		Assembly explode, assembly projects				
		Overview of Mechanism				
		Creating drawings, Creating dimensions				
		Dimension preferences, Creating section views				
8	DRAFTING	• GD & T symbols , Creating notes & ballons				
		Drawing Template				
		•Surface fir	nish & BOM			
	TERM W		ORK		Minimu	m Pass Marks
PRACTICAL	PRESENTATION		ORAL		PRACTICAL	PRESENTATION
(50 Marks)	(25 Marks) Randomly students are selected by facult	hy to explain	(25 Marks)		(50%)	& ORAL(50%)
No of exercises are given during the training and marks are awarded for	of exercises are en during the beginning of he previous class d beginning of new class. This may be repe end of each week for better learning.		faculty may ask 5 questions from various chapters / topics.			
effective & efficient performance	Grasping & presentation skill and knowled evaluated by faculty and marks are award	dge are ded.	ge are Each question carry 25 ad. TOTAL MARKS (100 Marks)		25 Marks 25 Marks	
Averages of marks obtained in various exercises are	Learnings of the previous class are to be precisely by 3 or more students each give minutes.	explained en time of 5-6	Total marks obtained will be considered for final evaluation.			
considered for final evaluation.	Average of various presentations are con final evaluation	nsidered for				

MSME TOOL SROOM AURANGABAD INDO GERMAN TOOL ROOM AURANGABAD INDO GERMAN TOOL ROOM AURANGABAD

SUBJECT	TOTAL HRS	
DELCAM	72	

PRACTICE			
UNIT NO	ТОРІС	SUB TOPICS	
		INTRODUCTION	
		Intoduction to CAD/CAM , Scope of DELCAM	
		Requirment of hardware and sofware	
1		High end and low end softwares	
		Intoduction to DELCAM Graphical interface	
		Overview of file management .	
		WIREFRAME MODELLING	
	INTRODUCTION AND	Creation of basic various geometrical entites	
	WIREFRAME MODELLING	Drawing of simple 2d drawings.	
		Editing and modifiaction technique of 2D drawings	
2		Selection methods by Grouping / Masking of entities / Assigning / Changing colours for transformation.	
		Working with level	
		Transformation technique of 2D drawings	
		Dimensioning and tolerancing method its editing method	
		Adding text to drawing and its modification	
		WORKPLANES	
3		Plan concept	
		3D construction plane. Misc planes	
	WORKPLANES	SURFACE MODELLING	
	SURFACE MODELLING	Surface terminology	
4		Creating surfaces, Primitive Surfaces, Automatic Surfacing Wizard	
		Modification of surfaces, Limit Selection, Advanced Surfaces	
		Converting wire frame models into surface model	
		SOLID MODELLING	
		Solid terminology	
5	SOLID MODELLING	creation of solids	
		Modification of solid	
		Drafting of solid	
		TOOL PATH GENERATION AND POST PROCESSING	
		2D-toolpath generation	
e	TOOL PATH	3D-tool path genaration for rough machining	
Ö	GENERATION	3D-toolpath generation for fininsh machining	
		Program post processing(G and M code generation)	
		programme simulation and varification	

	TERM WORK	Minimum Pass Marks				
PRACTICAL EXERCISES (50 Marks)	PRESENTATION (25 Marks)	ORAL (25 Marks)		SESSIONAL (40 % of Term work) (40 Marks)	FINAL EXAM (60 Marks)	
 No of exercises are given during the training and marks are awarded for effective & efficient performance 	•Randomly students are selected by faculty • to explain about the learning of the previous awarded for ormance for better learning. •Randomly students are selected by faculty • c c		TOTAL MARKS			
 Averages of marks obtained in various exercises are considered for final evaluation. 	 Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded. 	 Each question carry 2.5 marks 	(100 Marks)	20 Marks	30 Marks	
•Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5-6 minutes.	 Average of various presentations are considered for final evaluation 	 Total marks obtained will be considered for final evaluation. 				

MSME TOOL ROOM INDO GERMAN TOOL ROOM-AURANGABAD MSME TOOL ROOM AURANGABAD INDO GERMAN TOOL ROOM AURANGABAD

SUBJECT			TOTAL HRS		
	CAD/CAM (MASTER C	AM)	72		
	PRACTICE				
UNIT NO	TOPIC		SUB TOPICS		
		INTRODUCTION			
		Intoduction to CAD/CAN	/I, Scope of MASTER CAM		
		Requirment of hardware	e and sofware		
1		High end and low end s	oftwares		
		Intoduction to MASTE	R CAM Graphical interface		
		Overview of file manage	ement.		
	*	2D DRAWING			
	2 D MODELLING	Creation of basic varior	us geometrical entites		
		Drawing of simple 2d dr	rawings.		
		Editing and modifiaction	technique of 2D drawings		
2		Selection methods by G	Brouping / Masking of entities / Assigning / Changing colours for transformation.		
		Working with level			
		Transformation techniq	ue of 2D drawings		
		Dimensioning and tolerancing method its editing method			
		Adding text to drawing a	and its modification		
		3-D WIREFRAME M	ODELLING		
3		Plan concept			
		3D construction plane. I	Misc planes		
	3 D WIREFRAME	SURFACE MODELL	ING		
	SURFACE MODELLING	Surface terminology			
4		Creating surfaces			
		Modification of surfaces	3		
		Converting wire frame r	nodels into surface model		
		SOLID MODELLING			
		Solid terminology			
5	SOLID MODELLING	creation of solids			
		Modification of solid			
		Drafting of solid			
		TOOL PATH GENER	RATION AND POST PROCESSING		
		2D-toolpath generation			
<i>c</i>	TOOL PATH	3D-tool path genaration	for rough machining		
0	GENERATION	3D-toolpath generation	for fininsh machining		
		Program post processir	ng(G and M code generation)		
		programme simulation a	and varification		

	TERM WORK	Minimum Pass Marks				
PRACTICAL EXERCISES (50 Marks)	PRESENTATION (25 Marks)	ORAL (25 Marks)		SESSIONAL (40 % of Term work) (40 Marks)	FINAL EXAM (60 Marks)	
No of exercises are given during the training and marks are awarded for effective & efficient performance	Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This icient performance for better learning. tudents tudents class class		TOTAL MARKS			
•Averages of marks obtained in various exercises are considered for final evaluation.	 Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded. 	 Each question carry 2.5 marks 	(100 Marks)	20 Marks	30 Marks	
•Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5-6 minutes.		 Total marks obtained will be considered for final evaluation. 				

SYLLABUS

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	Subject		Total Hrs.	
	HYPERMESH	I	72	
UNITS	TOPICS	SUB-TOPICS		
		OVERVIEW OF FE	A	
		BASIC ANALYSIS F	PROCEDURE	
	INTRODUCTION TO	Basic analysis proce	edure	
	0/2 0 111 21112011	Analytical approach	to solve a problem	
		GUI & SHORT CUT	S	
1		Node		
		Line		
	GEOMETRY	Surface		
	OREATION	Primitives		
		Solid		
		Point edit, Node edi	t, Lines edit	
		Surface edit		
2	GEOMETRY EDIT	Edge edit		
		Defeature		
		Mid surface		
		Different manual me	eshing options	
3	MANUAL & AUTOMESHING	Automeshing		
		3-D meshing		
		Check elements		
		Quality criteria		
4	QUALITY CRITERIA	Save and rectify ele	ments	
		Knowledge of differe	ent quality parameters	
		Different collectors		
		Defining load and co	onstraints	
5	OPTRISTRUCT & HYPERVIEW	Running analysis		
		Viewing results in H	yperview	
		Updating collectors		
		Capabilites of hyper	form	
6	INTRODUCTION TO HYPERFORM	Introduction to One	Step and Incremental Analysis	
		Performing One Ste	p Analysis	

	TERM WOR	Minimum Pass Marks				
PRACTICAL EXERCISES	PRESENTATION ORAL		PRACTICAL EXERCISES			
(50 Marks)	(25 Marks)	(25 Marks)		(50%)	PRESENTATIN & ORAL(50%)	
No of exercises are given during the training and marks are awarded for	Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning.	At the end of the course faculty may ask 5 questions from various chapters / topics.			25 Marks	
effective & efficient performance	Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded.	Each question carry 25 marks	TOTAL MARKS (100 Marks)	25 Marks		
Averages of marks obtained in various exercises are considered for final evaluation.	Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5-6 minutes.	Total marks obtained will be considered for final evaluation.				
	Average of various presentations are considered for final evaluation					

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ļ			STELADOS				
Subject			Total Hrs.				
	ANSYS		72				
UNITS	TOPICS		S	JB-TOPICS			
	Introduction to FEA	Overview of FEA					
		Basic Analysis Pro	ocedure				
1	Introduction to Ansys &		nsys (Dinerent analysis type)				
	different type of interfaces	Introduction to di	fferent type of interfaces				
ļ		Ansys classic in					
		Graphics & picki	ng				
		Select logic					
		Database files &	Job name.				
		General analysis	procedure				
		Solid modelling					
		Import solid mod	lel from other CAD software				
2	Ansys classic & analysis	Building of finite	element model				
_	procedure	Defining materia	l properties				
		Element Selection	on & details				
		Defining Real co	nstants				
		□ Loading & boundary conditions					
		□ Solving					
		□ Post Processing					
		Review results b	y means of POST1 & POST26				
		□ Types of structural Analysis					
		□ FEA modeling for structural analysis					
		□ Linear & non linear analysis					
3	Structural Analysis	□ Static analysis					
		Dynamic transient analysis					
		□ Buckling analysis					
		□ Modal Analysis					
		Types of thermal Analysis					
		□ FEA modeling for thermal Analysis					
4	Thermal Analysis	□ Steady State thermal analysis					
		□ Transient Therm	al analysis				
		TEDM	NORK		Minim	um Booo Morko	
DRACTICAL		IERM	WORK		IVIIIIIII		
EXERCISES	PRESENTAT	ION	ORAL		PRACTICAL EXERCISES	PRESENTATIN & ORAL(50%)	
(50 Marks)	(25 Marks	s)	(25 Marks)		(50%)		
No of exercises are given during the training and marks	explain about the learning of t during beginning of new class repeated at the end of each w learning.	ted by faculty to the previous class s. This may be veek for better	At the end of the course faculty may ask 5 questions from various chapters / topics.				
effective & efficient performance	Grasping & presentation skill evaluated by faculty and mark	and knowledge are ks are awarded.	Each question carry 25 marks	Marks)	25 Marks	25 Marks	
Averages of marks obtained in various exercises are	Learnings of the previous class explained precisely by 3 or mo given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.				
considered for final evaluation.	Average of various presentati for final evaluation	ons are considered					

Indo-German Tool Room, Aurangabad - Training Centre

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MSME TOOL ROOM MSME TOOL ROOM AURANGABAD MSME TOOL ROOM AURANGABAD INDO GERMAN TOOL ROOM AURANGABAD

	SYLLABUS						
	Subject		Total Hrs.				
	3DS MAX				72		
UNITS	TOPICS			SUB-T	OPICS		
1	INTRODUCTION OF 3DS MAX	Capability of 3DS N Starting 3DS MAX Various Visualizatio Defining the menu Creating and Acces Defining the ribbon Defining the comm	Capability of 3DS MAX Starting 3DS MAX /arious Visualization commands Defining the menu bar Creating and Accessing documentation Defining the ribbon				
2	GETTING STARTED (PRINCIPLE & CONCEPT	 Starting 3DS MAX 3DS MAX & interfa How to transfer dra Opening & saving e 	ce wing AutoCAD to 3D existing file & functior	PS MAX n keys etc.			
3	CREATING AOBJECTS OF LAYER&WAALL	 How to change bac How to create your How to create layer Customize unit sett How to lock your pl 	ckground colour plan r and wall up, How to set layer lan	,create new layer			
4	WORKING WITH PRIMITIVES MODIFIERS & REACTORS IN 3DS MAX	 Working with name Understanding geo understanding Star working with the pr selecting objects ai Hiding or freezing a working with spline understanding com working with modifi How to create wall 	Working with named objects Understanding geometry primitives understanding Standard primitives working with the project workflows selecting objects and moving objects rotating Hiding or freezing an objects working with grids working with spline and layers understanding compound objects and extended primitives working with modifiers How to create wall and door window probooleon object				
5	MODELING IN 3DS MAX	 How to create strai How to create sce Editing method for using hair and fur How to create door Process of create co How to create floor 	 How to create straight stair and U type stair ,L type stair ,Spiral stair case How to create scene and creating a ND simulating the cloth and wind objects Editing method for editable poly objects using hair and fur How to create door and window Process of create objects scale and copy How to create floor and roof 				
6	BASICS O9F LIGHTS AND MATERIALS AND CAMERA	 Exploring lights How to create array Working with lights Working with came Working with mater Summarization of the 	 Exploring lights How to create array in 3type Working with lights Working with cameras Working with materials Summarization of the class and exercises 				
7	ANIMATION OF 3DS MAX	 Understanding anir How to create gate Terrain modeling ir How to create coffe 	mation concepts in line method a 3ds max ee mug				
8	EXPLORING RENDERING	 Concepts of renders How to set render in 3ds max How to change background of render in 3ds max How to set up render in 3ds max 					
9	CREATING SURFACE MODEL	 Surface modelling i Converting wire fra 	in 3DS MAX(creating me models in to surfa	, editing and modifica ace model	ation technique)		
		TERM WORK	K	1		Minimum Pass Marks	
PRACI	TICAL EXERCISES (50 Marks)	PRESEN (25 M	ITATION larks)	ORAL (25 Marks)		SESSIONAL (40 % of Term work) (40 Marks)	FINAL EXAM (60 Marks)
 No of exe the training awarded fo performance 	rcises are given during and marks are r effective & efficient æ	 Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning. At the end of the course faculty may ask 10 questions from various chapters / topics. 		TOTAL MARKS (100 Marks)			
Averages of marks obtained in various exercises are considered for final evaluation. Grasp knowledg marks ar		 Grasping & present knowledge are evaluat marks are awarded. 	ation skill and ed by faculty and	 Each question carry 2.5 marks 		20 Marks	30 Marks
 Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5-6 minutes. 		 Average of various considered for final evaluation 	presentations are aluation	 Total marks obtained will be considered for final evaluation. 			

MSME TOOL ROOM AURANGABAD

INDO GERMAN TOOL ROOM AURANGABAD

Subject			Total Hrs.			
	REVIT ARCHITEC	TURE	96			
UNITS	TOPICS		SUB-TOPICS			
		Introduction & Review of	Previous knowledge			
		Introduction & Revie	ew of Previous knowledge			
		Capability of revit are	chitecture			
1	INTRODUCTION TO AUTODESK REVIT	Starting revit archite	cture			
	ARCHITECTURE	Understanding the b	asic concept and principles of autodesk revit architecture			
		Opening of autodes	< revit architecture			
		Understanding the u	ser interface			
		Using autodesk revit	t architecture help			
		Starting revit archite	cture.			
		revit architecture &	interface			
2	GETTING STARTED (PRINCIPLE & CONCEPT	Setting new drawing	L			
		Accessing command				
		Opening & saving e	xisting file .			
		Creating a new project				
		Sketching element				
		Saving & closing a project & opening an existing a project				
3	WORKING WITH PROJECT AND ELEMENTS	Selecting, modifying, moving and rotating an element				
		Fliping , mirroring ,re	esizing an elements			
		Coping cutting and p	basting an element			
		Trimming and extend	ding and deleting an element and creating an array of element			
		Working with project views	t views of plan views, elevation views, section views, callout views, legend views, duplicate dependent			
	WORKING WITH PROJECT	Modifying visibility a	nd graphics display of an elements.			
4	VIEWS AND WORK PLANES	Modifying graphics v	risibility and graphics display of an elements.			
		Hiding elements in a	view			
		Cropping, rotating a view				
		Understanding the	workflow of a building project.			
		Working with walls,A	Adding doors to a wall			
		Adding windows to a	a wall.			
		Adding the free stan	ding components.			
		Creating a floor.				
		Creating a roof.				
		Creating a ceiling.				

MSME TOOL ROOM INDO GERMAN TOOL ROOM AURANGABAD

		Creating a railing.									
	WORKING WITH BASIC	Creating a ramp.									
5	BUILDING COMPONENT	Creating a stairs.									
		Creating a ramp.									
		Creating a architectural columns.	eating a architectural columns.								
		Using a curtain elements.									
		Creating a model text.									
		creating spiral stair case									
		Different types of opening									
		Editing wall offset									
		Attaching the wall with other elements.									
		Using toposurface.									
		Using property lines.									
6	WORKING WITH SITE DESIGN	Creating a building pad.									
		Adding parking components.									
		Adding site components.									
		Using sheets.									
		Creating a title blocks.									
8	WORKING WITH CONSTRUCTION	Adding views to a sheet.									
	DOCOMENTS	Using drawing lists.									
		Printing a construction documents.									
		Understanding the rendering workflow.									
9	RENDERING BASICS	Rendering an image.									
		View ports									
		TERM WORK	1		Minimum Pass Marks						
PRAC	TICAL EXERCISES (50 Marks)	PRESENTATION (25 Marks)	ORAL (25 Marks)		SESSIONAL (40 % of Term work) (40 Marks)	FINAL EXAM (60 Marks)					
 No of exe the training for effective 	rcises are given during and marks are awarded & efficient performance	 Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning. 	• At the end of the course faculty may ask 10 questions from various chapters / topics.	TOTAL MARKS							
 Average various exe final evaluation 	es of marks obtained in rcises are considered for tion.	 Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded. 	 Each question carry 2.5 marks 		20 Marks	30 Marks					
 Learning are to be ex more stude 6 minutes. 	is of the previous class cplained precisely by 3 or ints each given time of 5-	 Average of various presentations are considered for final evaluation 	 Total marks obtained will be considered for final evaluation. 								

MSME TOOL ROOM INDO GERMAN TOOL ROOM AURANGABAD

MSME TOOL ROOM AURANGABAD

INDO GERMAN TOOL ROOM AURANGABAD

	Subject		Total Hrs.				
	STAAD_PRO)	96				
UNITS	TOPICS		SUB-TOPICS				
		Introduction to struct	ural Engineering theory.				
		Introduction to staad	pro V8i theory.				
1	INTRODUCTION TO	route map or sequence of analysis and designing staad pro V8i.					
		Analysis of various b	peams with different end condition and different loadings.				
		Analysis of 2D porta	RC frame with different load condition.				
		Grouping and prope	rty of a structure.				
		Analysis and design	of 3D RC structure with floor load.				
2	ANALYSIS OF RC STRUCTURE AND	Analysis and Design	of 2D truss.				
	TOWER	Analysis and design	nalysis and design of power transmission tower				
		offset and beta angle	e of structure.				
		Analysis and design	of elevated water tank.				
		Analysis of wind load	d and support.				
		Earthquake analysis IS1893:2002.	/seismic analysis of a moment resisting space frame by seismic co-efficient method conformed to				
	GETTING STARTED	seismic analysis by	response spectrum method				
3	WITH THE APPLICATION OF LOADING	Shear force and ben	ding moment diagram				
	CONDITION	Plane frame structur	e.				
		Space frame structu	re				
		Interactive concrete	design				
		Interactive steel des	ign				
		Analysis and design	of shear wall.				
4	METHOD FOR	File transfer staad p	ro to auto cad.				
	WALL	Errors in staad pro lo	pading system.				
5	METHOD FOR DESIGNING SHEAR WALL		ALIOIO UF OLAB				

	TERM WORK	Minimum Pass Marks			
PRACTICAL EXERCISES (50 Marks)	PRESENTATION (25 Marks)	ORAL (25 Marks)		SESSIONAL (40 % of Term work) (40 Marks)	FINAL EXAM (60 Marks)
 No of exercises are given during the training and marks are awarded for effective & efficient performance 	 Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning. 	• At the end of the course faculty may ask 10 questions from various chapters / topics.	TOTAL MARKS		
 Averages of marks obtained in various exercises are considered for final evaluation. 	verages of marks obtained in us exercises are considered hal evaluation. • Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded.		(100 Marks)	20 Marks	30 Marks
 Learnings of the previous class are to be explained precisely by 3 or more students each given time of 5-6 minutes. 	 Average of various presentations are considered for final evaluation 	 Total marks obtained will be considered for final evaluation. 			

SYLLABUS						
	Subject			Total Hrs.		
С	NC PROGRAMMING - ED	М		72		
UNITS	TOPICS		SI	UB-TOPICS		
1	CNC PROGRAMMING - MILLING	NTRODUCTION CLASSIFICATION OF EDM DIE SINKING CNC MACHINE DEFINITION, DESCRIPTION, MAIN PARTS & FEATURES DEFINITION DESCRIPTION OF MAIN PARTS DESCRIPTION OF MAIN PARTS TOOL HOLDING DEVICES MACHINE PARAMETERS MACHINE PARAMETERS WORK HOLDING DEVICES NORK HOLDING DEVICES STRUCTURE & CHARACTERISTIC OF CNC EDM MACHINED SURFACE SURFACE FINISHES DEFRATIONS ON CNC EDM MACHINE MAINTENANCE & SAFETY OF MACHINE SAFETY & MAINTENANCE CHENERAL RECOMMENDATIONS				
		TERM	WORK		Minim	um Pass Marks
PRACTICAL EXERCISES	PRESENTAT	ΓΙΟΝ	ORAL		PRACTICAL EXERCISES	PRESENTATIN &
(50 Marks) No of exercises are given during the training and marks	(25 Marks Randomly students are selec explain about the learning of during beginning of new class repeated at the end of each v	s) ted by faculty to the previous class s. This may be week for better	(25 Marks) At the end of the course faculty may ask 5 questions from various chapters / topics.		(50%)	
are awarded for effective & efficient performance	learning. Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded.		Each question carry 25 marks	TOTAL MARKS (100 Marks) 25 Ma	25 Marks	25 Marks
Averages of marks obtained in various exercises are considered for final evaluation.	Learnings of the previous cla explained precisely by 3 or m given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.			
	Average of various presentat for final evaluation	ions are considered		1		

			SYLLABUS				
	Subject		Total Hrs.				
	E-CAD			72			
UNITS	TOPICS		SI	JB-TOPICS			
1	INTRODUCTION TO AUTOCAD		DF AUTOCAD				
		CO-ORDINATE	SYSTEM				
			OF CO-ORDINATE SYSTEM				
2	BASIC OF AUTOCAD	USING COMMA HATCH, GRADIEN	NDS FOR LINE,CIRCLE,ARC,FILLET, MII NT.	RROR, OFFSET, ARR	AY, TAN TAN RADI	US, TAN TAN TAN,	
		DESIGNS USIN	G AUTOCAD				
	INTRODUCTION OF	INTRODUCTION OF E-CAD					
3	E-CAD	ADVANTAGE O	F E-CAD				
			OF E-CAD.SOFTWARE EXPLORATION				
		□ TOOLBARS, TO	DOL PALLETS, INSERT COMPONENT, WORKING WITH PROJECT MANAGER.				
5	BASICS OF E-CAD	EDIT COMPONENT LATERS , LEXT WIRE & LADDER, TRIM, PARENT-CHILD COMPONENT DISCUSSION, MULTIPLE WIRE BUS & EDIT COMPONENT					
		FORWARD REVERSE CONTROL CIRCUIT, STAR DELTA CONTROL CIRCUIT, STAR DELTA CONTROL POWER CIRCUIT,					
		STAR DELTA C	CONTROL CIRCUIT , STAR DELTA CONT	ROL POWER CIRCUI	T ATTRIBUTE, SCO	DOT ,MOVE	
		TERM	WORK		Minim	um Pass Marks	
PRACTICAL EXERCISES	PRESENTAT	TION	ORAL		PRACTICAL EXERCISES	PRESENTATIN &	
(50 Marks)	(25 Marks	5)	(25 Marks)		(50%)	ORAL(50%)	
No of exercises are given during the training and marks are awarded for	Randomly students are select explain about the learning of the during beginning of new class repeated at the end of each w learning.	ted by faculty to the previous class 5. This may be veek for better	At the end of the course faculty may ask 5 questions from various chapters / topics.	TOTAL MARKS (100			
are awarded for effective & efficient performance	Grasping & presentation skill evaluated by faculty and mark	and knowledge are ks are awarded.	Each question carry 25 marks	TOTAL MARKS (100 Marks) 25 Marks		25 Marks	
Averages of marks obtained in various	Learnings of the previous clast explained precisely by 3 or me given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.				
exercises are considered for final evaluation.	Average of various presentati for final evaluation	ions are considered					

Indo-German Tool Room, Aurangabad – Training Centre

TRG: FO:04/01

SYLLABUS

	Subject		Total Hrs.					
	PLC PROGRAMMING		96					
UNITS	TOPICS		s	UB-TOPICS				
			N TO INDUSTRIAL AUTOMATION.					
		D ADVANTAGE O	F AUTOMATION.					
1	INTRODUCTION		OF PLC IN INDUSTRIAL AUTOMATION.					
		OVERVIEW OF	DIFFERENT CONTROL SYSTEM.					
	DETAILS OF		N TO ELECTRICAL HARDWARE CONTR	ROL.				
2	HARDWARE CONTROL	STUDY OF ELE	CTRICAL SYMBOLS AND APPLICATION	N IN ONE LONE DIAGR	RAM.			
	(MANUAL CONTROL)		ELD INPUT AND OUTPUT DEVICES.					
2	RELAY HARDWARE		ICIPLE OF RELAY.					
3	LOGIC CONTROL		OF ACTUATORS IN VARIOUS INDUSTR	IAL CONTROL CIRCUI	TS.			
	PROGRAMMABLE	INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLER.						
4	(SIEMENS)	HARDWARE CONFIGURATION OF PLC						
			CONCEPT OF SIGNAL MODULES.					
		SOFTWARE INSTALLATION AND APPLICATION.						
	PRATICES WITH SOFWARES (TIA)	INTRODUCTION TO PROGRAMMING LANGUAGE-LAD, FBD, STL.						
5		DETAILS OF BIT, BYTE, WORD AND MEMORY						
_		APPLICATION OF BLOCK OPERANDS-COMPARATOR, TIMER, COUNTER.						
		INTERFACING OF I/O WITH SIGNAL MODULE						
		DEMO BOARD	JARD PRACTICE.					
		TERM	WORK		Minim	um Pass Marks		
PRACTICAL EXERCISES	PRESENTAT	TION	ORAL		PRACTICAL EXERCISES	PRESENTATIN &		
(50 Marks)	(25 Marks	5)	(25 Marks)]	(50%)	ORAL(50%)		
No of exercises are given during the training and marks are awarded for	Randomly students are select explain about the learning of during beginning of new class repeated at the end of each w learning.	ted by faculty to the previous class s. This may be veek for better	At the end of the course faculty may ask 5 questions from various chapters / topics.					
effective & efficient performance	Grasping & presentation skill evaluated by faculty and mar	and knowledge are ks are awarded.	Each question carry 25 marks	Marks) 25 Marks	25 Marks			
Averages of marks obtained in various	Learnings of the previous cla explained precisely by 3 or m given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.					
considered for final evaluation.	Average of various presentat for final evaluation	ions are considered						

			SYLLABUS				
	Subject		Total Hrs.				
CNG	C PROGRAMMING - MILI	LING		72			
UNITS	TOPICS		S	UB-TOPICS			
1	CNC PROGRAMMING - MILLING	INTRODUCTION A CLASSIFICATION CLASSIFICATION DEFINITION CONSTRUCTIO WORK HOLDIN TOOL HOLDING CUTTING TOOL CALCULATIONS TOOL RADIUS TECHNOLOGIC EXAMPLE FOR MAINTENANCE MAINTENANCE	TRODUCTION A CLASSIFICATION OF CNC MILLING MACHINE LASSIFICATION, SELECTION & USE OF CNC MILLING MACHINE DEFINITION CONSTRUCTIONAL FEATURES & FUNCTION OF MAIN PARTS WORK HOLDING DEVICES TOOL HOLDING DEVICES CUTTING TOOLS ALCULATIONS OF MACHINE PARAMETERS & TOOL GEOMETRY TOOL RADIUS COMPENSATION TECHNOLOGICAL DATA FOR CNC MILLING EXAMPLE FOR CALCULATING CUTTING PARAMETERS AINTENANCE & SAFETY OF MACHINE MAINTENANCE CHART MAINTENANCE WORK				
		TERM	WORK		Minim	um Pass Marks	
PRACTICAL EXERCISES (50 Marks)	PRESENTAT	FION S)	ORAL (25 Marks)		PRACTICAL EXERCISES (50%)	PRESENTATIN & ORAL(50%)	
No of exercises are given during the training and marks are awarded for	Randomly students are select explain about the learning of during beginning of new class repeated at the end of each v learning.	ted by faculty to the previous class s. This may be veek for better	At the end of the course faculty may ask 5 questions from various chapters / topics.				
effective & efficient performance	Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded.		Each question carry 25 marks	Marks)	Marks) 25 Marks	25 Marks	
Averages of marks obtained in various	Learnings of the previous cla explained precisely by 3 or m given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.	1			
considered for final evaluation.	Average of various presentat for final evaluation	ions are considered		1			

SYLLABUS

	STELADOS							
	Subject			Total Hrs.				
CNC	PROGRAMMING - WIRE	CUT		72				
UNITS	TOPICS		SUB-TOPICS					
1	CNC PROGRAMMING - MILLING	INTRODUCTION CLASSIFICATIO EDM WIRE SEL DEFINITION, DES DEFINITION CONSTRUCTIO CALCULATION O WORK HOLDIN A STRUCTURE SURFACE FINIS OPERATIONS OF MACHINE UTILI TAPER MACHIN MAINTENANCE & GENERAL RECO MAINTENANCE	CLASSIFICATION OF CNC WIRE CUT MACHINE EDM WIRE SELECTION FEINITION, DESCRIPTION, MAIN PARTS & FEATURES OF CNC WIRE CUT DEFINITION CONSTRUCTIONAL FEATURES & MAIN PARTS ALCULATION OF CUTTING PARAMETERS WORK HOLDING DEVICES A STRUCTURE & CHARACTERISTIC OF WIRE EDM MACHINED SURFACE SURFACE FINISHES PERATIONS OF CNC WIRE CUT MACHINE MACHINE UTILITIES (POSSIBLE PROGRAMMING OPTIONS) TAPER MACHINING HAINTENANCE & SAFETY OF MACHINE IGENERAL RECOMMENDATIONS					
		TERM	WORK		Minim	um Pass Marks		
PRACTICAL EXERCISES (50 Marks)	PRESENTAT	ΓΙΟΝ s)	ORAL (25 Marks)		PRACTICAL EXERCISES (50%)	PRESENTATIN & ORAL(50%)		
No of exercises are given during the training and marks	Randomly students are select explain about the learning of during beginning of new class repeated at the end of each w learning.	tted by faculty to the previous class s. This may be week for better	At the end of the course faculty may ask 5 questions from various chapters / topics.					
are awarded for effective & efficient performance	Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded.		Each question carry 25 marks	TOTAL MARKS (100 Marks) 25 Marks	25 Marks	25 Marks		
Averages of marks obtained in various	Learnings of the previous cla explained precisely by 3 or m given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.					
considered for final evaluation.	Average of various presentat for final evaluation	ions are considered		1				

			SYLLABUS				
	Subject			Total Hrs.			
Cl	NC PROGRAMMING-LAT	HE		72			
UNITS	TOPICS		SUB-TOPICS				
1	CNC PROGRAMMING- LATHE	Introduction Classification, Selection of CNC Lathe Machine Description Of Main Parts And Features Definition Constructional Features & Function Of Main Parts Summary Calculation of Machining Parameters & Tool Geo. Selection Definition Of Cutting Values Formulas For Cutting Values Calculations & Example Calculations For Machining Time Calculations For Machining Time Calculating Of Cutting Forces & Motor Power Safety & Maintenance Of CNC Lathe Machine Safety Precautions					
		TERM WC	DRK		Minimur	n Pass Marks	
PRACTICAL EXERCISES	PRESENTA		ORAL		PRACTICAL EXERCISES (50%)	PRESENTATIN & ORAL(50%)	
(50 Marks) No of exercises are given during the training and marks are awarded for	(25 Marks) Randomly students are selected by faculty to explain about the learning of the previous class during beginning of new class. This may be repeated at the end of each week for better learning.		(25 Marks) At the end of the course faculty may ask 5 questions from various chapters / topics.	(50%)	(3070)		
effective & efficient performance	Grasping & presentation skill and knowledge are evaluated by faculty and marks are awarded.		Each question carry 25 marks	(100 Marks) 25 Marks		25 Marks	
Averages of marks obtained in various exercises are	Learnings of the previous clase explained precisely by 3 or m given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.				
evaluation.	for final evaluation						

			SYLLABUS					
	Subject			Total Hrs.				
	SCADA		96					
UNITS	TOPICS		S	UB-TOPICS				
		INTRODUCTION	TO SCADA. STRIAL AUTOMATION,					
1	1 OF PLC & SCADA IN INDUSTRIAL AUTOMATION		ADVANTAGES OF AUTOMATION APPLICATION OF PROGRAMMABLE LOGIC CONTROLLER NEED OF SCADA SYSTEM IN AUTOMATION?					
2	COMMUNICATION OF SCADA WITH PLC, CREATING PROCESS SCREENS	INSTALLATION COMMUNICATI CREATING A N TYPES OF PRC ACTIVATE & DE WORKING WITH CREATE & EDI CREATING & E TAC MANAGEM	VSTALLATION OF SCADA SOFTWARE COMMUNICATION DRIVERS FOR SCADA REATING A NEW SCADA APPLICATION YPES OF PROJECTS IN SCADA CTIVATE & DEACTIVATE A PROJECT /ORKING WITH GRAPHIC DESIGNER SCREEN CREATE & EDIT PROCESS PICTURE CREATING & EDITING GRAPHIC DISPLAY WITH ANIMATION					
3	CREATING DATA BASE OF TAGS & DETAILS OF PROCESS TAGS & INTERNAL TAGS, APPLICATION OF STANDARD OBJECTS & CONTROL OBJECTS	 TAG MANAGEN TAG TYPES, CI PROCESS TAG APPLICATION (STANDARD OB SMART OBJEC 	TAG MANAGEMENT & TAG SELECTION DIALOG BOX TAG TYPES, CREATE & EDIT TAGS PROCESS TAG, INTERNAL TAG, AND PROPERTY SETTING OF TAGS APPLICATION OF LAD PROGRAM ON SCADA PROJECTS STANDARD OBJECTS, WINDOW OBJECTS SMART OBJECTS					
4	APPLICATION OF LAD PROGRAM ON SCADA PROJECTS, WORKING WITH PICTURE WINDOW	 Types of structu FEA modeling fo Linear & non lino Static analysis Dynamic transie Buckling analysis Modal Analysis 	Types of structural Analysis FEA modeling for structural analysis Linear & non linear analysis Static analysis Dynamic transient analysis Buckling analysis					
5	SETTING UP AN ALARM SYSTEM, WORKING WITH ONLINE TREND CONTROL& CREATING A PROCESS CONTROL WINDOW WITH ALL APPLICATIONS	ALARM LOGGII DISPLAY MESS CREATING & A CREATING AN SIMULATION O INTERFACING	NG PRINCIPLES OF MASSAGE SYSTEM GAGE IN RUN TIME CCESSING REAL-TIME & HISTORICAL T ONLINE TREND F THE PROJECT OF VARIOUS FIELD DEVICES WITH SC/	ARCHIVING MESSAC RENDS. USE OF ALL ADA SYSTEM	GES			
		TERM	WORK		Minim	um Pass Marks		
PRACTICAL EXERCISES	PRESENTAT	ΓΙΟΝ	ORAL		PRACTICAL EXERCISES	PRESENTATIN &		
(50 Marks)	(25 Marks	3)	(25 Marks)		(50%)	01012(0070)		
No of exercises are given during the training and marks are awarded for effective & efficient performance	Randomly students are select explain about the learning of during beginning of new class repeated at the end of each w learning. Grasping & presentation skill	ted by faculty to the previous class s. This may be veek for better and knowledge are	At the end of the course faculty may ask 5 questions from various chapters / topics. Each question carry 25 marks	TOTAL MARKS (100 Marks)				
Averages of marks obtained in various exercises are considered for final	Learnings of the previous cla explained precisely by 3 or m given time of 5-6 minutes.	ks are awarded. ss are to be ore students each	Total marks obtained will be considered for final evaluation.	25 Marks 25 Mar		25 Marks		
evaluation.	for final evaluation							

51 LLADOS								
	Subject		Total Hrs.					
	EMBEDDED SYSTEM		96					
	TOPICS		SI	IB-TOPICS				
01110								
		INTRODUCTION 1						
1	INTRODUCTION	ADVANTAGES OF						
		APPLICATIONS O	F EMBEDDED SYSTEM					
		CONCEPT OF RIS						
			IO LOGIC GATES					
		DIGITAL NUMBER	RING SYSTEM					
	BASICS OF	MULTIPLEXER AN	ND DEMULTIPLEXER					
2	DIGITAL ELECTRONICS	INTRODUCTION 1	FO C LANGUAGE					
		DATA TYPES, KE	YWORDS					
		IF, IF-ELSE						
		LOOPING, FUNCT	FIONS, ARRAY					
		INTRODUCTION 1	TO ARM7 AND ITS ARCHITECTURE					
	INTRODUCTION TO ARM7 AND PROGRAMMING WITH PERIPHERALS	OPERATING MODES						
		INSTRUCTION SE	T, ADDRESSING MODES					
3		PROGRAMMING	PRACTICE USING ASSEMBLY LANGUA	GE				
		PROGRAMMING	PRACTICE USING EMBEDDED C LANGU	JAGE				
		INTERNAL PERIP PHASE LOCK LOC	HERALS OF LPC2148 DP, TIMER, ANALOG TO DIGITAL CONV	ERTER, DIGITAL TO A	NALOG CONVERT	ER, UART		
		LED INTERFACING						
		SEVEN SEGMENT INTERFACING						
		SEVEN SEGMENT MULTIPLEXING						
	NITEREAGING	SWITCH INTERFACING						
4	INTERFACING	MATRIX KEYBOARD INTERFACING						
		LCD INTERFACING.						
		ANALOG INPUT INTERFACING						
		SERIAL COMMUNICATION						
		TERM	WORK		Minim	um Pass Marks		
PRACTICAL EXERCISES	PRESENTAT	ΓΙΟΝ	ORAL		PRACTICAL EXERCISES	PRESENTATIN &		
(50 Marks)	(25 Marks	5)	(25 Marks)		(50%)	OKAL(30%)		
No of exercises are given during the training and marks	Randomly students are selec explain about the learning of 1 during beginning of new class repeated at the end of each v learning.	ted by faculty to the previous class s. This may be veek for better	At the end of the course faculty may ask 5 questions from various chapters / topics.					
are awarded for effective & efficient performance	Grasping & presentation skill evaluated by faculty and marl	and knowledge are ks are awarded.	Each question carry 25 marks	TOTAL MARKS (100 Marks) 25 Marks		25 Marks		
Averages of marks obtained in various exercises are considered for final evaluation.	Learnings of the previous clase explained precisely by 3 or m given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.					
	Average of various presentat for final evaluation	ions are considered						

Indo-German Tool Room, Aurangabad - Training Centre

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SYLLABUS							
	Subject			Total Hrs.			
	VLSI			96			
UNITS	TOPICS		s	UB-TOPICS			
1	INTRODUCTION	INTRODUCTION 1 ADVANTAGES OF APPLICATIONS O	ITRODUCTION TO VLSI DVANTAGES OF VLSI SYSTEM PPLICATIONS OFVLSI				
2	BASICS OF DIGITAL ELECTRONICS	INTRODUCTION 1 MULTIPLEXER AN COMBINATIONAL SEQUENTIAL CIR	ITRODUCTION TO LOGIC GATES ULTIPLEXER AND DEMULTIPLEXER OMBINATIONAL CIRCUITS EQUENTIAL CIRCUITS				
3	BACK-END DESIGN	SWITCHING CHARACTERISTICS OF MOS CMOS LEVEL DESIGN USING DSCH 3.5 LAYOUT DESIGN USING µWIND 3.5 SOFTWARE SOFTWARE DSCH3.5					
4	FRONT-END DESIGN	VHDL/ VERILOG H DATAFLOW MOD BEHAVIORAL MO STRUCTURAL MO INTRODUCTION 1	HDL PRODRAMMING EL IDEL DDEL TO XILINX SOFTWARE.				
		TERM	WORK		Minim	um Pass Marks	
PRACTICAL EXERCISES (50 Marks)	PRESENTAT	FION 5)	ORAL (25 Marks)	-	PRACTICAL EXERCISES (50%)	PRESENTATIN & ORAL(50%)	
No of exercises are given during the training and marks	Randomly students are selec explain about the learning of during beginning of new class repeated at the end of each v learning.	ted by faculty to the previous class s. This may be veek for better	At the end of the course faculty may ask 5 questions from various chapters / topics.				
are awarded for effective & efficient performance	Grasping & presentation skill evaluated by faculty and mar	and knowledge are ks are awarded.	Each question carry 25 marks	TOTAL MARKS (100 Marks) 25 Marks		25 Marks	
Averages of marks obtained in various	Learnings of the previous cla explained precisely by 3 or m given time of 5-6 minutes.	ss are to be ore students each	Total marks obtained will be considered for final evaluation.]			
exercises are considered for final evaluation.	Average of various presentat for final evaluation	ions are considered					

MSME TOOL - AURANGABAD INDO GERMAN TOOL ROOM, AURANGABAD - TRAINING CENTRE

MSME TOOL ROOM AURANGABAD INDO GERMAN TOOL ROOM AURANGABAD

SYLLABUS - POST GRADUATE DIPLOMA IN TOOL DESIGN & CAD CAM Subject Total Hrs.

Theory Subject
DESIGN OF PLASTIC MOULDS
(Theory)

32

	(Theory)					
	UNITS	ТОРІС	SUB-TOPICS			
			Introduction: An Overview of Use of plastic moulds, moulding machine& drawings to produce Plastic Components for mass production - Visit to IG	equipment an FR productio	nd Tool n center	
A	INTRODUCTION	A1 OVERVIEW OF MASS PRODUCTION OF PLASTIC COMPONENTS	Classification of plastic materials, Types of plastic material with examples, Abbreviations, Properties, Material Characteristics & Uses, Identification	Definition of &	f Polymer, plastics	
			Classification of industrial application of plastics - Automotive, Consumer Heavy Engineering, Bio-Medical	Electronics,	Aeronautics,	
		B1 MOULDING PROCESS - INJECTION,COMPRESSION,	Introduction: Use and Application of moulding machine and further injecti	on moulding	processes	
		TRANSFER, BLOW,	Classification of moulding processes for Thermo plastics and Thermosets			
		ROTATIONAL, THERMO FORMING MOULDING	Injection, Compression, Transfer, Blow, Rotational, Thermo Forming & E Illustrate	xtrusion - De	fine &	
			Introduction: Use and Application of moulding machine, Mould, material and	injection mot	ulding process	
	MOULDING		Injection moulding process elements - Machine, Material and Mould.			
	PROCESS / OPERATIONS		Classification of injection moulding machines			
	•••	B2	Classification of application of moulding machine & equipment.			
		MOULDING PROCESS - INJECTION	Parts & Function of injection moulding machine (Clamping, Heating & Feedi	ng, Ejection)		
			Classification of moulding processes for Thermo plastics and Thermosets			
			Principles of parting surface, multi day light, injection moulding process			
			Classification of application of moulds - Based on Day light, Ejection and Fe	ed system		
			Introduction: Use and application of different elements in a typical INJEC IIC	JN MOULD		
		OF HEIR N HEIR FUNCTION – INJECTION MOULD	FEEDING SYSTEM: Elements & function of feed system and it's layout, Pri Classification of Gates - Their applications, Advantages and Disadvantages Rectangular gate, Pin gate & Sub Surface gate, Centric gate	nciples of par , Design featu	ting surfaces, ires of	
			COOLING SYSTEM: Elements and functions of cooling systems, Classifica system., Principles of cooling – Heat transfer, Distribution of velocity for efficit techniques, Balanced circuits and O - ring applicati	ation of variou ient cooling, (is cooling Core cooling	
с	ELEMENTS OF		EJECTION SYSTEM: Parts & function of ejector elements with classification Ejector Plate Assembly, Ejector Rod & Bush, Ejector Pin, Sprue Puller etc, f Fixed half & Moving half, Ejection force Calculation, Pr	n, Elements - Ejection meth	Ejection Grid, ods from	
	FUNCTION		CORE AND CAVITY : Classification, Functions and Materials used for core & Venting, Principles of parting surfaces, alignment, guidance and clearance Types of Parting Surfaces	& cavity, Shr e, mounting a	inkage , Draft Ind ejection,	
			CORE & CAVITY RETAINER PARTS:Principle of alignment and guidance, parting surfaces, alignment, guidance and clearance, mounting and ejection	clearance, Pr	inciples of	
			MOULD BASE & PARTS: Mould base housing parts with classification, Elem Locating ring, Bolsters, Ejection guides, Guide pillars & Bushes, Principles of clearance, mounting and ejection,	nents - Sprue f alignment, g	bush, juidance and	
			Material used for different elements.			

MSME TOOL - AURANGABAD INDO GERMAN TOOL ROOM, AURANGABAD - TRAINING CENTRE

SYLLABUS - POST GRADUATE DIPLOMA IN TOOL DESIGN & CAD CAM

SYLLAB	<u>US - POST GRADU</u>	ATE DIPLOMA IN TOOL DESIGN & CAD CAM
Theory Subject		Total Hrs.
DESIGN OF PLASTIC MOULDS (Theory)		32

	UNITS	ΤΟΡΙϹ	SUB-TOPICS		
D	CLASSIFICATION OF MOULDS	D1 CLASSIFICATION OF MOULDS -INJECTION MOULDS	Introduction: Use and application of multi day light moulds BASED ON DAY LIGHT: According to No. of Parting lines - Two plate mould, Three plate mould, Stripper plate mould and Stack mould. BASED ON EJECTION:Classification of moulds based on ejection, Principle of ejection, undercuts & threads, Split Cavity Mould,Side Core and Side Cavity Moulds, Unscrewing Moulds BASED ON FEED SYSTEM: Classification of moulds based on feed system, Principles of feed systems layout of runner gates spure bush etc. Cold Runner moulds. Insulated Runner Moulds Hot		
E	DESIGN PARAMETERS RELATED TO MOULD, MATERIAL & MACHINE	E1 DESIGN PARAMETERS RELATED TO MOULD, MATERIAL & MACHINE - INJECTION MOULDS	Introduction : Use and application of Design parameters in injection mould LIGHT, BASED ON EJECTION & BASED ON FEED SYSTEM Concept of design parameters pertaining to mould, machine and material. (Parameters) No. of cavity selection based on Shot capacity, Plastisizing capacity, Clamp pressure Calculation of Projected area for Standard mould and split mould to calcula Min. Cycle time calculation Calculations for Cooling channel dimensions Hot runner system Concept of quality and quantity required, Construction of mould with respe Properties of plastic material Composition, Properties and Heat treatment of Mould material	- BASED Ol Refer list of Ding capacity ate clamping	N DAY Design & injection force ne.
	MATERIAL HANDLING	F1 MATERIAL HANDLING – PRE MOLDING	Introduction: Use and application of pre-moulding techniquesf Classification of plastics processing., pre moulding techniques(Drying, Del Pallatising, Heating)	umidifying,	Pre forming/
		F2 AL MATERIAL HANDLING – NG POST MOLDING	Introduction: Use and application of post-moulding techniques		
F			Classification of post moulding techniques (Trimming, use of fixtures, Coarelated equipment for the above techniques.	ting, Surface	decoration),
			Introduction: Use and application of storage and disposal of plastic materia	1.	
		MATERIAL HANDLING -	Methods of storage and equipment - 1.1 Unit Storage 1.2 Bulk Storage		
		STORAGE & DISPOSAL	Methods of disposal & equipments - 2.1 Sprue & gates 2.2 Scrap		
н	MAINTENANCE,	H1 MAINTENANCE, SAFETY & STORAGE WITH RESPECT	Introduction :To understand the standard procedures for maintenance, safe and machine	ty, storage of	press tool
		TO MOULD & MACHINE	Concept of safety, maintenance & storage.	motorial	d maakina f
			Tool Design data.	, inaterial and	u macnine for
			Classification of mould material		
I	SPECIFICATION	MATERIAL & MACHINE – INJECTION MOULD	Tool material & their applications, Composition, Properties and Heat treatr	nent	
			Machine specification.		

EXAMINATION SCHEME:

SESSIONAL N	MARKS	SEMESTER MARKS		Minimum	Doce Morks
(40 Marks)		(60 Marks)		wiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	
Internal Assessment Internal Assignments		Semester Examination		Sessional	Semester
(30 Marks – 1 Hour Duration) (10 Marks)		(60 Marks – 3 Hrs Duration)		(50%)	(50%)
Three class tests at regular intervals as specified in syllabus detailed programme.	Class work books & home assignment books checked before the each Assessments.	Final Examination at the end of module covering entire syllabus of the Semester.	TOTAL MARKS (100 Marks)	20 Marks	30 Marks
Average of best of two assessments to be considered for final Sessional marks	Average of best of two assignments to be considered for final Sessional marks.	Student is eligible to write in final exam only after obtaining minimum Sessional Marks.		20 Marks	50 Walks

INDO GERMAN TOOL ROOM, AURANGABAD - TRAINING CENTRE **MSME TOOL ROOM AURANGABAD** INDO GERMAN TOOL ROOM AURANGABAD SYLLABUS - POST GRADUATE DIPLOMA IN TOOL DESIGN & CAD CAM

1

	SYLLABUS - POST GRADUATE DIPLOMA IN TOOL DESIGN & CAD CAM					
	Theory Subject	ct	Total Hrs.			
1	DESIGN OF PLASTIC MOU	ULDS (Theory)	48			
	UNITS	TOPIC	SUB-TOPICS			
		B1	Introduction: Use and Application of moulding machine and further injection moulding processes			
		MOULDING PROCESS - INJECTION,COMPRESSION,	introduction. Use and Apprication of mounting machine and further injection mounting processes			
		TRANSFER, BLOW, ROTATIONAL, THERMO FORMING MOULDING	Classification of moulding processes for Thermo plastics and Thermosets			
			Injection, Compression, Transfer, Blow, Rotational, Thermo Forming & Extrusion - Define & Illustrate			
			Introduction: Use and Application of moulding machine, Mould, material and injection moulding process			
			Injection moulding process elements - Machine, Material and Mould.			
			Classification of application of moulding machine & equipment.			
		B2 MOULDING PROCESS - INJECTION	Parts & Function of injection moulding machine (Clamping, Heating & Feeding, Ejection)			
			Classification of moulding processes for Thermo plastics and Thermosets			
			Principles of parting surface, multi day light, injection moulding process			
			Process Setup Data			
			Introduction: Use and Application of moulding machine and further Compression moulding processes			
В	MOULDING PROCESS / OPERATIONS		Classification of moulding processes for Thermosets			
		B3 MOULDING PROCESS -	COMPRESSION MOULDING - Define & Illustrate			
		COMPRESSION	Process elements: Machine, Material & Mould			
			Parts & function of moulding machines (clamping, heating, feeding). Process Setun Data			
			Introduction: Use and Application of moulding machine and further TRANSFER moulding processes			
		B4 MOULDING PROCESS - TRANSFER	Classification of moulding processes for Thermosets			
			TRANSFER MOULDING - Define & Illustrate			
			Process elements: Machine, Material & Mould			
			Process Setup Data			
		DE .	Introduction: Use and Application of moulding machine and further moulding processes			
		MOULDING PROCESS - BLOW, ROTATIONAL,	Process elements: Machine, Material & Mould			
		THERMO FORMINGMOULDING	Parts & function of moulding machines (clamping, heating, feeding). Process Setup Data			
	ELEMENTS OF MOULD & THEIR FUNCTION	MENTS OF LD & THEIR INCTION ELEMENTS OF MOULD & THEIR FUNCTION – INJECTION MOULD	Introduction: Use and application of different elements in a typical INJECTION MOULD			
			FEEDING SYSTEM: Elements & function of feed system and it's layout, Principles of parting surfaces, Types of Runners and their selection Criteria, Advantages and Disadvantages, Classification of various feed systems (Runner Layout)Classification of Gates			
			COOLING SYSTEM: Elements and functions of cooling systems, Classification of various cooling system., Principles of cooling – Heat transfer, Distribution of velocity for efficient cooling, Core cooling techniques, Balanced circuits and O - ring applicati			
с			EJECTION SYSTEM: Parts & function of ejector elements with classification, Elements - Ejection Grid, Ejector Plate Assembly, Ejector Rod & Bush, Ejector Pin, Sprue Puller etc, Ejection methods from Fixed half & Moving half, Ejection force Calculation.			
			CORE AND CAVITY : Classification, Functions and Materials used for core & cavity, Shrinkage, Draft & Venting, Principles of parting surfaces, alignment, guidance and clearance, mounting and ejection, Types of Parting Surfaces			
			CORE & CAVITY RETAINER PARTS: Principle of alignment and guidance, clearance, Principles of parting surfaces, alignment, guidance and clearance, mounting and ejection.			
			MOULD BASE & PARTS: Mould base housing parts with classification, Elements - Sprue bush, Locating ring, Bolsters, Ejection guides, Guide pillars & Bushes, Principles of alignment, guidance and clearance, mounting and ejection.			
			Material used for different elements.			
			Introduction: Use and application of different elements in a typical COMPRESSION MOULD & TRANSFER MOULD			
			FEEDING SYSTEM: Elements & function of feed system and it's layout, Principles of parting surfaces, Classification of Gates, Types of Runners and their selection Criteria, Advantages and Disadvantages, Classification of various feed systems (Runner Layou			
			HEATING SYSTEM: Classification of various heating systems, Elements & functions of heating system, Balanced circuits.			
с	ELEMENTS OF MOULD & THEIR FUNCTION	C2 ELEMENTS OF MOULD & THEIR FUNCTION – COMPRESSION MOULD	EJECTION SYSTEM: Parts & function of ejector elements with classification, Elements - Ejection Grid, Ejector Plate Assembly, Ejector Rod & Bush, Ejector Pin, Sprue Puller etc, Ejection methods from Fixed half & Moving half, Ejection force Calculation.			
			CORE AND CAVITY : Classification, Functions and Materials used for core & cavity, Shrinkage, Draft & Venting, Principles of parting surfaces, alignment, guidance and clearance, mounting and ejection, Types of Parting Surfaces			
			CORE & CAVITY RETAINER PARTS: Principle of alignment and guidance, clearance, Principles of parting surfaces, alignment, guidance and clearance, mounting and ejection.			
			MOULD BASE & PARTS: Mould base housing parts with classification, Elements , Principles of alignment, guidance and clearance, mounting and ejection.			

	SYLLABUS - POST GRADUATE DIPLOMA IN TOOL DESIGN & CAD CAM					
Theory Subject		x	Total Hrs.			
1	DESIGN OF PLASTIC MOULDS (Theory)		48			
UNITS TOPIC		TOPIC	SUB-TOPICS			
			Material used for different elements.			

SYLLABUS - POST GRADUATE DIPLOMA IN TOOL DESIGN & CAD CAM					
	Theory Subject	t	Total Hrs.		
1	DESIGN OF PLASTIC MOU	LDS (Theory)	48		
	UNITS	TOPIC	SUB-TOPICS		
			Introduction: Use and application of different elements in a typical TRANSFER MOULD, BLOW MOULDS, ROTATIONAL MOULDS & THERMO FORMING MOULDS		
			FEEDING SYSTEM: Elements & function of feed system and it's layout, Principles of parting surfaces, Classification of Gates - Their applications, Advantages and Disadvantages, Design features of Rectangular gate, Pin gate & Sub Surface gate, Centric gate.		
			HEATING SYSTEM / COOLING SYSTEM: Classification of various heating / cooling systems, Elements & functions of heating / cooling system, Balanced circuits.		
с	ELEMENTS OF MOULD & THEIR	C3 ELEMENTS OF MOULD & THEIR FUNCTION -	EJECTION SYSTEM: Parts & function of ejector elements with classification, Elements - Ejection Grid, Ejector Plate Assembly, Ejector Rod & Bush, Ejector Pin, Sprue Puller etc, Ejection methods from Fixed half & Moving half, Ejection force Calculation.		
	FUNCTION	TRANSFER MOULD	CORE AND CAVITY : Classification, Functions and Materials used for core & cavity, Shrinkage, Draft & Venting, Principles of parting surfaces, alignment, guidance and clearance, mounting and ejection, Types of Parting Surfaces.		
			CORE & CAVITY RETAINER PARTS: Principle of alignment and guidance, clearance, Principles of parting surfaces, alignment, guidance and clearance, mounting and ejection.		
			MOULD BASE & PARTS: Mould base housing parts with classification, Elements - Sprue bush, Locating ring, Bolsters, Ejection guides, Guide pillars & Bushes, Principles of alignment, guidance and clearance, mounting and ejection.		
			Material used for different elements.		
			Introduction: Use and application of different elements in a typical TRANSFER MOULD, BLOW MOULDS, ROTATIONAL MOULDS & THERMO FORMING MOULDS		
			FEEDING SYSTEM: Elements & function of feed system and it's layout, Principles of parting surfaces, Classification of Gates - Their applications, Advantages and Disadvantages, Design features of Rectangular gate, Pin gate & Sub Surface gate, Centric gate.		
			HEATING SYSTEM / COOLING SYSTEM: Classification of various heating / cooling systems, Elements & functions of heating / cooling system, Balanced circuits.		
с	ELEMENTS OF MOULD & THEIR FUNCTION	C4 ELEMENTS OF MOULD & THEIR FUNCTION - BLOW MOULDS, ROTATIONAL MOULDS & THERMO FORMING MOULDS	EJECTION SYSTEM: Parts & function of ejector elements with classification, Elements - Ejection Grid, Ejector Plate Assembly, Ejector Rod & Bush, Ejector Pin, Sprue Puller etc, Ejection methods from Fixed half & Moving half, Ejection force Calculation.		
			CORE AND CAVITY : Classification, Functions and Materials used for core & cavity, Shrinkage , Draft & Venting, Principles of parting surfaces, alignment, guidance and clearance, mounting and ejection, Types of Parting Surfaces.		
			CORE & CAVITY RETAINER PARTS: Principle of alignment and guidance, clearance, Principles of parting surfaces, alignment, guidance and clearance, mounting and ejection.		
			MOULD BASE & PARTS: Mould base housing parts with classification, Elements - Sprue bush, Locating ring, Bolsters, Ejection guides, Guide pillars & Bushes, Principles of alignment, guidance and clearance, mounting and ejection.		
			Material used for different elements.		
			Introduction: Use and application of multi day light moulds		
			BASED ON DAY LIGHT: According to No. of Parting lines - Two plate mould, Three plate mould, Stripper plate mould and Stack		
		D1 CLASSIFICATION OF	BASED ON EJECTION: Classification of moulds based on ejection, Principle of ejection, undercuts & threads, Split Cavity		
		MOULDS -INJECTION MOULDS	Mould,Side Core and Side Cavity Moulds, Unscrewing Moulds		
	CLASSIFICATION OF		BASED ON FEED SYSTEM :Classification of moulds based on feed system, Principles of feed systems, layout of runner, gates, spure bush etc., Cold Runner moulds, Insulated Runner Moulds.Hot Runner Moulds, Principles of parting surface, multi day light,		
			injec		
			Introduction: Use, application of classified compression moulds.		
_		D2 CLASSIFICATION OF MOULDS - COMPRESSION	Principles of compression moulding process, heating system, temperature control, feeding & ejection		
D	MOULDS	MOULDS	Classification: Positive mould, Semi Positive mould, Flash mould : a) Open flash mould b) Closed flash mould , c) Inclined flash		
			mould and Landed positive type		
		D3	Classification:Pot type transfer mould. Plunger type transfer mould : a) Top plunger type b) Bottom plunger type c) Side plunger		
		MOULDS - TRANSFER MOULDS	type and Screw type transfer mould		
			Principles of transfer moulding process, heating system, temperature control, feeding & ejection		
		D4 CLASSIFICATION OF	Introduction: Use and application of classified Transfer moulds & Blow moulds		
		MOULDS - BLOW MOULDS, ROTATIONAL MOULDS &	Classification: Pot type transfer mould, Plunger type transfer mould		
		THERMO FORMING MOULDS	Classification: Injection blow mould, extrusion blow mould		
			Introduction : Use and application of Design parameters in injection mould- BASED ON DAY LIGHT, BASED ON EJECTION & BASED ON FEED SYSTEM		
			Concept of design parameters pertaining to mould, machine and material. (Refer list of Design Parameters)		
			No. of cavity selection based on Shot capacity, Plastisizing capacity, Clamping capacity & injection pressure		
-	DESIGN PARAMETERS	E1 DESIGN PARAMETERS	Calculation of Projected area for Standard mould and split mould to calculate clamping force		
Ē	MATERIAL & MACHINE	RELATED TO MOULD, MATERIAL & MACHINE - INJECTION MOULDS	Min. Cycle time calculation		
	MAGNINE		Calculations for Cooling channel dimensions		
			Hot runner system		
			Properties of plastic material		
			Composition, Properties and Heat treatment of Mould material		

-	SYLLABUS - POST GRADUATE DIPLOMA IN TOOL DESIGN & CAD CAM					
	Theory Subject	21	Total Hrs.			
I	DESIGN OF PLASTIC MOU	JLDS (Theory)	48			
	UNITS TOPIC		SUB-TOPICS			
			Introduction: Use and application of Design parameters - COMPRESSION MOULDS			
		E2	Concept of design parameters pertaining to mould, machine and material. (Refer list of Design Parameters)			
		RELATED TO MOULD, MATERIAL & MACHINE -	Concept of quality and quantity required, Construction of mould with respective machine.			
			Properties of plastic material			
			Composition, Properties and Heat treatment of Mould material			
			Introduction: Use and application of Design parameters - TRANSFER MOULDS			
		E3 DESIGN PARAMETERS	Concept of design parameters pertaining to mould, machine and material. (Refer list of Design Parameters)			
	DESIGN	MATERIAL & MACHINE -	Concept of quality and quantity required, Construction of mould with respective machine.			
Е	PARAMETERS RELATED TO MOULD,	TRANSPER MOULDS	Properties of plastic material			
	MATERIAL & MACHINE		Composition, Properties and Heat treatment of Mould material			
			Introduction: Use and application of Design parameters - BLOW MOULDS			
		E4 DESIGN PARAMETERS	Concept of design parameters pertaining to mould, machine and material. (Refer list of Design Parameters)			
		RELATED TO MOULD, MATERIAL & MACHINE -	Concept of quality and quantity required, Construction of mould with respective machine.			
		BLOW MOULDS	Properties of plastic material			
			Composition, Properties and Heat treatment of Mould material			
		E5 POLISHING AND SURFACE TREATMENT	Introduction :Use and application of polishing surface treatment of mould parts.			
			Classification of polishing equipment a) Manual Polishing Kits b) Power Assisted Polishing Kits			
			Classification of surface finishing a) Electro plating b) Etching c) Classification of surface roughness values.			
	MATERIAL HANDLING	F1 MATERIAL HANDLING – PRE MOLDING	Introduction: Use and application of pre-moulding techniquesf			
			Classification of plastics processing., pre moulding techniques(Drying, Dehumidifying, Pre forming/ Pallatising, Heating)			
		F2 MATERIAL HANDLING - POST MOLDING	Introduction: Use and application of post-moulding techniques			
F			Classification of post moulding techniques (Trimming, use of fixtures, Coating, Surface decoration), related equipment for the above techniques			
		F3 MATERIAL HANDLING –	Introduction: Use and application of storage and disposal of plastic material.			
			Methods of storage and equipment - 1.1 Unit Storage 1.2 Bulk Storage			
		STORAGE & DISPOSAL	Methods of disposal & equipments - 2.1 Sprue & gates 2.2 Scrap			
			Introduction: Estimation of material requirement, machine hours and processes (cycle time)			
		G1	Concept of estimation of			
G	ESTIMATION	OF MOULD, MACHINE & PROCESS	Material estimation for plastics and mould, Machine time estimation for mould making & Cycle time estimation (for Injection,			
			Compression & Blow mould) Principle of estimation of time using the process analysis for mould making and cycle time			
		H1				
н	MAINTENANCE, SAFETY & STORAGE	MAINTENANCE, SAFETY & STORAGE WITH RESPECT	Introduction : To understand the standard procedures for maintenance, safety, storage of press tool and machine			
			Concept of safety, maintenance & storage.			
			Introduction - Use and appreciation of the specification pertaining to model, material and machine for 1000 Design data.			
		SPECIFICATION OF MOULD, MATERIAL & MACHINE -				
		INJECTION MOULD	1 ool material & their applications, Composition, Properties and Heat treatment			
I.	SPECIFICATION		Machine specification.			
			Introduction : Use and application of the specification pertaining to mould, material and machine for Tool Design data.			
		12 SPECIFICATION OF MOULD, MATERIAL & MACHINE -	Classification of mould material			
		COMPRESSION & TRANSFER MOULD	Tool material & their applications, Composition, Properties and Heat treatment			
			Machine specification.			
	INTRODUCTION TO	J1	Introduction :Use & application of simulation package			
J	SIMULATION PACKAGES	INTRODUCTION TO SIMULATION PACKAGES	Concept & principles of process parameters, Classification of simulation packages			

EXAMINATION

SCHEME:						
SESSIONAL MARKS		SEMESTER MARKS			Minimum Boos Morks	
(40 Marks)		(60 Marks)			winning	1 ass Marks
Internal Assessment	Internal Assignments	Semester Examination			Sessional	Semester
(30 Marks - 1 Hour Duration)	(10 Marks)	(60 Marks – 3 Hrs Duration)			(50%)	(50%)
Three class tests at regular intervals as specified in syllabus detailed programme.	Class work books & home assignment books checked before the each Assessments.	Final Examination at the end of module covering entire syllabus of the Semester.	TOTAL MARKS	(100 Marks)	20 Marks	30 Marks
Average of best of two assessments to be considered for final Sessional marks	Average of best of two assignments to be considered for final Sessional marks.	Student is eligible to write in final exam only after obtaining minimum Sessional Marks.			20 Marks	JU Marks

PREPARED BY

MSME TOOL ROOM - AURANGABAD INDO GERMAN TOOL ROOM, AURANGABAD - TRAINING CENTRE

MSME TOOL ROOM AURANGABAD INDO GERMAN TOOL ROOM AURANGABAD SYLLABUS - POST DIPLOMA IN TOOL DESIGN & CAD CAM

DESIGN OF PLASTIC MOULDS - (Practice)		JLDS - (Practice)	96
	UNITS	TOPIC	SUB-TOPICS
A	ELEMENTS OF DESIGN	A1 INTRODUCTION TO TOOL DESIGN PRACTICES	Introduction: Use of typical Layout - Mold Design for planning and manufacturing, Assembly drawing layout with bill of material & tool data, Details drawing Layout, Study and observe typical tool design layouts, Study and observe the application of desig
^	PROCESS	A2 OVERVIEW OF PRINCIPLES	Introduction: Use of mould design principles and their relationship with Typical component mould, machine & material, Study & analyze customer needs, Typical features of component, mould, machine, Typical material properties.
		B1 DRAWING MOULD PARTS FROM STANDARD CATALOGUES	Introduction: Use and application of standard catalogues, Study & select standard mould parts, Draw the standard mould parts.
в	MOULD PARTS	B2 DRAWING OF MOULD HOUSING AND BASES	Introduction: Use & application of mould housing and bases from standard catalogues, Study and select mould bases and mould housing from standard catalogues, Draw the assembly and details of mould housing / bases
		B3 REPRESENTATION OF STANDARD ELEMENTS	Introduction: Use of representation of standard elements in the mould design, Study & select the various standard elements used in mould design, Draw the standard elements & their representation from the catalogues & standards
		C1 COMPONENT DRAWING	Introduction: Use and application of allowances for component drawing, Study of component / sample, Study & analyze customer needs, Determine the dimensions with allowances and shrinkages & Draw component drawing.
с	COMPONENTS & LAYOUTS	C2 RUNNER LAYOUT	Introduction: Use and application of the typical runner layout, Study the component drawing / sample, Study & select the impression according to requirement, Draw the typical runner layout.
		C3 COOLING / HEATING LAYOUT	Introduction: Use of cooling & heating circuit in moulds, Draw a typical circuit layout for cooling in mould - (Simple circuit, 'O' circuit, Z circuit, Heat pipes, insert cooling, integer core cooling, Baffled cooling etc.)
			Introduction: Use of design parameters for optimum mould design
	WORK / DATA SHEETS	D1 CALCULATE DESIGN PARAMETERS WITH RESPECT TO MOULD, MATERIAL & MACHINE	Study the component specification and customer requirement.
D			Study & use the design parameters with respect to mould, material and machine.
			Use the data book, standards for optimum selection of design parameters.
			Calculate & verify the design parameter according to requirement of mould.
		D2 PREPARATION OF WORK / DATA SHEET	Introduction: Use of work sheet for mould design, Use the information data from Unit E1, Prepare the work / data sheet for mould design in relevant format
E	CONCEPTUAL DESIGNS	E1 SKETCHING CONCEPTUAL DESIGNS	Introduction: Use and application of alternative conceptual design - Refer (List of exercises for design practice & Flow Chart), Study the component drawing / sample, Develop conceptual design using data sheet. (Refer chapter 4.2), Develop alternative conceptual designs.
		F1 DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (HAND INJECTION MOULD)	Introduction: Use of Assembly and detailed drawings for manufacturing of mould. Refer (List of exercises for design practice & Flow Chart).Refer the process sheet & worksheet from the design parameters for the selected optimal design, Use the conceptual drawings. Draw the assembly & detailed drawings of mould as per norms.
		F2 DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (MULTI CAVITY HAND INJECTION MOULD)	Introduction: Use of Assembly and detailed drawings for manufacturing of mould. Refer (List of exercises for design practice & Flow Chart).Refer the process sheet & worksheet from the design parameters for the selected optimal design, Use the conceptual drawings. Draw the assembly & detailed drawings of mould as per norms.
F	DESIGN OF MOULDS	DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (MULTI CAVITY INJECTION MOULDWITH PIN EJECTION)	Introduction: Use of Assembly and detailed drawings for manufacturing of mould. Refer (List of exercises for design practice & Flow Chart).Refer the process sheet & worksheet from the design parameters for the selected optimal design, Use the conceptual drawings. Draw the assembly & detailed drawings of mould as per norms.
		DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (MULTI CAVITY INJECTION MOULDWITH STRIPPER BAR EJECTION)	Introduction: Use of Assembly and detailed drawings for manufacturing of mould. Refer (List of exercises for design practice & Flow Chart). Refer the process sheet & worksheet from the design parameters for the selected optimal design, Use the conceptual drawings. Draw the assembly & detailed drawings of mould as per norms.
		DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (MULTI CAVITY INJECTION MOULDWITH SLEEVE EJECTION)	Introduction: Use of Assembly and detailed drawings for manufacturing of mould. Refer (List of exercises for design practice & Flow Chart). Refer the process sheet & worksheet from the design parameters for the selected optimal design, Use the conceptual drawings. Draw the assembly & detailed drawings of mould as per norms.
		G1 BILL OF MATERIALS	Introduction: Use of Bill of Material in mould manufacturing and mass production of component, Study the data sheet & work sheet, Prepare bill of material.
G	MOULD DATA		Introduction: Use of mould data in the production of components
		G2	
		MOULD DATA	Study the standards, norms & prepare data for machine set up, Prepare processing data & mould data
н	SIMULATION PACKAGES	HI	Introduction to software packages.
		CAD/CAE	Design of moulds with CAD

EXAMINATION SCHEME: SESSIONAL MARKS (60 Marks) SEMESTER MARKS (90 Marks) Minimum Pass Marks TOTAL MARKS Internal Assessment (60 Marks) Semester Examina Sessional Semester (90 Marks – 5 Hrs Dura Assessments of designs sheets at regular intervals as specified in syllabus detailed programme. Final Examination at the end of Module covering entire syllabus of the Semester. (150 Marks) 30 Marks 45 Marks verage of assessments to be considered for final Sessional marks Student is eligible to write in final exam only after obtaining minimum Sessional Marks.

INDO GERMAN TOOL ROOM, AURANGABAD - TRAINING CENTRE

Interference Interference <th< th=""><th>termine the dimensions with ng to requirement, Draw the t, Heat pipes, insert cooling,</th></th<>	termine the dimensions with ng to requirement, Draw the t, Heat pipes, insert cooling,
UNITS TOPIC SUB-TOPICS c COMPONENTS & LAYOUTS COMPONENTS & LAYOUTS Introduction: Use and application of allowances for component drawing. Introduction: Use and application of the typical runner layout, Study the component drawing / sample, Study & select the impression according typical runner layout. c COMPONENTS & LAYOUTS C2 RUNNER LAYOUT Introduction: Use and application of the typical runner layout, Study the component drawing / sample, Study & select the impression according typical runner layout. c COLUME / HEATING LAYOUT Introduction: Use of cooling & heating circuit in moulds, Draw a typical circuit layout for cooling in mould - (Simple circuit, 'O' circuit, Z circuit, I integer core cooling, Baffled cooling etc.) p WORK / DATA SHEETS Study the component specification and customer requirement. calculatered Study & use the design parameters with respect to mould, material and machine.	termine the dimensions with ng to requirement, Draw the t, Heat pipes, insert cooling,
c CI Introduction: Use and application of allowances for component drawing, Study of component / sample, Study & analyze customer needs, Dete allowances and shrinkages & Draw component drawing. c COMPONENTS & LAYOUTS C2 Introduction: Use and application of the typical runner layout, Study the component drawing / sample, Study & select the impression according typical runner layout. c COMPONENTS & LAYOUTS C2 Introduction: Use and application of the typical runner layout, Study the component drawing / sample, Study & select the impression according typical runner layout. c COMPONENTS & LAYOUTS C3 Introduction: Use of cooling & heating circuit in moulds, Draw a typical circuit layout for cooling in mould - (Simple circuit, 'O' circuit, Z circuit, Heiger core cooling, Baffled cooling etc.) c CALCULATE DESIGN PARAMETERS Study the component specification and customer requirement. D WORK / DATA SHEETS Study & use the design parameters with respect to mould, material and machine.	termine the dimensions with ng to requirement, Draw the t, Heat pipes, insert cooling,
c components & LAYOUTS c: RUNNER LAYOUT Introduction: Use and application of the typical runner layout, Study the component drawing / sample, Study & select the impression according typical runner layout. c: c: Introduction: Use of cooling & heating circuit in moulds, Draw a typical circuit layout for cooling in mould - (Simple circuit, 'O' circuit, Z circuit, I integer core cooling, Baffled cooling etc.) D work / DATA SHEETS Study the component specification and customer requirement.	ng to requirement, Draw the t, Heat pipes, insert cooling,
c3 Introduction: Use of cooling & heating circuit in moulds, Draw a typical circuit layout for cooling in mould - (Simple circuit, 'O' circuit, Z circuit, I integer core cooling, Baffled cooling etc.) Introduction: Use of design parameters for optimum mould design Study the component specification and customer requirement. WORK / DATA SHEETS	t, Heat pipes, insert cooling,
D WORK / DATA SHEETS	
D WORK / DATA SHEETS Study a sub the design parameters with respect to mould, material and machine.	
D WORK / DATA SHEETS	
Use the data book, standards for optimum selection of design parameters.	
Calculate & verify the design parameter according to requirement of mould.	
D2 PREPARATION OF WORK/DATA SHEET Introduction: Use of work sheet for mould design, Use the information data from Unit E1, Prepare the work / data sheet for mould design in release	elevant format
E CONCEPTUAL DESIGNS SKETCHING CONCEPTUAL ESIGNS SKETCHING CONCEPTUAL DESIGNS EI Introduction: Use and application of alternative conceptual design - Refer (List of exercises for design practice & Flow Chart), Study the comp Develop conceptual design using data sheet. (Refer chapter 4.2), Develop alternative conceptual designs.	nponent drawing / sample,
DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (STREPER Worksheet from the design parameters for the selected optimal design, Use the conceptual drawings. Draw the assembly & detailed drawings PLATE ELECTION MOULD)	Refer the process sheet & so f mould as per norms.
P7 DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (SIDE CORE MOULD)	Refer the process sheet & so f mould as per norms.
PR DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - SPUT INJECTION MOULD) INTEGRATION MOULD)	Refer the process sheet & so f mould as per norms.
F DESIGN OF MOULDS DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (TREEE PLATE INJECTIONMOLLD) Introduction: Use of Assembly and detailed drawings for manufacturing of mould, Refer (List of exercises for design practice & Flow Chart),F	I,Refer the process sheet & Is of mould as per norms.
PIO DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (COMPRESSION MOULD) INFORMATION OF THE DETAIL INFORMATION OF THE DESCRIPTION OF THE DESCRIPTI	Refer the process sheet & so f mould as per norms.
F11 DRAW THE ASSEMBLY AND DETAIL DRAWINGS OF MOULD - (TRANSFER MOULD) (TRANSFER MOULD)	I,Refer the process sheet & Is of mould as per norms.
F12 DRAW THE ASSEMULY AND DETAIL DRAWINGS OF MOULD - BLOW MOULD (OPTIONAL)	I,Refer the process sheet & Is of mould as per norms.
BILL OF MATERIALS	bill of material.
G MOULD DATA Introduction: Use of mould data in the production of components	
Study the standards, norms & prepare data for machine set up, Prepare processing data & mould data	
H SIMULATION PACKAGES H1 CADICAE	
Design of moulds with CAD	

EXAMINATION SCHEME:				
SESSIONAL MARKS (60 Marks)	SEMESTER MARKS (90 Marks)		Minimum Pass Marks	
Internal Assessment	Semester Examination	Semester Examination TOTAL MARKS		Semester
(60 Marks)	(90 Marks – 5 Hrs Duration)		50%	50%
Assessments of designs sheets at regular intervals as specified in syllabus detailed programme.	Final Examination at the end of Module covering entire syllabus of the Semester.	(450 Modes)	20 Morko	45 Morko
Average of assessments to be considered for final Sessional marks	Student is eligible to write in final exam only after obtaining minimum Sessional Marks.	(rou metrixs)	30 Warks	40 Marks

INDO GERMAN TOOL ROOM, AURANGABAD	DOCUMENT NO. : TRG : PLN :	
Short Term Course	REV	: 0
MASTER CERTIFICATE COURSE IN TOOL DESIGN	REV. DATE	: 01/04/2015

SYLLABUS

FOR

MASTER CERTIFICATE COURSE IN TOOL DESIGN

DESIGNED BY	VERIFIED BY	REVIEWED BY	APPROVED BY	
ENGINEER (TRG.)	SR. ENGINEER (TRG.)	HOD TRAINING	MANAGING DIRECTOR	

MTC/ MASTER CERTIFICATE COURSE IN TOOL DESIGN

INDEX

Sr. No.	DESCRIPTION	Page No.
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7.	UNIGRAPHICS CAD	08 OF 16
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OVERVIEW OF COURSE

Name of the Course	:	MASTER CERTIFICATE COURSE IN TOOL DESIGN
Duration	:	6 Month (24 Weeks) (Part time course: 8 Hrs. / Day & 5 Days a week)
Entry Qualification	:	Degree in Engineering (Mech./Prod./Automobile)/ Diploma in Engineering (Mech./Prod./Automobile)/
Total Intake Seats	:	30 (Max.)
Pattern	:	MTC
Affiliation	:	Autonomous
Course Fees	:	Rs. 40,000/- (Rupees Forty Thousand only)
Security Deposit	:	Nil
COURSE CONTENTS

SR. NO.	SUBJECT	ALLOTED HRS	NO. OF. MONTH
01	AUTOCAD	72	
02	SOLID WORK	72	
03	UNIGRAPHICS CAD	96	
04	UNIGRAPHICS CAM	96	
05	DESIGN OF JIG & FIXTURE	48	06
06	DESIGN OF PRESS TOOL	48	
07	DESIGN OF MOULD	48	
08	DESIGN OF DIE CASTING DIES	48	
09	DESIGN OF CUTTING TOOL	48	
10	PROJECT WORK	384	
	TOTAL	960 HRS	6 Month

AUTOCAD CIVIL

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	INTRODUCTION TO AUTO CAD	 Introduction & Review of Previous knowledge Capability of Auto Cad Starting AUTOCAD Various Visualization commands Documentation Quick tour Creating and Accessing documentation Layout and plotting Concept of hardware & software 	2	
2	GETTING STARTED (PRINCIPLE & CONCEPT)	 Starting AUTOCAD. AUTOCAD & interface Setting new drawing. Accessing command Opening & saving existing file & function keys etc. 	8	20%
3	CREATING OBJECTS (CO ORDINATE SYSTEM)	Co-ordinates system and their type.Drawing line objectsDrawing curve objects and solid filled areas.	5	
4	EDITING METHODS AND CONTROLLING DRAWING DISPLAY	 Working with named objects Editing objects using the object property tool bar and various method Zooming & Panning drawing, redrawing screen, regenerating the drawing 	5	
5	DRAWING WITH PRECISION	 Adjusting snap & Grid alignment using Ortho mode Using object snap and object tracking methods. 	5	20%
6	LAYER MANAGEMENT	Understanding the concept and use of layersWorking with Layer	5	
7	BASIC DIMENSIONING, GEOMETRIC DIMENSIONING & TOLERANCING. ADDING TEXT TO DRAWING	 Need for Dimensioning Detailed discussion on Dimensioning and tolerance method in AUTOCAD Editing method Adding text with various engineering symbols 	5	20%
8	WORKING WITH BLOCK AND DEFINING BLOCK ATTRIBUTES	 Concept of block, formation of block, Attribute definition DD attribute and edit block Insert, Modify, renaming block 	10	
9	ISOMETRIC DRAWING LAYOUT & PLOTTING	 Concept of Isometric Drawing, axes and planes Defining the paper setting View ports 	10	15%
10	GETTING STARTED WITH 3D & WORKING IN 3D SPACE	 Overview of 3D model Solid modelling in AutoCAD (creating ,editing and modification technique) 	12	20%
11	CREATING SURFACE MODEL	 Surface modelling in AutoCAD (creating, editing and modification technique) Converting wire frame models in to surface model 	5	05%
			72	100%

SOLIDWORK:

			NO.	WEIGHTAGE
UNIT	CHAPTER	SUBTOPIC	OF	(% OF
			HRS.	MARKS)
1	INTRODUCTION TO SOLIDWORKS	 Overview of Solid works essentials Getting started in Solid works Command Manager. Dimensioning standards and units for dimensioning. Important terms and their definitions Open a new part document. 	06	
2	SKETCHER & MODIFICATION OF SKETCHES	 Orderstand the requirement of the sketching environment Open a new part document. Understand the various terms used in sketching environment. Work with various sketching tools. Use the drawing display tools. Delete the sketched entities. Sketching in Solid works, creating & constraining a sketch Edit the sketches using various editing tools. Creating and modifying the rectangular patterns of the sketched entities. Creating and modifying the circular patterns of the sketched entities. Creating and modifying the circular patterns of the sketched entities. Creating and modifying the sketched. Dimension the sketches. Modifying the dimensions of the sketch. Understand the concept of fully defined sketch. View and examine the relations applied to the sketches. 	15	20%
3	SOLID MODELING & EDITING	 Creating and Modifying solid base and thin extruded features Creating and modifying solid base and thin revolved features. Dynamically rotate the view to display the model from all directions. Modifying the orientation of the view. Change the display modes of the solid model. Apply material and textures to the models Creating and Modifying Features -Holes, Draft, Shell, Wrap, Pre-form Features. Creating and Modifying Linear and circular Patterns/Mirror Apply simple and advanced fillets. Chamfer the edges and vertices of the model 	24	25%

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			96	100%
6	DRAFTING	 Generate standard three views, Model view, and predefined view, standard section views Crafting drawings, Creating dimensions, Annotations, Notes and Surface Finish Symbols Add Geometric Tolerance to the Drawing Views. Add Center Marks and Center Lines to the Drawing Views Add Center Marks and Center Lines to the Drawing Views 	18	35%
5	ASSEMBLY MODELING	 Overview of assemblies, the assembly command manager. Bottom-up assemblies, reference sets Bottom-down assemblies, filtering, mating conditions Component pattern , exploding views and components Assembly drawings, assembly projects, Simulation setting, simulation. 	15	
4	SURFACE MODELING & EDITING	 Creating and Modifying and thin extruded surface Creating and Modifying revolved surface Creating and Modifying sweep surface Creating and Modifying lofted surface Surface Editing and modification - trimming, extending etc. 	18	20%
		 Faces and bodies. Creating and Modifying Curves Creating and Modifying reference Geometry - Plane, Axis, Co-ordinate System, and Point. Creating and Modifying model using the contour selection technique. 		

UNIGRAPHICS CAD:

	CHADTED	SUBTODIO	NO.	WEIGHTAGE
UNIT	CHAPTER	SUBTOPIC	HRS.	(% OF MARKS)
1	INTRODUCTION TO UNIGRAPHICS & CURVES	 Overview of Unigraphics essentials Getting started in Unigraphics History of cad & UG Short-cut Commands Basic curves, splines & conics Curve from curves, Curves from bodies 	06	20%
2	SKETCHER	 Sketching in Unigraphics, creating & constraining a sketch Dragging & animating a sketch Transformation of sketch 	12	
3	FEATURING MODELING	 Getting started, blocks, cylinders, cones, spheres, tubes, Boolean operation, holes, slots, bosses, grooves, pockets pads Extruded body, revolved body, sweep along Datum plane, datum axes, hollow, edge blends, chamfers, tapers, instance feature, scale body 	30	35%
4	FREE FORM FEATURES	 Free form features Through points, from poles, From point cloud, through curves, ruled, Through curve mesh Swept, section body, bounded plane Offset sheet, quilt, thicken sheet, editing surfaces Mid-surface, trimmed sheet 	18	20%
5	ASSEMBLY MODELING	 Overview of assemblies, the assembly navigator Bottom-up assemblies, reference sets Concept of Top-down assemblies, mating conditions Component arrays, exploding views and components. Sequencing Assembly explode, assembly projects Overview of Mechanism 	15	25%
6	DRAFTING	 Creating drawings, Creating dimensions Dimension preferences, Creating section views GD & T symbols, Creating notes & balloons Drawing Template Surface finish & BOM 	15	
			96	100%

UNIGRAPHICS CAM:

			NO.	WEIGHTAGE
UNIT	CHAPTER	SUBTOPIC	OF	(% OF
			HRS.	MARKS)
1	OVERVIEW OF MANUFACTURING	 Unigraphics different from other CAM software's Review of Modelling Introduction to CAM concept, Master model concept 	06	
2	MANUFACTURING APPLICATION	 Machining environment, Operation Navigator Re-entering into the Manufacturing application Work and Machine Co-ordinate Downloading the Internal Tool path Manufacturing Tools, Creating new operation Saving part file, closing part file 	12	20%
3	POINT TO POINT MACHINING	 Point to point machining Creating drilling & reaming operation hole making 	30	35%
4	PLANNER MILLING	 Planner mill overview Profiling, Single level, Multi-level Multi region, Creation of Boundaries Setting Custom Boundary Member Data Setting Drive Cutting Method, Ramping method Cut types, Trim boundary, Uncut Region boundary 	18	20%
5	CAVITY MILLING	 Cavity Milling operation Creating Cavity Milling operation Blank Geometry and offset, Uses of cutting option Definition of work piece using solid, Definition of cut ranges Defining of level of the bottom of the 1st range & 2nd range Depth of cut, Feed rates, Tolerant machining Cavity milling using faces, Creating new geometry object Defining part geometry with drawing rector Editing geometry, Using pre-drill engage points Generating tool path, Looking for pre-defined setting Machining offset blank geometry Blank distance, Generating tool path Using blank geometry to Isolate cavity area 	12	25%
6	FIXED CONTOUR OPERATION	 Creating fixed contour operation Geometry creation, Adding a new operation template Setting machine tolerance, setting non 	12	

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		 cutting motions Defining of clearance geometry, drive method, boundary method Use part containment option, cut pattern Sequential milling 		
7	INTRODUCTION TO CNC LATHE & CNC WIRE	 Lathe cross section, common turning parameters Rough & Finish turning What is wire EDM, EDM dialog overview Wire EDM operation, creating Wire EDM Operation Internal & External Trim operation 	06	
			96	100%

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DESIGN OF JIG & FIXTURE:

			NO.	WEIGHTAGE
UNIT	CHAPTER	SUBTOPIC	OF	(% OF
			HRS.	MARKS)
1	INTRODUCTION	 Overview of mass production of components with Tools Overview of mass production of components using Jigs & Fixture 	02	
2	BASIC ELEMENTS OF JIG & FIXTURE	Typical Jig & it's partsTypical Fixture & it's parts	04	2007
3	LOCATING ELEMENTS	 Introduction to Location Plane locators Concentric locators Profile locators 	04	30%
4	CLAMPING ELEMENTS	Introduction to ClampingStandard Clamping elementsNon Standard Clamping elements	04	
5	GUIDING ELEMENTS	Introduction to GuidingGuiding elements	04	
6	SUPPORTING ELEMENTS	Intermediate supporting elementsBody design features	04	25%
7	CLASSIFICATION OF JIGS	Classification of Jigs	04	
8	DESIGN OF JIG	Design of Jig	08	25%
9	TOOL SETTING ELEMENTS	Tool Setting elements	04	2376
10	CLASSIFICATION OF FIXTURES	Classification of Fixtures	02	
11	DESIGN OF FIXTURE	Design of Fixture	06	059/
12	ESTIMATION	Material, Machine time & process estimation	02	25%
13	MAINTENANCE, SAFETY & STORAGE	Jig & Fixture maintenance, safety & storage	02	
			48	100%

DESIGN OF PRESS TOOL:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	INTRODUCTION	 Overview of mass production of sheet material components 	02	
2	PRESS TOOL OPERATIONS	 Press Tools - Cutting operations Press Tools - Non Cutting Operations Press Tools - Integrated Operations 	04	25%
3	BASIC ELEMENTS OF PRESS TOOLS	Typical Press Tool & Parts	04	
4	CLASSIFICATION OF PRESS TOOLS	Cutting Dies	04	
5	DESIGN PARAMETERS	 Design Parameters for Shearing Design Parameters for Strip Layout Design Parameters for elements of Press Tools for cutting operations 	20	50%
6	CLASSIFICATION OF PRESSES	Classification of Presses	04	
7	MATERIAL HANDLING	Material Feeding & Scrap Handling	02	
8	ESTIMATION	 Material, Machine Time & Process Estimation 	04	
9	DIE MAINTENANCE, SAFETY & STORAGE	Die maintenance, Safety & Storage	02	25%
10	SPECIFICATION	 Specification of Material, Press Tool & Press 	02	
			48	100%

DESIGN OF MOULD:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	INTRODUCTION	Overview of mass production of moulded plastic components.	02	
2	MOULDING OPERATIONS	 Injection Moulding Compression Moulding Transfer Moulding Blow Moulding Rotational Moulding Thermo Forming Other Operations 	04	
3	ELEMENTS OF MOULD & THEIR FUNCTION	 Injection Mould Core & Cavity Mould Base & Parts Feeding system Cooling system Ejection system Core & Cavity Retainer Parts 	04	25%
4	CLASSIFICATION OF MOULDS	 Injection Moulds Based on day light Based on ejection Based on Feed system 	04	
5	DESIGN PARAMETERS RELATED TO MOULD, MATERIAL & MACHINE	Injection Moulds	20	50%
6	MATERIAL HANDLING	 Pre Molding Post Molding Storage & Disposal	04	
7	ESTIMATION	 Estimation parameters of Mould, Machine & process. 	02	
8	MAINTENANCE, SAFETY & STORAGE	 Maintain, safety and storage with respect to Mould and Machine. 	04	25%
9	SPECIFICATION	Specification of Mould, Material and Machine.	02	
10	INTRODUCTION TO SIMULATION PACKAGES	Introduction to Simulation Packages	02	
			48	100%

DESIGN OF DIE CASTING DIE:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	INTRODUCTION	 Overview of mass production of casted parts produced by various casting process. 	02	
2	DIE CASTING OPERATIONS	 Gravity Die Casting Pressure Die Casting (Cold Chamber) Pressure Die Casting (Hot Chamber) Defects & Remedies on Die Casting Components 	04	25%
3	ELEMENTS OF DIE CASTING DIE & THEIR FUNCTION	Feeding SystemCooling ElementsEjection System / Techniques	04	
4	CLASSIFICATION OF DIE CASTING DIES	 Hot Chamber Die Casting Dies Cold Chamber Die Casting Dies Investment Die Casting Dies Gravity Die Casting Dies 	04	
5	DESIGN PARAMETERS RELATED TO MATERIALS (METAL), MACHINE & DIE CASTING DIES	 Pressure Die Casting Dies (Hot & Cold Chamber) Gravity Die Casting Dies Investment Casting 	20	50%
6	MATERIAL HANDLING	 Pre Casting Post Casting Storage & Disposal	04	
7	ESTIMATION	 Estimation Parameters of Die Casting Dies, Machining and Process 	02	
8	MAINTENANCE, SAFETY & STORAGE	 Maintenance, Safety & Storage with respect to Die Casting Die & Machine 	04	25%
9	SPECIFICATION	 Specification of Die, Material and Machine 	02	
10	COMPUTER AIDED INFORMATION ANALYSIS	 Introduction of Simulation and Analysis Packages 	02	
			48	100%

DESIGN OF CUTTING TOOL:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	INTRODUCTION TO CUTTING TOOL	Introduction.	02	
2	TOOL GEOMETRY	Single point cutting toolMulti point cutting tool	08	
3	METAL CUTTING THEORY	 Methods of metal cutting Mechanics of metal cutting Chip formation Chip breakers 	08	55%
4	CUTTING TOOL LIFE	 Tool life & Tool wear Machinability Heat generation in metal cutting Cutting tool materials Cutting fluids 	08	
5	DESIGN OF CUTTING TOOL	 Metal cutting parameters Cutting forces Determination of shear plane angle Design of single point cutting tool Design of multi point cutting tool 	18	45%
6	MAINTENANCE OF CUTTING TOOL	 Re-sharpening of cutting tool Storage of cutting tool Precautions of cutting tool 	04	
			48	100%

LIVE PROJECT ON TOOL DESIGN:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	PROJECT	LIVE PROJECTS ON DESIGN OF JIGS & FIXTURE, DESIGN OF PRESS TOOL, DESIGN OF MOULD, DESIGN OF DIE CASTING DIE USING ABOVE SOFTWARES	384	100%
			48	100%

MTC/ MASTER CERTIFICATE COURSE IN TOOL DESIGN

INDO GERMAN TOOL ROOM, AURANGABAD	DOCUMENT NO.: TRG:PLN:
Short Term Course	REV : 1
MASTER CERTIFICATE COURSE IN CAD/CAM	REV. DATE : 28/03/2016

SYLLABUS

FOR

MASTER CERTIFICATE COURSE IN CAD/CAM

DESIGNED BY	VERIFIED BY	REVIEWED BY	APPROVED BY
ENGINEER (TRG.)	SR. ENGINEER (TRG.)	HOD TRAINING	MANAGING DIRECTOR

MTC/ MASTER CERTIFICATE COURSE IN CAD/CAM

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Sr. No.	DESCRIPTION	Page No.
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4.	COURSE CONTENTS	04 OF 17
5.	AUTOCAD	05 OF 17
6.	SOLID WORK	06 OF 17
7.	UNIGRAPHICS CAD	08 OF 17
8.	UNIGRAPHICS CAM	09 OF 17
9.	CREO PARAMETRIC (CAD)	11 OF 17
10.	CATIA (CAD)	12 OF 17
11.	ANSYS (CAE)	13 OF 17
12.	HYPERMESH (CAE)	14 OF 17
13.	CNC PROGRAMMING	15 OF 17
14	INTRODUCTION TO CNC MACHINING	16 OF 17
15.	PROJECT WORK	17 OF 17

OVERVIEW OF COURSE

Name of the Course	:	MASTER CERTIFICATE COURSE IN CAD/CAM
Duration	:	6 Month (24 Weeks, 8Hrs. /day)
Entry Qualification	:	Degree in Engineering (Mech./Prod./Automobile)/ Diploma in Engineering (Mech./Prod./Automobile)/
Total Intake Seats	:	30 (Max.)
Pattern	:	MTC
Affiliation	:	Autonomous
Course Fees	:	Rs. 40,000/- (Rupees Forty Thousand only)
Security Deposit	:	Nil

COURSE CONTENTS

SR. NO.	SUBJECT	ALLOTED HRS	NO. OF. MONTH
01	AUTOCAD	72	
02	SOLID WORK	72	
03	UNIGRAPHICS CAD	96	
04	UNIGRAPHICS CAM	96	
05	CREO PARAMETRIC (CAD)	96	
06	CATIA (CAD)	96	06
07	ANSYS (CAE)	72	
08	HYPERMESH (CAE)	72	
09	CNC PROGRAMMING	48	
10	INTRODUCTION TO CNC MACHINING	48	
11	PROJECT WORK	192	
	TOTAL	960 HRS	6 Month

AUTOCAD

	CHAPTER	SUBTOPIC	NO. OF	WEIGHTAGE
UNIT	CHAFTER	30610FIC	HRS.	(% OF MARKS)
1	INTRODUCTION TO AUTO CAD	 Introduction & Review of Previous knowledge Capability of Auto Cad Starting AUTOCAD Various Visualization commands Documentation Quick tour Creating and Accessing documentation Layout and plotting Concept of hardware & software 	2	
2	GETTING STARTED (PRINCIPLE & CONCEPT)	 Starting AUTOCAD. AUTOCAD & interface Setting new drawing. Accessing command Opening & saving existing file & function keys etc. 	8	20%
3	CREATING OBJECTS (CO ORDINATE SYSTEM)	 Co-ordinates system and their type. Drawing line objects Drawing curve objects and solid filled areas. 	5	
4	EDITING METHODS AND CONTROLLING DRAWING DISPLAY	 Working with named objects Editing objects using the object property tool bar and various method Zooming & Panning drawing, redrawing screen, regenerating the drawing 	5	
5	DRAWING WITH PRECISION	Adjusting snap & Grid alignment using Ortho modeUsing object snap and object tracking methods.	5	20%
6	LAYER MANAGEMENT	Understanding the concept and use of layersWorking with Layer	5	
7	BASIC DIMENSIONING, GEOMETRIC DIMENSIONING & TOLERANCING. ADDING TEXT TO DRAWING	 Need for Dimensioning Detailed discussion on Dimensioning and tolerance method in AUTOCAD Editing method Adding text with various engineering symbols 	5	20%
8	WORKING WITH BLOCK AND DEFINING BLOCK ATTRIBUTES	 Concept of block, formation of block, Attribute definition DD attribute and edit block Insert, Modify, renaming block 	10	
9	ISOMETRIC DRAWING LAYOUT & PLOTTING	 Concept of Isometric Drawing, axes and planes Defining the paper setting View ports 	10	15%
10	GETTING STARTED WITH 3D & WORKING IN 3D SPACE	 Overview of 3D model Solid modelling in AutoCAD (creating ,editing and modification technique) 	12	20%
11	CREATING SURFACE MODEL	 Surface modelling in AutoCAD (creating, editing and modification technique) Converting wire frame models in to surface model 	5	05%
			72	100%

MTC/ MASTER CERTIFICATE COURSE IN CAD/CAM

SOLIDWORK:

			NO.	WEIGHTAGE
UNIT	CHAPTER	SUBTOPIC	OF	(% OF
			HRS.	MARKS)
1	INTRODUCTION TO SOLIDWORKS	 Overview of Solid works essentials Getting started in Solid works Command Manager. Dimensioning standards and units for dimensioning. Important terms and their definitions Open a new part document. Understand the requirement of the sketching. 	06	
2	SKETCHER & MODIFICATION OF SKETCHES	 Orderstand the requirement of the sketching environment Open a new part document. Understand the various terms used in sketching environment. Work with various sketching tools. Use the drawing display tools. Delete the sketched entities. Sketching in Solid works, creating & constraining a sketch Edit the sketches using various editing tools. Creating and modifying the rectangular patterns of the sketched entities. Creating and modifying the circular patterns of the sketched entities. Creating and modifying the circular patterns of the sketched entities. Creating and modifying the sketche. Dimension the sketches. Modifying the dimensions of the sketch. Understand the concept of fully defined sketch. View and examine the relations applied to the sketches. 	15	20%
3	SOLID MODELING & EDITING	 Creating and Modifying solid base and thin extruded features Creating and modifying solid base and thin revolved features. Dynamically rotate the view to display the model from all directions. Modifying the orientation of the view. Change the display modes of the solid model. Apply material and textures to the models Creating and Modifying Features -Holes, Draft, Shell, Wrap, Pre-form Features. Creating and Modifying Linear and circular Patterns/Mirror 	24	25%

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MTC/ MASTER CERTIFICATE COURSE IN CAD/CAM

			96	100%
6	DRAFTING	 Generate standard three views, Model view, and predefined view, standard section views Crafting drawings, Creating dimensions, Annotations, Notes and Surface Finish Symbols Add Geometric Tolerance to the Drawing Views. Add Center Marks and Center Lines to the Drawing Views Add Center Marks and Center Lines to the Drawing Views 	18	35%
5	ASSEMBLY MODELING	 Overview of assemblies, the assembly command manager. Bottom-up assemblies, reference sets Bottom-down assemblies, filtering, mating conditions Component pattern , exploding views and components Assembly drawings, assembly projects, Simulation setting, simulation. 	15	
4	SURFACE MODELING & EDITING	 Creating and Modifying and thin extruded surface Creating and Modifying revolved surface Creating and Modifying sweep surface Creating and Modifying lofted surface Surface Editing and modification - trimming, extending etc. 	18	20%
		 Apply simple and advanced fillets. Chamfer the edges and vertices of the model Faces and bodies. Creating and Modifying Curves Creating and Modifying reference Geometry - Plane, Axis, Co-ordinate System, and Point. Creating and Modifying model using the contour selection technique 		

UNIGRAPHICS CAD:

UNIT	CHAPTER	SUBTOPIC	NO. OF	WEIGHTAGE (% OF
			HRS.	MARKS)
1	INTRODUCTION TO UNIGRAPHICS & CURVES	 Overview of Unigraphics essentials Getting started in Unigraphics History of cad & UG Short-cut Commands Basic curves, splines & conics Curve from curves, Curves from bodies 	06	20%
2	SKETCHER	 Sketching in Unigraphics, creating & constraining a sketch Dragging & animating a sketch Transformation of sketch 	12	
3	FEATURING MODELING	 Getting started, blocks, cylinders, cones, spheres, tubes, Boolean operation, holes, slots, bosses, grooves, pockets pads Extruded body, revolved body, sweep along Datum plane, datum axes, hollow, edge blends, chamfers, tapers, instance feature, scale body 	30	35%
4	FREE FORM FEATURES	 Free form features Through points, from poles, From point cloud, through curves, ruled, Through curve mesh Swept, section body, bounded plane Offset sheet, quilt, thicken sheet, editing surfaces Mid-surface, trimmed sheet 	18	20%
5	ASSEMBLY MODELING	 Overview of assemblies, the assembly navigator Bottom-up assemblies, reference sets Concept of Top-down assemblies, mating conditions Component arrays, exploding views and components. Sequencing Assembly explode, assembly projects Overview of Mechanism 	15	25%
6	DRAFTING	 Creating drawings, Creating dimensions Dimension preferences, Creating section views GD & T symbols, Creating notes & balloons Drawing Template Surface finish & BOM 	15	
			96	100%

UNIGRAPHICS CAM:

			NO.	WEIGHTAGE
UNIT	CHAPTER	SUBTOPIC	OF	(% OF
			HRS.	MARKS)
1	OVERVIEW OF MANUFACTURING	 Unigraphics different from other CAM software's Review of Modelling Introduction to CAM concept, Master model concept 	06	
2	MANUFACTURING APPLICATION	 Machining environment, Operation Navigator Re-entering into the Manufacturing application Work and Machine Co-ordinate Downloading the Internal Tool path Manufacturing Tools, Creating new operation Saving part file, closing part file 	12	20%
3	POINT TO POINT MACHINING	 Point to point machining Creating drilling & reaming operation hole making 	30	35%
4	PLANNER MILLING	 Planner mill overview Profiling, Single level, Multi-level Multi region, Creation of Boundaries Setting Custom Boundary Member Data Setting Drive Cutting Method, Ramping method Cut types, Trim boundary, Uncut Region boundary 	18	20%
5	CAVITY MILLING	 Cavity Milling operation Creating Cavity Milling operation Blank Geometry and offset, Uses of cutting option Definition of work piece using solid, Definition of cut ranges Defining of level of the bottom of the 1st range & 2nd range Depth of cut, Feed rates, Tolerant machining Cavity milling using faces, Creating new geometry object Defining part geometry with drawing rector Editing geometry, Using pre-drill engage points Generating tool path, Looking for pre-defined setting Machining offset blank geometry Blank distance, Generating tool path Using blank geometry to Isolate cavity area Creating fixed contour operation 	12	25%
6	FIXED CONTOUR OPERATION	 Creating fixed contour operation Geometry creation, Adding a new operation template Setting machine tolerance, setting non 	12	

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MTC/ MASTER CERTIFICATE COURSE IN CAD/CAM

		 cutting motions Defining of clearance geometry, drive method, boundary method Use part containment option, cut pattern 		
7	INTRODUCTION TO CNC LATHE & CNC WIRE	 Sequential milling Lathe cross section, common turning parameters Rough & Finish turning What is wire EDM, EDM dialog overview Wire EDM operation, creating Wire EDM Operation Internal & External Trim operation 	06	
			96	100%

MTC/ MASTER CERTIFICATE COURSE IN CAD/CAM

CREO PARAMETRIC:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	INTRODUCTION TO CREO PARAMETRIC	 Overview of CREO Parametric Getting started in CREO Parametric About configuration options Model tree, layers. Working with model properties. 	06	20%
2	SKETCHER WORKBENCH	 Sketcher environment, References Creating Sketcher geometry. Dimensioning and constraining sketcher. Modifying sections, Sketcher text. 	15	
3	PART DESIGN WORKBENCH	 Datum's. Basic Features-Extrude, Revolve, Offset, Fill. Construction Features. Tweak Features. Modifying Dimensions. Copying features, Mirroring features. Advance features. 	24	25%
4	SURFACE & ADVANCED COMMANDS	 Creating surface features. Creating advance surface features. Trimming Quilts. 	18	20%
5	ASSEMBLY DESIGN WORKBENCH	 Various Assembly constraints Working with bottom up and concept of top down assembly Degrees of freedom Editing Assembly Modify Dimensions & Edit Definition 	18	
6	GENERATIVE & INTERACTIVE DRAFTING WORKBENCH	 Drawing templates Creating various section views Add a B.O.M. Adding text and labels Automatic Dimensioning Various engineering symbols Translators 	15	35%
			96	100%

CATIA:

			NO.	WEIGHTAGE
UNIT	CHAPTER	SUBTOPIC	OF	(% OF
			HRS.	MARKS)
1	INTRODUCTION TO CATIA	 Introduction to various workbenches CATIA user interface Tool Bar Customization Various Visualization commands 	06	
2	SKETCHER WORKBENCH	 Sketching in CATIA Creating and constraining various sketch profile Operations on sketch Geometry viz. corner, quick trim, break, chamfer Project 3D Elements, Intersect 3D Elements, Isolate sketch profile Various sketch based projects 	15	20%
3	PART DESIGN WORKBENCH	 Various workbench based features viz. pad, pocket, shaft, Groove, Hole etc. Boolean Operations Add, Remove, Intersect, and Remove Lump. Transformation Features Translate, Rotate, Mirror, R/C pattern, Scale etc. Surface Based Features split, close surface, sew surface Various advance tasks power copy, catalogs, design table etc. 	24	25%
4	WIREFRAME AND SURFACE DESIGN WORKBECH	 Various wire frame geometries Various surface creation methods extrude, revolve, offset, swept, loft Operation on shape geometry join, healing, trim, extract geometry projects 	18	20%
5	ASSEMBLY DESIGN WORKBENCH	 Various Assembly constraints Working with bottom up and top down assembly Design in context Generating bill of material 	15	
6	GENERATIVE & INTERACTIVE DRAFTING WORKBENCH	 Creating various views through wizard Creating various section views Add a B.O.M. Adding text and labels Dimensioning Various engineering symbols Translators Center Lines to the Drawing Views 	18	35%
			96	100%

ANSYS:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	INTRODUCTION TO FEA	Overview of FEABasic Analysis Procedure		
2	INTRODUCTION TO ANSYS & DIFFERENT TYPE OF INTERFACES	 Capabilities of ANSYS (Different analysis type) Introduction to different type of interfaces ANSYS classic interface in dept. 	16	25%
3	ANSYS CLASSIC & ANALYSIS PROCEDURE	 Graphics & picking Select logic Database files & job name. General analysis procedure Solid modelling Import solid model from other CAD software Building of finite element model Defining material properties Element Selection & details Defining Real constants Loading & boundary conditions Solving Post Processing Review results by means of POST1 & POST26 	24	30%
4	STRUCTURAL ANALYSIS	 Types of structural Analysis FEA modeling for structural analysis Linear & nonlinear analysis Static analysis Dynamic transient analysis Buckling analysis Modal Analysis 	16	25%
5	THERMAL ANALYSIS	 Types of thermal Analysis FEA modeling for thermal Analysis Steady State thermal analysis Transient Thermal analysis 	16	20%
			72	100%

HYPERMESH:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	INTRODUCTION TO CAE & HYPERMESH	 OVERVIEW OF FEA BASIC ANALYSIS PROCEDURE Basic analysis procedure Analytical approach to solve a problem GUI & SHORT CUTS Node 	16	25%
2	GEOMETRY CREATION	 Node Line Surface Primitives Solid 		
3	GEOMETRY EDIT & MANUAL & AUTOMESHING	 Point edit, Node edit, Lines edit Surface edit Edge edit De feature Mid surface Different manual meshing options Auto meshing 3-D meshing 	24	30%
4	QUALITY CRITERIA AND OPTRISTRUCT & HYPERVIEW	 Check elements Quality criteria Save and rectify elements Knowledge of different quality parameters Different collectors Defining load and constraints Running analysis Viewing results in Hyper view Updating collectors 	24	30%
5	THERMAL ANALYSIS	 Capabilities of hyper form Introduction to One Step and Incremental Analysis Performing One Step Analysis 	08	15%
			72	100%

CNC PROGRAMMING:

	CHARTER					
UNIT	CHAPTER	SUBTOPIC	HRS.	(% OF MARKS)		
1	PREPARING PROGRAM FOR CNC LATHE/MILLING OPERATIONS	 Writing CNC program for Lathe/Milling to specification Simulating the program on the control. Generating work plan for machine operations to given quality criteria. Planning of Tool clamping in spindle and tool magazine. Set machine data & Tool parameters required on the machine control. Optimizing the cutting & geometrical parameters of the available tools Check and confirm the tool & tool holder's condition. 	12	25%		
2	PREPARATION & SETTING CNC LATHE/MILLING FOR OPERATION WITH TEST RUN SIMULATION.	 Setting the job references. Checking the optimized program with simulation. Record the alterations and allowance kept in tool table Preset. Inspect & clamp lathe tools, Record the variations after final tool setup Setting the job references. Rechecking the optimized Programme with simulation. Record the alterations and allowance kept in tool table Preset. Inspect & clamp lathe tools, Record the variations after final tool setup 	18	75%		
3	EXECUTION OF PART PROGRAMME MACHINING	 Calling part Programme for machining Starting and controlling machining operation and observe the operation Apply in process inspection and testing procedures. Correction of task/ task elements not conforming to the specifications and quality criteria 	18			
			48	100%		

INTRODUCTION TO CNC MACHINING:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	EXECUTION OF PART PROGRAMME MACHINING	 Exposure for Programming & simulator of FANUC, SINUMERIK, DMG TURNPLUS & HEIDENHAIN Controls through postprocessors. Practical Training and workshop for above sub topic on CNC Machines. Programming Exercise. Machining of Programmed exercise on CNC Lathe & Milling Machines. 	12	25%
2	CNC TURNING	 Plan and optimize programs for CNC turning operations. Prepare & set CNC lathe for operations & test run Programme. Execute program & inspect simple geometrical forms/standard parts. 	18	759/
3	CNC MILLING	 Prepare & optimize programs for CNC milling operation. Prepare & set CNC milling for operations & test run Programme. Execute program & inspect simple geometrical forms/standard parts. 	18	75%
			48	100%

LIVE PROJECT ON TOOL DESIGN:

UNIT	CHAPTER	SUBTOPIC	NO. OF HRS.	WEIGHTAGE (% OF MARKS)
1	PROJECT	LIVE PROJECTS ON DESIGN OF JIGS & FIXTURE, DESIGN OF PRESS TOOL, DESIGN OF MOULD, DESIGN OF DIE CASTING DIE USING ABOVE SOFTWARES	384	100%
			48	100%

MTC/ MASTER CERTIFICATE COURSE IN CAD/CAM

POST DIPLOMA IN TOOL DESIGN & CAD/CAM (PDTD&CC)

curriculum

MSME-Technology Centre Indo German Tool Room, Aurangabad

Organization Profile:

The government of India in its endeavor to provide right stimulus for the growth of industry in the country – particularly with a objective of helping MSME's has established Indo German Tool Room, Aurangabad.

A project of Government on India, Government of Federal Republic of Germany & Government of Maharashtra, Indo German Tool Room (IGTR) an ISO 9001:2000, ISO 14001:2004 is a Centre which nurtures excellence and provides total tooling & training solutions. IGTR is concentrating on an integrated development of the related segments of the industry by way of providing International Quality Tools, Trained Personnel, and Consultancy in Tooling & Related Areas & is constantly crossing new frontiers in quest for excellence & beyond.

The Organization implements its programme of technical training through its Training Center located at Aurangabad and sub centers at Pune, Mumbai & Nagpur. State of-the-art Tool Room facilities under single roof has wide spectrums of sophisticated Machines include latest & advanced CNC Lathe, Milling, EDM & Wire Cut machines, which can cater to various requirements of the customers. Modern Tool Room Facilities are indispensable for the industrial development of the Country & properly trained manpower is an asset to the nation. It has achieved international recognition also by providing continuous training courses in Tool Design & Die manufacturing technology to the trainees of South Africa, Sri Lanka, Saudi Arabia sponsored by respective state governments' agencies & industrial associations

Tool Room is aimed at promoting purposeful skill oriented technical education for the youth in India. Training dept. is equipped with CAD/CAM/CAE labs supported with CNC lathe, CNC Milling, CNC EDM and CNC WEDM sections to impart skill oriented training. The organization implements its programme of technical training through its Training Centre and On-Job Training in Production Centre located at Aurangabad and sub centers at Pune, Nagpur & Mumbai.

The institute offers various courses to cover a wide spectrum of technical man power at Post Graduate Level, Post Diploma Level, Diploma Level and Certificate Level. Besides above number of shortterm courses in specialized areas of Tool Design, CAD/CAM, CNC Machining as well as tailor made modules are designed and conducted to suit customer requirement

PROGRAMME TITLE: POST DIPLOMA IN TOOL DESIGN AND CAD CAM

- ENTRY REQUIREMENTS/QUALIFICATION: **Preferably Diploma** (Mech. Engineering or equivalent)
- DURATION: Months/Years/Hours: 1 year. (1560 hrs.)

A. PROGRAM LEVEL MAPPING

I. MISSION OF THE INSTITUTE :

- Trained man-power to the industry through Long Term, Medium Term and Short Term Courses in CAD/CAM/CAE/CNC Machining and Tool & Die Technology.
- Providing Consultancy for Total Tooling Solutions for product development, productivity enhancement and quality improvement.
- Design and Manufacturing of Quality Press Tools, Die Casting Dies, Moulds, Jigs, Fixtures and Gauges and components as per customer requirements conforming to International Standards.

II. VISION OF THE INSTITUTE

- Self Sufficiency and beyond with sustained growth.
- > Adopt e teaching practices including Computer Based Training / Web Based Training
- Internationally acclaimed Centers of Excellence in product Developments Tool Engineering & Allied Fields.
- > Developing competitive edge over National & International Players
- > Nurturing Socially Relevant Skill Development programmers for improving employment potential.

III. JOB FUNCTIONS/ROLES:

- Design and Development of Jigs and Fixtures
- Design and Development of Press Tools
- Design and Development of Mould
- Design and Development of Die Casting Dies
- Develop tool design using CAD software
- Develop and execute CNC Machining programme using CAM software

Curriculum

POST DIPLOMA IN TOOL DESION AND CAD/CAM (PDTD&CC)

SYLLABUS/ CURRICULUM

This programme is aimed at training candidates for the job of "Tool Designer" in the "Capital Goods" Sector/ industry and by the end of the program aims at building the following key competencies amongst the learner:

1. Identify customer's requirement and create Conceptual Tool Design.	12. Design and Development of Die Casting Dies
2. Develop plan for design process.	13. Mathematical calculations
3. Create and evaluate Tool design options.	14. Develop tool design using CAD software
4. Describe tool Design procedure	15. Develop and execute CNC Machining programme using CAM software
5. Describe tool construction	16. Develop quality consciousness concept
 Describe elements of tool with their functions, material and heat treatment processes 	17. Prepare costing of Tooling
7. List different tooling standards	18. Use basic health and safety practices at the workplace
8. Describe Manufacturing Processes and process plan	19. Responsibility for own work and learning and full responsibility for other's works and learning
9. Design and Development of Jigs and Fixtures	20. Communicate effectively
10. Design and Development of Press Tools	21. Develop entrepreneurship skills
11. Design and Development of Mould	22. WORK PROJECT

CURRICULUM REVIEW

			Teaching No. of	Scheme / f Hours				Exan	nination So	heme						
Sr.	Subject	Subject Name				Theo	ry			Prac	actice					
No	code				Sess	ional	Seme Exa	ster m	Soccional Somostor Exam			er Fxam				
			Theory	Practice	Practice Max. Min to Max. Marks pass Marks	Max. Marks	Min to pass	Max. Marks	Min to pass	Max. Marks	Min to pass	Total Marks				
1		CNC PROGRAMMING AND CNC MACHINING	40	120	40						60		100			
2		COMPUTER AIDED DESIGN (AUTOCAD, COLLAB CAD AND SOLIDWORKS)		120	40						60		100			
3		COMPUTER AIDED MANUFACTURING (MASTERCAM AND UNIGRAPHICS CAM)		120	40						60		100			
4		DESIGN OF JIGS AND FIXTURES	40	80	80		60				60		200			
5		DESIGN OF PRESS TOOLS	40	120	80		60				60		200			
6		DESIGN OF MOULDS	40	120	80		60				60		200			
7		DESIGN OF DIE CASTING DIES	40	80	80		60				60		200			
8		ENGINEERING METROLOGY AND QUALITY CONTROL	40	40	40		60						100			
9		ADVANCE CAD - II (UNIGRAPHICS AND CATIA)		120	40						60		100			
10		MANUFACTURING PROCESS PLANNING AND HEAT TREATMENT	40		40		60						100			
11		ENTREPRENUERSHIP	40		60								60			
12		PROJECT		320	600								600			
			320	1240									2060			

COURSE / MODULE TEMPALTE

SEMESTER: I

COURSE NAME: CNC PROGRAMMING AND CNC MACHINING

COURSE CODE:

COURSE OUTCOMES: After completion of course Student should be able to:

- Explain applications and advantages of CNC machines and technology
- Prepare CNC program for CNC Lathe , Milling, EDM and WEDM
- Calculate CNC Machining Parameters
- Prepare process plan, job card, inspection report
- Handle measuring instrument for inspection
- Prepare program and execute machining for CNC Lathe , Milling, EDM and WEDM
- Follow Safety norms during operations

THEORY HOURS: 40 PRACTICAL HOURS: 120

THEORY MARKS: -

PRACTICAL MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks	
Unit No. UNIT-I	Unit Name Introduction to CNC technology and CNC programing	 Unit level outcomes After completion of unit Student should be able to: Explain applications and advantages of CNC machines and technology Understand and explain difference between conventional & non-conventional machine tool Demonstrate and explain various CNC control 	Contents (chapters/topics) Introduction to CNC technology – CNC machines & controls. History & development of CNC technology. Conventional Vs. non-conventional machine tool. Numerical control on CNC machine tools CNC control and CNC Control and types of CNC control Calculation of technological data for CNC machining. CNC clamping system. Implementation of JH for CNC	6	Marks 8	
		Calculate technological data for	Basic health and safety			
		 CNC machining Explain the JH system, its use and application Understand the importance and use of PPE's 	CNC programming basics. Introduction to manual NC programming Manual NC programming for lathe & milling machines. Application Numerical Control, Advantages, & Disadvantages, Adoptive Control System. Practical training & workshop for above sub topics on CNC Machine.			
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UNIT-II	CNC Programing	 After completion of unit Student should be able to Understand and explain the concept and importance of CNC programming Prepare and understand line program for various profiles Identify and set parameters for various simulators Prepare and simulate various operation cycles for lathe and milling Use and simulate cycles using various Controls Knowledge of the parameters for various machining cycles and operations 	 Introduction to CNC programming Introduction and demonstration of line programs CNC programming for lathe & milling machine using iso codes into the CNC simulator. CNC programming for lathe and milling machines using different machining cycles into the CNC simulator. Procedures Associated with part programming, Cutting process parameter selection, Process planning issues and path planning, G & M Codes, Interpolations, Canned Cycles and Subprograms, Tool compensations Exposure for programming and simulator of FANUC, SINUMERIC, DMG TURNPLUS & Controls through post processors. Programming exercise. Machining of programmed exercise on CNC lathe & milling machines. 	6	10	
UNIT-III	CNC Machining – Lathe	 After completion of unit Student should be able to Calculate parameters for turning operations Understand the parameters of lathe operations Explain operation sequence for the lathe operations Prepare operation sequence for test run 	Plan and optimize programs for CNC turning operations. Calculate parameters like speed feed etc. and set a references for the various operations Prepare operation and operation sequence for the lathe operations like turning, grooving etc. Prepare & set CNC lathe operations and test run programmed Execute program and inspect simple geometrical forms / standard parts	8	12	

		 Set , Simulate, and perform various operations like turning , grooving threading etc. 	Use of various PPE's on CNC lathe machine			
UNIT-IV	CNC Machining – Milling	 After completion of unit Student should be able to Calculate parameters for milling operations Understand the parameters of milling operations Explain operation sequence for the milling operations Prepare operation sequence for test run Set , Simulate, and perform various operations like core milling , cavity milling , PCD drilling etc. 	Plan and optimize programs for CNC Milling operations. Calculate parameters like speed feed , depth of cut etc. and set a references for the various operations Various methods of work process like edge finding block center etc. Prepare & set CNC Milling operations and test run programmed Execute program and inspect simple geometrical forms / standard parts Use of various PPE's on CNC milling machine	6	8	
UNIT-V	CNC Machining – EDM & WEDM	 After completion of unit Student should be able to Calculate parameters for EDM and WEDM operations Understand the parameters related to surface finish of work parts Explain operation sequence for the operations Calculate and set various parameters of the EDM and WEDM machines Explain and describe difference between EDM and WEDM 	 Plan and optimize programs for CNC Wire EDM operations. Calculate parameters affecting surface finish Calculate various machining parameters like Ip, voltage etc Prepare & set CNC Wire EDM operations and test run programmed Execute program and inspect simple geometrical forms / standard parts Plan and optimize programs for CNC EDM operations. Prepare & set CNC EDM operations and test run programmed Execute program and inspect simple geometrical forms. Prepare & set CNC EDM operations and test run programmed Execute program and inspect simple geometrical forms / standard parts Distance of the program and inspect simple geometrical forms / standard parts Use of various PPE's on CNC milling machines 	6	10	
UNIT-VI	Modern CNC Systems	After completion of unit Student should be able to	Indexable carbide tools, Modular Tooling & Tool Presetting, Machining Centers, Automatic tool changers	8	12	

	 Describe and use ATC and explain its applications Describe advanced CNC systems and its applications Explain the importance of Computer Aided Part Programming 	Introduction to advanced cnc systems like HSM, RP,CIM Importance and application of advanced CNC systems Computer Aided Part Programming Part Program Generation through Pro E/Del CAM Post Processors Computations for part programming		
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COURSE NAME: Computer Aided Design (CAD-Auto CAD/Collab CAD and Solid works)

COURSE CODE:

COURSE OUTCOMES: The aim of this course student should be able to:

- Understand types of different CAD/CAM/CAE software.
- Create 2D geometric sketches by using Auto CAD/Collab CAD and Solid works a software.
- Develop 3D modeling by using advanced command.
- Clarify of Knowledge to the assembly constraint & develop different types of assembly design by using Collab CAD & Solid Work.
- Understand design generative & interactive drafting.

THEORY HOURS: PRACTICAL HOURS: 120

THEORY MARKS:

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	Marks
UNIT-I		 At the end of this Unit the student should be able to: Understand CAD/CAM/CAE software. Understand various feature in CAD software. Understand various types of CAD software. Understand Uses and Importance of CAD software in Industries. Understand selection criteria of CAD software. 	Capability of CAD Software and Introduction to AutoCAD, Collab CAD, Solid Work. Description of the feature that have been added or changed since new Release CAD. Criteria for selection of CAD workstations, Shingle Design Process, Design criteria, Geometric modeling, entities, 2D & 3D Primitives. Different Types of cad software. Also comparison of various CAD Software. CAD software features. Concept of hardware & software.	20	8
UNIT-II		 At the end of this Unit the student should be able to: Understand drawing curve object. Create various types of sketch geometry. Understand editing property tools. Understand controlling drawing display. Understand geometric dimension & 	Drawing curve objects (Circle, Arc, Ellipse, elliptical arcs). Creating solid filled areas- Regions, Hatch, Dot-nut, DD type. Drawing line object like line, polyline, multiline etc. Drawing curve objects like Circle, Arc, Ellipse, elliptical arcs etc. Editing objects using the object property tool bar and various method & Controlling Drawing Display. (Carry, Lengthen, Stretching, Offset, Align, Trim, Extend,	20	10

UNIT-III	 tolerance method At the end of this Unit the student should be able to: Working with block & defining block attributes. Understand Concept of Isometric Drawing, Layout & Plotting. Execute of solid modeling / 3d modelling. Create surface modeling. 	Array etc. Detailed discussion on Dimensions, Geometrical Dimension, Tolerance method in AUTOCAD. Working with block & defining block attributes. Concept of Isometric Drawing, Layout & Plotting. Creating of solid modeling / 3d modelling. Like creating, Editing, and modification technique. Creating of surface modeling like creating, Editing, and modification technique.	20	12	
UNIT-IV	 At the end of this Unit the student should be able to: Understand Capability of Collab CAD. Understand 2D drawing generation with dimensioning & detailing. Create and Modification of Surface Entities Trimming and Lofting of Surfaces, Surface Diagnostics, Reflection Line Analysis. Create Solid Modeling and Feature Based Part Modeling. Understand Assembly- Constraint based Parametric Profile Editing and 3D Constraint Solver. 	Capability of Collab CAD Software and Brief Introduction to Collab CAD. Introduce Collab CAD Modeling Philosophy & PLM Strategy. Build and Edit entities in Virtual 3D Space, 2D Profile and free hand Sketching, Plot Configurator, Generation of 2D Drawings, Dimensioning and Detailing. Creation and Modification of Surface Entities Trimming and Lofting of Surfaces, Surface Diagnostics, Reflection Line Analysis. Generate complex Surfaces and Curves from a set of Points obtained from Raw/Scanned Data Create Solid Modeling Primitive Solids Slab, Revolution Solid, Sweep Solid Boolean operations, Mass and Section property calculations, Sectioning, Slicing, and Feature Based Part Modeling. Assembly- Constraint based Parametric Profile Editing and 3D Constraint Solver.	20	8	

UNIT-V	 At the end of this Unit the student sho able to: Understand Capability of Solid wor Software. Understand Basic Part Modeling, E Modeling, Terminology, Choosing Profile, Choosing the Sketch Plane of the Part feature. Understand concept of assembly constraint. Clarify Different type of assembly. 	build beIntroduction & Capabilities of Solid Work. SolidWorks Basics and the User InterfacerkWhat is the SolidWorks Software Design Intent File References Opening Files The SolidWorks UserBasicInterface.the BestBasic Part Modeling, Basic Modeling, Terminology, Choosing the Best Profile, Choosing the Sketch Plane, Details of the Part Boss Feature, Patterning, revolving, shelling, ribs & editing features. Assembly- Bottom-Up Assembly, Creating a New Assembly.	20	10	
UNIT-VI	 At the end of this Unit the student sho able to: Understand Bill of Materials. Create Assembly Drawings. Create & draw various drafting vie Understand dimensions, annotation various Engineering symbols. 	build be Bill of Materials, Assembly Drawings, Drafting generate standard three views, model view, and predefined view, standard section views, crafting drawings, creating dimensions, annotations, notes and surface finish symbols, add geometric tolerance to the drawing views, add center marks and center lines to the drawing views, add center marks and center lines to the drawing views	20	12	

COURSE NAME: Computer Aided manufacturing. (Master CAM & Unigraphics CAM)

COURSE CODE:

COURSE OUTCOMES: The aim of this course student should be able to:

- Understand capabilities of CAM Software like Master CAM & UG CAM.
- Create 2D geometric sketches by using Master CAM & UG CAM.
- Understand 3D solid & surface terminology.
- Clarify the Concept of CNC Programming.
- Understand Post processing.
- Execute & generate various Milling, Lathe, EDM operations NC program.

THEORY HOURS: PRACTICAL HOURS: 120

THEORY MARKS: PRACTICAL MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	Marks	
UNIT-I		 At the end of this Unit the student should be able to: Understand capabilities of CAM Software like Master CAM & UG CAM. Understand scope of software. Understand difference between CAM/CAD/CAE software. Understand various CAM software compare to Master CAM & UG CAM. 	Capability of CAM Software and Introduction to Master CAM and Unigraphics CAM. Scope of CAM software in Market advantages of CAM. Introducing CNC machining by using CAM. Distinguish between Various types of CAM software and Master CAM and Unigraphics CAM. CAD software features. Concept of hardware & software.	05	8	
UNIT-II		 At the end of this Unit the student should be able to: Understanding 2D drawing. Create basic geometry. Execute editing, modification, creating features. Understand brief Transformation feature. Understand modify tool. 	Introduction to master CAM environment. To understanding 2D drawing. Creation of basic geometry like Point, line, rectangle, arc, ellipse, helix, spline & polygon. Modify Like fillet, chamfer, Trim, Break, Join, Extend, Dragging spline to arc, control point I NURBS Spline, Break Drafting etc. Transformation of object - Mirror, Rotate, Translate, Scale. Selection Methods Creating Groups / Masking of entities / Assigning / Changing colors. Chain / Window / Area / Group / Delete / Undelete / Undo.	25	10	

		Transformation of object - Mirror, Rotate, Translate, Scale.			
UNIT-III	 At the end of this Unit the student should be able to: Understand Plane concept. Understand Wireframe 3D modeling. Create surface modeling by use modification & editing surface feature. Understand solid terminology Create Drafting with all Engineering symbols & dimensions. 	Plane concepts. Wireframe Modelling: 3D Wireframe, normal, entity, rotated, named, number. Surface terminology. Modification of surfaces and Editing of Surfaces features. Solid terminology - Creation of solids extrude, revolve, lofts, sweep, solids manager, fillet, chamfer, solids editing, trim, Boolean operations, shell, draft etc. Creating drafting : dimensions/ drafting note/ freestanding witness / leader lines / attributes / Editing drafting text/ Creating hatch /Smart mode function to create a layout of different part views/ Layout view selection / dimensioning.	25	12	
UNIT-IV	 At the end of this Unit the student should be able to: Understand 2D tool path generation. Understand concept of CNC machining. Perform & execute generate various milling & Lathe operations. Understand Post processing. Understand NC program Transfer to machine. 	2D Tool path generation. Concepts of Machining: CNC control basics, & coordinate systems, Selection of tool, tool parameters, Program Manager / Creation of 2D tool path: contour / Facing / Pocket. Compensations, Drilling parameters / 3D contour machining surface roughing methods Pocket / Parallel for 3D Surfaces And Solids. Various 3D machining surface finishing methods.3D machining surface roughing methods. Various 3D machining surface finishing methods. Various 3D machining surface finishing methods. Post Processing: Generating NC / Nci Files / Editing NC Files / Verification and Program generation for actual machining / verification / post processing / Job machining on CNC Milling Machine DMU 50 T simulation - Backlot / Solid NC Verification of material cutting and simulation .DNC Data I.e. NC Program Transfer to machine.	25	8	
UNIT-V	 At the end of this Unit the student should be able to: Understand capabilities of UG CAM. Understand CAM concept, Master Model concept. 	Introduction to Unigraphics CAM environment. Review of Modelling. Introduction to CAM concept, Master model concept. Machining environment, Operation Navigator. Re-entering into the Manufacturing application. Manufacturing Tools,	20	10	

	Understand Manufacturing application.	Creating new operation. Manufacturing applications, Saving part file, closing part file.			
UNIT-VI	 At the end of this Unit the student should be able to: Understand Various Milling and Lathe operations by using Unigraphics CAM. Execute various drilling, reaming operation & hole making etc. Understand various boundary setting. Execute all milling & lathe operation by using UG CAM. Understand Wire EDM, EDM operation. Understand generate Wire EDM Operation. 	Various Milling and Lathe operations by using Unigraphics CAM. Point to point machining. Creating drilling & reaming operation and hole making. Planner mill overview Profiling, Single level, Multi- level. Multi region, Creation of Boundaries. Setting Custom Boundary Member Data Setting Drive Cutting Method, Ramping method. Cut types, Trim boundary, and Uncut Region boundary. Creating Cavity Milling operation. Blank Geometry and offset, Uses of cutting option. Creating fixed contour operation. Lathe cross section, common turning parameters. Rough & Finish turning, What is wire EDM, EDM dialog overview? Wire EDM operation, creating Wire EDM Operation. Internal & External Trim operation	20	12	

COURSE NAME: DESIGN OF JIGS, FIXTURES AND GAUGES

COURSE CODE:

COURSE OUTCOMES: After completion of course Student should be able to:

- Understand clearly the tool design parameters of Jigs, fixtures and Gauges
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: 40 PRACTICAL HOURS: 80

THEORY MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hrs.	Marks	
UNIT-I		 At the end of this unit student should be able to: Describe and classify locating elements Explain locating principle and methods Select locating devices Use standard parts 	Locating Elements: Introduction, Jigs (Production Devices), Locating Principle, Locating methods and devices, Standard parts and their selection	6	10	
UNIT-II		At the end of this unit student should be able to: Describe and classify devices Explain working of Pneumatics and hydraulic actuation clamping Determine clamping force Interpret tolerance in design Analyze error	Clamping Devices: Introduction, Pneumatics and hydraulic actuation clamping, Analysis of clamping force, Tolerance and error analysis	6	12	

UNIT-III	 At the end of this unit student should be able to: Understand deign of jigs Design procedure for different jigs Select material in Jig design Determine economic justification of use of jigs and fixture 	Design of Jigs: Introduction, drill bushes, elements of jig, construction, material for jig elements, different types of jigs-plate jig, table jig, box jig, indexing device, multi station jig, economic justification for jigs and fixtures, clearances and selection of jigs	8	12	
UNIT-IV	 At the end of this unit student should be able to: Understand deign of fixture Design procedure for different fixture Select material in fixture design Maintenance of Fixture Use of CAD/CAM in Jigs and Fixture Design 	Design of fixtures: Introduction, Design principles of fixtures, types of fixture, general principles of boring fixtures, classification of boring fixture, lathe fixture, , Milling fixture, Grinding fixture, Inspection Fixture, welding fixture	8	12	
UNIT-V	At the end of this unit student should be able to: • Explain and Classify Gauges • Understand deign of gauges • Design procedure for different gauges	Design of Gauges: Introduction, Types of gauges-plug gauge, snap gauge, profile gauge, Gauge design Practices, Design principles of gauges	10	14	

COURSE NAME: DESIGN OF PRESS TOOLS

COURSE CODE: DPT

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Press Tools
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: 40 PRACTICAL HOURS: 120

THEORY MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hrs.	Marks	
UNIT-I		At the end of this unit student should	Classification of Mechanical, Hydraulic, and pneumatic	6	10	
		be able to:	presses, Press Characteristics, safety devices in presses.			
		• Understand and classify Press	Principles of stretch forming machines, principles of			
		machines	feeding and unloading equipment			
		• Describe the characteristics of				
		press machines				
		• Explain the principle of stretch				
		forming machine				
		• Understand feeding and				
		unloading equipment				
		Have fundamental knowledge of				
		Design principles of presses				
UNIT-II		At the end of this unit student should	Design of Dies: Introduction terminology shearing dies-	6	12	
		be able to:	types of dies – analysis process shearing clearance – size			

	 Explain shearing theory Explain tooling List different type of tools Perform mathematical calculations for designing Will be able to calculate best economy for production. 	and tolerances of die opening and punch – force, power, energy in shearing – loading center, shearing with inclined edges – strip layouts, economical stock – Utilization.			
UNIT-III	 At the end of this unit student should be able to Describe and select elements of press tool Perform Design calculation for elements Apply alignment system design for press tool 	Elements of shearing dies – die plates – split dies, rules of development for split dies, inserts, types of punches, punch holders, punches – strippers – calculation of springs and rubber ejector, shedders, stops – pilots – stock guides – alignment system design for press tools.	8	12	
UNIT-IV	 At the end of this unit student should be able to Explain compound and progressive dies Design Compound and progressive tool Design Bending tool Understand springback in bending tool 	Compound dies, progressive dies, precision shearing dies, shaving dies, Bending dies, theory of bending development of blank, spring back, curling, flanging and press brake dies, bending on press brake.	8	12	
UNIT-V	 At the end of this unit student should be able to Explain drawing and forming dies Design forming and drawing tool Design Bending tool Understand springback in bending tool Use CAD/CAM/CAE in tool design Identify and rectify defects in Press Tool 	Drawing and forming Dies: Theory of drawing, blank development, strain factor, calculation of force, construction of drawing and drawing dies – Drawing of rectangular components (development, stages draw beeds) – Ironing (application of rubber and hydraulic system) – Defects in deep drawing	10	14	

COURSE NAME: DESIGN OF MOULDS

COURSE CODE:

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Moulds
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: 40 PRACTICAL HOURS: 120

THEORY MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hrs.	Marks	
UNIT-I		 At the end of this unit student should be able to: Describe terminology in moulds Understand different types moulds List elements of moulds Describe the functions of element / component of tools 	Basic terminology in moulds, Mould cavities and cores, Bolters, Ancillary items, Attachment of mould to platen, Basic Terminology injection, ejector plate assembly, ejection techniques, ejection from fixed half, sprue pullers, feed system – runner, gates	6	10	
UNIT-II		 At the end of this unit student should be able to: To select standard moulds system To Clarify select best option among various option available To explain significance of parting surface 	Parting surface –general, flat parting surface, non-flat parting surface, venting. Mould cooling – general, cooling insert-type mould plates, Standard mold system – general considerations, standard two-parts mould systems, deviations from the standard mould, comparative terminology	6	12	

	 Study/Analyses problem faced in designing & manufacturing tool 				
UNIT-III	 At the end of this unit student should be able to: To select split moulds To use standard parts for split moulds Understand side cores and cavities Design moulding with undercuts To identify and apply various design features 	Splits – general, sliding splits, angled-lift splits, standard parts for the splits type mould. Side cores and cavities – general design features, types of side core and side cavity, standard mould parts. Moulding internal undercuts – general, from pin, split cores, side cores	8	12	
UNIT-IV	 At the end of this unit student should be able to: To understand mould for threaded components both internally and externally threaded To use standard unscrewing type mould systems Understand and design malty-daylight moulds Describe hot runner mould 	Mould for thread components – general, moulds for internally threaded components, moulds for externally threaded components, mould construction. Multi-day light moulds – general, underfeed moulds, standard parts for underfeed moulds. Runner less moulds – general, nozzle, hot runner unit mould.	8	12	
UNIT-V	 Understand customer requirement and component specification To draw the conceptual drawing for appropriate mould Perform design calculation for tooling To select different standard element. To draw final tool design. Evaluate design against standard Prepare bill of material 	Procedure for designing an injection mould – general, primary positioning of inserts, ejector system, complete the top half the drawing, complete the plan view, complete the cross-section, complete drawing and checking mould drawings	10	14	

COURSE NAME: DESIGN OF DIE CASTING DIES

COURSE CODE:

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Design of Die Casting Dies
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: 40 PRACTICAL HOURS: 80

THEORY MARKS: 60 PRACTICAL MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hrs.	Marks	
UNIT-I		At the end of this unit student should	Die Casting Machines – types, classification, operations.	10	15	
		be able to:	Die-Casting Dies – introduction, specific details of die			
		• Describe and classify Die Casting	construction, classification dies, general details of die			
		machines	design. theoretical and practical aspect of die casting –			
		• Classify Dies along with general	frommer's theory, other theories, techniques affecting the			
		die details	parts			
		• Explain various theoretical and				
		practical aspect of die casting				
		• Understand various theories				
		related to Die Casting				
		List control variables in Casting				
UNIT-II		At the end of this unit student should	Design of Die casting Dies: selection of parting line and	10	15	
		be able to:	general design, forming after casting, wall thickness, fillets			
		• To knowledge of select parting	and radii, tolerances, cored holes and recesses, inserts,			

	 line To perform design calculations Understand and design various parameters in Die casting Die Compare Die casting with other production processes 	bosses and projections, electroplated parts, designing for economy of production, comparison of Die Casting with other production processes			
UNIT-III	At the end of this unit student should be able to: •Understand characteristics of die steels` •to Knowledge Select steels for Die Casting •Select different Die casting alloys •Understand finishing and machining of Die casting	Die Steels: required characteristics of die steels, quality control of die steel, selection of steels for Die Casting Dies, heat treatment of die steels. Die casting alloys: types of Die Casting alloys and their properties and selection, introduction to Finishing and machining of Die casting	10	15	
UNIT-IV	At the end of this unit student should be able to: •Inspect the Die casting •Estimate Cost of Die Casting •Understand safety in Die Casting •Maintain the Tool	Inspection of Die Casting : first inspection, final inspection, functions of the inspection department Estimating the cost of Die Casting : Estimating the die cost, estimating the casting cost, part cost, maintenance and safety education	10	15	

COURSE NAME: Engineering Metrology and Quality Control

COURSE CODE:

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand Various Principles of Measurements.
- Identify various Length Standards & Knowledge of Limits, Fits & Tolerances.
- Explain and demonstrate various gauges like NPL gauge
- Understand, define ,explain and review Taylor's principles of gauge design and Fixed & Indicating Gauges
- Classify & describe various measuring machines like Floating carriage diameter measuring m/c etc.
- Predict and examine various modes and types of errors and also the demonstration of devices used for measurement.
- Evaluate and do analysis of parameters of screw threads
- Determine and describe various methods of measurements of gear terminology

THEORY HOURS: 40 P

PRACTICAL HOURS:

THEORY MARKS: 60

) PRACTICAL MARKS: -

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH	Marks	
				hours		
UNIT-I		 After completion of unit Student should be able to Understand the Principles of measurements. List the various length standards Knowledge of Limits, fits & tolerances Understand Design of Gauges 	Principles of measurement: Definition of Metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors, errors in measurement of a quality which is function of other variables. Introduction to Coordinate Measuring Machine (CMM). Length Standards: Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges. Limits, fits and Tolerances: Different types of fits and methods to provide these fits. Numerical to calculate	6	10	

		the limits, fits and tolerances as per IS 919-1963. ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges. Different methods of giving tolerances on gauges		
UNIT-II	After complet Student shoul Understa inspection Inspection measurer various In Vernier ca Microme	ion of unitTypes of Inspection:-Inspection by Gauging: limit8d be able togauging, plug gauges, Ring gauges, position gauges1and types ofInspection by Measurement: Direct measurement suchasVernier Caliper, Vernier Height gauge, Vernier DepthasVernier Caliper, Vernier Height gauge, Vernier Depthment by usingMicrometer, Slip gauges (gauge blocks), length bars ,bstrument likeBevel protractor etc. Indirect Measurement such asaliper,Mechanical, optical, & pneumatic comparators, Angularter, Gauges etc.Measurements- Sine bar, angle gauges, precision levels,Introduction to Autocollimator, Interferometers, NPLFlatness Interferometer etc.	12	
UNIT-III	After complet Student shoul Understa features t Inspectio Flatness c Understa & Gear M Calibrate Measurer Measurer	ion of unit d be able to: nd variousStraightness and flatness: Feature inspection such as flatness, roundness, straightness, parallelism, etc. Surface texture, different types of irregularities, Measurement of various surface roughness parameters. Tomlinson surface meter, Taylor-Hobson talysurf.8Screw Thread Measurement. thread ment & Gear mentScrew Thread Measurement: flatness, flatness, flatness, flatness, straightness, parallelism, etc. Surface texture, different types of irregularities, Measurement of various surface roughness parameters. Tomlinson surface meter, Taylor-Hobson talysurf. Screw Thread Measurement: Error in threads, Measurement of elements of screw threads – major dia, minor dia, pitch, flank angle and effective diameter. Various thread gauges. Gear Measurement: Gear terminology, measurement of gear thickness, Gear tooth Vernier caliper Parkinson gear tester.	12	
UNIT-IV	After complet Student shoul • Understa Quality & • Knowledg sampling	ion of unit d be able to : nd Need of AssuranceIntroduction to Quality Assurance: Need of quality, Aspects of quality, Quality specification, and Quality function Shewhart's control charts for variables: X bar and R charts, operating characteristics curves, producer's risk, consumer's risk, Sampling inspection, single double and multiple sampling plan.8	12	

SEMESTER: II COURSE NAME: Advanced-CAD (Unigraphics & CATIA) COURSE CODE:

COURSE OUTCOMES: The aim of this course student should be able to:

- Understand advance Computer aided design software (UG & Catia) as compare to other CAD software.
- Create 2D geometric sketches by using UG & Catia software.
- Develop 3D solid & surface modeling by using advanced command.
- Understand assembly constraint & develop different types of assembly design.
- Understand design generative & interactive drafting.
- Apply knowledge in create complicated modeling & creative/innovative solution.

THEORY HOURS: PRACTICAL HOURS: 120

THEORY MARKS: PRACTICAL MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR	Marks	
				hours		
UNIT-I		 At the end of this Unit the student should be able to: Understand advance computer aided design. Understand Different types CAD software. Understand advanced features added & changed since new release software. Understand difference between various software as compare to UG & Catia. Execute the concept of hardware & software. 	Capability of CAD Software and Introduction to Unigraphics & Catia. Description of the feature that have been added or changed since new Release software. Criteria for selection of CAD workstations, Shingle Design Process, Design criteria, Geometric modeling, entities, 2D & 3D Primitives. Different Types of cad software. Also comparison of various CAD Software. CAD software features. Concept of hardware & software.	5	8	
UNIT-II		At the end of this Unit the student should be able to:	Introduction of Unigraphics. History of cad & UG. Technical terms related to UG. Drawing sketches for	25	10	
		Have fundamental knowledge of UG	solid models. Creating sketches in the Sketch task			
		software.	environment & Modeling Environment. Understand			

	 Create complicated geometry sketch Understand Adding Geometric & Dimensional Constraint to sketches. Perform Drawing sketches for solid models. Understand various sketching tools. Understand & Create sketches in the Sketch task environment & Modeling Environment. 	Various Sketching Tool. Editing, Extruding, Revolving sketches. Adding Geometric & Dimensional Constraint to sketches.			
UNIT-III	 At the end of this Unit the student should be able to: Understand Working with Datum plane, Coordinate System, and datum axes. Understand Advance Modelling Tool. Apply advance editing, modifying, creating feature. To execute Boolean, extrusion termination operations. Create 3D model design. 	Working with Datum plane, Coordinate System, and datum axes. Specifying Boolean operation, Specification other Extrusion Termination option. Advance Modelling Tool like creating various types of Hole, Grooves, Slots, Dove-Tail Slots, Chamfer, and Edge Blend. Pattern Feature Tool, Mirror Feature Tool, and Sweeping Sketches along guide curve. Creating swept, Tubes or cables, Threads, Shell Features.	30	12	
UNIT-IV	At the end of this Unit the student should be able to: Understand surface modeling concept. Create surface model. Understand concept of assembly constraint. Understand concept of Drafting. Understand different types of view. Use different engineering symbols	Various Assembly constraints. Working with bottom up and top down assembly. Design in context. Generating bill of material. Tool Develop & design in UG. Surface Modelling Feature, surface analysis, curve analysis, Family table. Generating, Editing, and Dimensioning the Drawing views. Types of Drawing View, Modifying the properties of Generated drawing view, printing tools, print, plot.	20	10	
UNIT-V	 At the end of this Unit the student should be able to: Have fundamental knowledge of CATIA software. Create complicated geometry sketch Understand Adding Geometric & 	Introduction to Catia and Important Technical Terms & Definitions. Understand function of Tool bar, hot keys, Color Scheme etc. Drawing Display Tools like Zoom In, Zoom Out, Pan etc. Drawing sketches in Sketcher work bench. Using sketching tools like lines, Center Lines, Rectangle,	25	10	

	 Dimensional Constraint to sket Perform Drawing sketches for models. Understand various sketching Understand & Create sketches Sketch task environment & Mo Environment. Create 3D model by using varia sketch based features. Understand operation, transformation, and dress up f hole & editing feature tool bar 	tches.Point, and Circle etc. Editing and Modifying Tools. solidsolidConstraining Sketches and Creating Base Features. Solid Modeling Feature Tool bars like Reference Element, Sketch Based Feature, Dress up Feature, Hole Feature, Editing Features, Transforming odelings in theHole Feature, Editing Features, Transforming surface design feature. Wire frame geometry, ousoussurface creation methods Extrude, revolve, spheres, offset, fill, swept, loft, blend, Join, healing, untrimmed, disassemble, split, trim, boundary feature, rs.feature, rs.geometry Translate, symmetry, scaling affinity, rotate, nearest, extrapolate
UNIT-VI	 At the end of this Unit the student sho able to: Understand assembly concept different type of assembly. Use editing & constraint assen features. Understand drafting automatic manually drawing 	uld beAssemblyModeling.CreatingBottomup1520Assemblies& Top- downAssemblies.EditingS.&Assembly Features.Working with Drafting Workbench.Types of Views, generating automatically &bench.Types of Views, generating automatically &mblymanuallyDrawingView.AddingVariousDimensions,Tolerances,Datum,Surface finish,c &Welding symbols etc.

COURSE NAME: Manufacturing process-process planning and heat treatment

COURSE CODE:

COURSE OUTCOMES:

After completion of Course Student should be able to

- Describe, explain and Classify Engineering material and explain physical properties of materials.
- Understand the relation of grain size and relation to mechanical properties Review and brief discussion on stress strain
- Evaluate tensile strength percentage of elongation etc. & Annalise Fatigue and Creep testing, testing for Residual stresses
- Explain Selection and specification of carbon and alloy steels and also Describe types of modern Cutting Tool materials
- Understand and describe Powder Metallurgy and its applications
- Understand and explain concept of hardenability, define and explain Austempering, Martempering and Isothermal annealing
- Determine and analysis Tool failures due to improper quenching and loading
- Define and identify various manufacturing processes, Discuss process capabilities
- Understand and explain sheet metal working , its applications and limitations
- Summaries and define man machine consideration and Explain man machine information exchange
- Implement and describe JIT, KANBAN. Describe quality function development
- Explain concept of Rapid Prototyping & Define and implement Modern approaches to product design
- Explain and streamline creation of manufacturing data base and application of computer in production management

THEORY HOURS: 40 PRACTICAL HOURS:

THEORY MARKS: 60 PRACTIC

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH	Marks	
				hours		
UNIT-I	Classification of	After completion of unit Student	Types and Crystal Structures. Imperfections. Strain	6	8	
	materials	should be able to	hardening, Plastic range, Fracture, Fatigue, Creep and			
		Explain and describe	Creep properties. Recovery. Recrystallizations and			
		Crystal Structure	Grain growth. Primary and secondary recrystallization			
		• Define relation of grain	and sub-grain structure. Mechanism of strengthening			
		size and relation to	in metals. Grain size and its relation to mechanical			
		mechanical properties.	properties			
		Review and brief	Review and brief discussion on stress strain diagram			
		discussion on stress strain	of steel and the parameters for ductility toughness,			

		 Evaluate tensile strength percentage of elongation etc Annalise Fatigue and Creep testing, testing for Residual stresses 	strain hardening, and tensile strength percentage of elongation etc. Fracture toughness and crack growth measurement. Failure analysis, Factor-graphy and scanning electronic Microscope. Fatigue and Creep testing, testing for Residual stresses.			
UNIT-II	Tool Materials	 After completion of unit Student should be able to Explain Selection and specification of carbon and alloy steels Describe types of modern Cutting Tool materials Define and explain Properties of plastics Describe Powder Metallurgy 	Selection and specification of carbon and alloy steels for general engineering purpose, Specification of materials as per various standards (IS, BS, AISI, APS etc.) Case hardening steels, Cold work tool steels, hot work tool steels, high speed tool steels. Types of modern Cutting Tool materials like Carbide, Coated carbides, Ceramics, CBN, Diamond, Sialons, Impregnated tools. Introduction to Plastics. Properties of plastics-Thermoplastics-Thermosetting plastics. Methods of processing of plastics and plastic processing machines. Properties and applications of Carbon and alloy Steels, Specification of Grey iron casting IS: 210 SG Cast Iron IS: 865, Malleable iron castings IS: 2108 and IS: 2640. Selection and specification of die casting non-ferrous zinc and Aluminum (IS and LM Series). Powder Metallurgy and New Materials: Production of powders by various methods. Compacting, Sintering applications.	8	12	
UNIT-III	Heat treatment	 After completion of unit Student should be able to Understand and explain concept of hardenability Define and explain Austempering, Martempering and Isothermal annealing Determine and analysis Tool failures due to 	Hardenability, its concepts and its role in steel specification. Hardening and annealing of tool steels. Case hardening and local hardening, methods, selection and specification of such steels study of Isothermal Transformation diagrams. Austempering, Martempering and Isothermal annealing for tool steels. Tool failures due to improper heat treatment like Overheating, improper quenching and loading. ION Nitrating, Vacuum carburizing, Chemical Vapor depositing. Heat treatment of non-ferrous materials-	6	10	

		 improper quenching and loading Understand and explain Heat treatment of nonferrous materials 	Aluminum Alloys.		
UNIT-IV	Manufacturing processes	 After completion of unit Student should be able to Define and identify various manufacturing processes Discuss process capabilities Understand and explain sheet metal working Define and describe physical properties of engineering materials 	Various manufacturing processes, degree of accuracy and finish obtainable, process capability studies. Methods of improving tolerances. Basic product design rules for Casting, Forging, Machining, Sheet metal and Welding. Physical properties of engineering materials and their importance on products. Selection of plastics, rubber and ceramics for product design	8	12
UNIT-V	Industrial ergonomics:	 After completion of unit Student should be able to Summaries and define man machine consideration Explain man machine information exchange Implement and describe JIT , KANBAN Describe quality function development Explain concept of Rapid Prototyping Define and implement 	Man-machine considerations, ease of maintenance. Ergonomic considerations in product design- Anthropometry, Design of controls, man-machine information exchange. Process sheet detail and their importance, Advanced techniques for higher productivity. Just-in-time and Kanban System. Modern approaches to product design; quality function development, Rapid prototyping	6	10

		Modern approaches to product design				
UNIT-VI	Computer aided production management	 After completion of unit Student should be able to Define and explain Role of computer in product design and management Explain and streamline creation of manufacturing data base Define and explain communication network, production flow analysis Describe and explain Computer Aided product design and process Planning 	Role of computer in product design and management of manufacturing, creation of manufacturing data base, Computer Integrated Manufacturing, communication network, production flow analysis, Group Technology, Computer Aided product design and process Planning. Integrating product design, manufacture and production control.	6	8	

COURSE NAME: ENTREPRENEURSHIP

COURSE CODE:

COURSE OUTCOMES: After completion of Course Student should be able to

- Developing a detailed understanding of entrepreneurship along with the perspective of initiating and propelling new ventures.
- Developing the linkage between strategy, innovation, entrepreneurship and creativity.
- Inculcating the role of Intellectual Property perspective and Innovation as the key to entrepreneurship.
- THEORY HOURS: 40 PRACTICA
- PRACTICAL HOURS:

THEORY MARKS: --

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH	Marks	
				hours		
UNIT-I	ENTREPRENEURSH IP AND THE ENTREPRENEURIAL PROCESS	 At the end of this unit Student should be able to Understand Meaning and importance of entrepreneurship Understand the Motivations and reasons to start business Clarity of knowledge Entrepreneurial process Understand Entrepreurship framework. 	Introduction, entrepreneurship, Views on Entrepreneurship, Definitions of Entrepreneurship, historical perspectives on entrepreneurship, motivations to start a business, skill requirement, Entrepreneurial Qualities, Difference between an Entrepreneur and a Manager, different types of entrepreneurs, an entrepreneur converts the demand into supply, role of attitude, values and entrepreneurship, areas of skill development for entrepreneurs.	6	8	
UNIT-II	ENTREPRENEURSH IP FRAMEWORK AND THE ENTREPRENEURIAL PERSONALITY	 At the end of this unit Student should be able to Understand Role of information in opportunity recognition Knowledge of Emergence of entrepreneurship Understand Entrepreneurship framework Clarity of knowledge Entrepreneurial personality. 	Introduction, opportunity recognition, opportunity factors, three ways to identify an opportunity, opportunity recognition process, factors impacting emergence of entrepreneurship, entrepreneurial framework, framework of entrepreneurship, mental sequences in idea development, entrepreneurial development - four major themes, the entrepreneurial personality,	8	12	

			personality traits, fourteen character traits of an entrepreneur, competitive advantages of an entrepreneurial firm,			
UNIT-III	START-UP FACTORS, ORGANISATIONAL PLANNING AND WOMEN ENTREPRENEURSH IP	 At the end of this unit Student should be able to Understand Meaning and importance of start-up factors of entrepreneurship Understand Entry barriers Understand Significance and associated details of new ventures Factual & Theoretical Knowledge of Organizational planning 	Starting the venture, creativity, from creativity to entrepreneurship, environment scanning, swot (strengths, weaknesses, opportunities and threats), competitor analysis, industry analysis, porter's five forces analysis, feasibility studies, market analysis, business plan, preparing project report, marketing plan, marketing research for the new venture, the marketing concept for entrepreneurs, the marketing system, organization plan	6	10	
UNIT-IV	ORGANISATIONAL STRUCTURE AND FORMS OF OWNERSHIP	 At the end of this unit Student should be able to Understand Meaning and importance of various organizational structures in new ventures Understand the perspective of entrepreneurship Activity Forms of ownership Understand Job design Knowledge of Financial planning 	Basic forms of ownership, organizational structure, job design, meaning and importance of manpower planning, financial planning, cash budget, working capital, Performa income statement, Performa balance sheet, break even analysis, sick industries, board for industrial and financial reconstruction,	8	12	
UNIT-V	STAGES OF GROWTH AND STRATEGIC MANAGEMENT PROCESS	 At the end of this unit Student should be able to: Understand the Stages of growth of entrepreneurial ventures Understand Barriers to growth Knowledge of Entrepreneurship in small firms Understand Strategic management process Clarity of knowledge to Linkage of strategy and entrepreneurship 	Five stages of growth and development, grainer's model of organizational growth, business model, Definitions of the Term "Business Model", business model process, importance of the business model, the life cycle of entrepreneurship, barriers to small firm growth, strategic factors of entrepreneurship in small firms, the strategic management process, managerial competencies of entrepreneurs, environmental strategies.	6	10	

UNIT-VI	INTELLECTUAL PROPERTY CONCEPT AND INNOVATION	 At the end of this unit Student should be able to Understand Concept of intellectual property Understand Role perspective of intellectual property concept in entry 	Concept of property, intellectual property, objectives of intellectual property, nature of intellectual property rights, source of intellectual property, intellectual property and economic development, types of intellectual property, criteria for patentability, some exclusion from patentability spacial	6	8	
		 Onderstand note perspective of intellectual property concept in entrepreneurship Understand Intellectual property rights Knowledge of IP rights as strategic tools in entrepreneurship Understand to Innovational important tool for entrepreneurship 	property, criteria for patentability, some exclusion from patentability, special requirement for patent, trademarks, trade names & services marks, geographical indications(GI), industrial designs (id), integrated circuit layout designs, intellectual property management (IPM), transition from			
		Understand Advantages and disadvantages of family businesses	entrepreneur to entrepreneurial leader, family business			

Learning Resources:

Reference Books:

SR. NUMBER	AUTHOR	TITLE	PUBLISHER
1	DHOTRE	CNC MACHINE TOOL TECH. WITH PROGRAMMONG & OPERATING	SAITECH
2	B. S. PABLA	CNC MACHINES	NEW AGE PUBLICATION
3	DAVID GIBBS	CNC MACHINES & PROGRAMMING	INDUSTRIAL PRESS. INC.
4	S. N. MAHAJAN	METROLOGY & QUALITY CONTROL	NIRALI PUBLICATION
5	M. MAHAJAN	METROLOGY	DHANPAT RAI &CO.
6	NALINAKSHA MUTSUDDI	YOU TOO CAN BECOME AN ENTERPRENEUR	WHEELER PUBLISHING
7	B. S. RATHORE	A HANDBOOK OF ENTERPRENEURSHIP	AAPGA PUBLICATIONS
8	B. M. NAIK	EDUCATION & LEADERSHIP	ATLANTIC
9	V. D. KODGIRE	MATERIAL SCIENCE & METALLURGY	EVEREST PUBLISHING HOUSE
10	P. H. JOSHI	PRESS TOOL DESIGN & CONSTRUCTION	S. CHAND
11	R. G. W. PYE	INJECTION MOULD DESIGN	EWP
12	JOSHI	JIGS & FIXTURES	MC GRAW HILL EDUCATION
13	V. K. KHANNA	TQM	NEW AGE PUBLICATIONS
14	P. K. ROY	CUTTING TOOL TECHNOLOGY	NIRALI PUBLICATIONS
15	G. R. NAGPAL	TOOL ENGINEERING & DESIGN	KHANNA PUBLICATION
16	PROF. L. C. JHAMB	PRODUCTION PLANNING & CONTROL	EVEREST PUBLISHING HOUSE
17	P. C. SHARMA	PRODUCTION ENGINEERING	S. CHAND
18	PROF. SHAM TICKOO	AUTOCAD 2012 FOR ENGINEERS & DESIGNERS	DREAMTECH PRESS
19	PROF. SHAM TICKOO	SOLIDWORKS 2014 FOR ENGINEERS & DESIGNERS	DREAMTECH PRESS
20	JAMES VALENTINO	LEARNING MASTER CAM X MILLING 2D	INDUSTRIAL PRESS



POST GRADUATE DIPLOMA IN TOOL DESIGN & CAD/CAM (PGDTD&CC)

curriculum

MSME-Technology Centre Indo German Tool Room, Aurangabad

Organization Profile:

The government of India in its endeavor to provide right stimulus for the growth of industry in the country – particularly with a objective of helping MSME's has established Indo German Tool Room, Aurangabad.

A project of Government on India, Government of Federal Republic of Germany & Government of Maharashtra, Indo German Tool Room (IGTR) an ISO 9001:2000, ISO 14001:2004 is a Centre which nurtures excellence and provides total tooling & training solutions. IGTR is concentrating on an integrated development of the related segments of the industry by way of providing International Quality Tools, Trained Personnel, and Consultancy in Tooling & Related Areas & is constantly crossing new frontiers in quest for excellence & beyond.

The Organization implements its programme of technical training through its Training Center located at Aurangabad and sub centers at Pune, Mumbai & Nagpur. State of-the-art Tool Room facilities under single roof has wide spectrums of sophisticated Machines include latest & advanced CNC Lathe, Milling, EDM & Wire Cut machines, which can cater to various requirements of the customers. Modern Tool Room Facilities are indispensable for the industrial development of the Country & properly trained manpower is an asset to the nation. It has achieved international recognition also by providing continuous training courses in Tool Design & Die manufacturing technology to the trainees of South Africa, Sri Lanka, Saudi Arabia sponsored by respective state governments' agencies & industrial associations

Tool Room is aimed at promoting purposeful skill oriented technical education for the youth in India. Training dept. is equipped with CAD/CAM/CAE labs supported with CNC lathe, CNC Milling, CNC EDM and CNC WEDM sections to impart skill oriented training. The organization implements its programme of technical training through its Training Centre and On-Job Training in Production Centre located at Aurangabad and sub centers at Pune, Nagpur & Mumbai.

The institute offers various courses to cover a wide spectrum of technical man power at Post Graduate Level, Post Diploma Level, Diploma Level and Certificate Level. Besides above number of shortterm courses in specialized areas of Tool Design, CAD/CAM, CNC Machining as well as tailor made modules are designed and conducted to suit customer requirement

PROGRAMME TITLE: POST GRADUATE DIPLOMA IN TOOL DESIGN AND CAD CAM

• ENTRY REQUIREMENTS/QUALIFICATION: Preferably Graduate

(Mech. Engineering / Prod. Engineering or equivalent)

- DURATION: Months/Years/Hours: 1.5 year. (2340 hrs.)
- NSQF Level: Level 8

A. PROGRAM LEVEL MAPPING

I. MISSION OF THE INSTITUTE :

- Trained man-power to the industry through Long Term, Medium Term and Short Term Courses in CAD/CAM/CAE/CNC Machining and Tool & Die Technology.
- Providing Consultancy for Total Tooling Solutions for product development, productivity enhancement and quality improvement.
- Design and Manufacturing of Quality Press Tools, Die Casting Dies, Moulds, Jigs, Fixtures and Gauges and components as per customer requirements conforming to International Standards.

II. VISION OF THE INSTITUTE

- Self Sufficiency and beyond with sustained growth.
- > Adopt e teaching practices including Computer Based Training / Web Based Training
- Internationally acclaimed Centers of Excellence in product Developments Tool Engineering & Allied Fields.
- > Developing competitive edge over National & International Players
- > Nurturing Socially Relevant Skill Development programmers for improving employment potential.

III. JOB FUNCTIONS/ROLES:

- Design and Development of Jigs and Fixtures
- Design and Development of Press Tools
- Design and Development of Mould
- Design and Development of Die Casting Dies
- Develop tool design using CAD software
- Develop and execute CNC Machining programme using CAM software

Curriculum

POST GRADUATE DIPLOMA IN TOOL DESION AND CAD/CAM (PGDTD&CC)

SYLLABUS/ CURRICULUM

This programme is aimed at training candidates for the job of "Tool Designer" in the "Capital Goods" Sector/ industry and by the end of the program aims at building the following key competencies amongst the learner:

 Identify customer's requirement and create Conceptual Tool Design. 	14. Design and Development of Die Casting Dies
2. Develop plan for design process.	15. Develop mathematical /Analytical skills
3. Create and evaluate Tool design options.	16. Develop tool design using CAD software
4. Develop creative solution to the predictable and unpredictable problems In tool design using CAE	17. Develop and execute CNC Machining programme using CAM software
5. Describe tool Design procedure	18. Develop quality consciousness concept
6. Describe tool construction	19. Prepare costing of Tooling
7. Describe elements of tool with their functions, material and heat treatment processes	20. Troubleshoot the problems in Tool validation
8. List different tooling standards	21. Use basic health and safety practices at the workplace
9. Describe Manufacturing Processes and process plan	22. Work independently and guide team members with full responsibility of their work and learning
10. Describe reverse engineering and rapid prototyping technology	23. Communicate effectively
11. Design and Development of Jigs and Fixtures	24. Develop entrepreneurship skills
12. Design and Development of Press Tools	25. WORK PROJECT
13. Design and Development of Mould	

CURRICULUM REVIEW

			Teaching No. of	; Scheme / f Hours				Exan	nination So	cheme			
Sr.	Subject	ject Subject Name Theory			Prac	ctice							
NO	NO CODE		Theory	Practice	Sess	Sessional		ster m	Sessional		Semester Exam		Tetel
					Max. Marks	Min to pass	Max. Marks	Min to pass	Max. Marks	Min to pass	Max. Marks	Min to pass	Marks
1		CNC PROGRAMMING AND CNC MACHINING	40	120	40						60		100
2		COMPUTER AIDED DESIGN (AUTOCAD, COLLAB CAD AND SOLIDWORKS)		140	40						60		100
3		COMPUTER AIDED MANUFACTURING (MASTERCAM AND UNIGRAPHICS CAM)		120	40						60		100
4		DESIGN OF JIGS AND FIXTURES	40	80	80		60				60		200
5		DESIGN OF PRESS TOOLS	40	120	80		60				60		200
6		DESIGN OF MOULDS	40	120	80		60				60		200
7		DESIGN OF DIE CASTING DIES	40	80	80		60				60		200
8		ADVANCE METROLOGY	40	40	40		60						100
9		ADVANCED-CAD-I (UNIGRAPHICS & CATIA)		120	40						60		100
10		MANUFACTURING PROCESS PLANNING AND HEAT TREATMENT	40		40		60						100
11		ADVANCE CAD - II (PRO-E)		120	40						60		100
12		COMPUTER AIDED ENGINEERING (ANSYS)		80	40						60		100
13		RAPID PROTOTYPING AND REVERSE ENGINEERING	40		40		60						100
14		ENTREPRENUERSHIP	40		60								60
15		ENGINEERING RESEARCH METHODOLOGY	40		40		60						100
16		PROJECT		800	600								600
			400	1940									2460
COURSE / MODULE TEMPALTE

SEMESTER: I

COURSE NAME: CNC PROGRAMMING AND CNC MACHINING

COURSE CODE:

COURSE OUTCOMES: After completion of course Student should be able to:

- Explain applications and advantages of CNC machines and technology
- Prepare CNC program for CNC Lathe , Milling, EDM and WEDM
- Calculate CNC Machining Parameters
- Prepare process plan, job card, inspection report
- Handle measuring instrument for inspection
- Prepare program and execute machining for CNC Lathe , Milling, EDM and WEDM
- Follow Safety norms during operations

THEORY HOURS: 40 PRACTICAL HOURS: 120

THEORY MARKS: -

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks	
UNIT-I	Introduction to	After completion of unit Student	Introduction to CNC technology – CNC machines &	6	8	
	CNC technology	should be able to:	controls.			
	and CNC	Explain applications and	History & development of CNC technology.			
	programing	advantages of CNC machines and	Conventional Vs. non-conventional machine tool.			
		technology	Numerical control on CNC machine tools CNC			
		Understand and explain	control and CNC Control and types of CNC control			
		difference between conventional	Calculation of technological data for CNC			
		& non-conventional machine tool	machining.			
		• Demonstrate and explain various	CNC clamping system.			
		CNC control	Implementation of JH for CNC			
		Calculate technological data for	Basic health and safety			
		CNC machining	CNC programming basics.			
		• Explain the JH system, its use	Introduction to manual NC programming			

					T	
		 and application Understand the importance and use of PPE's 	Manual NC programming for lathe & milling machines. Application Numerical Control, Advantages, & Disadvantages, Adoptive Control System. Practical training & workshop for above sub topics on CNC Machine.			
UNIT-II	CNC Programing	 After completion of unit Student should be able to Understand and explain the concept and importance of CNC programming Prepare and understand line program for various profiles Identify and set parameters for various simulators Prepare and simulate various operation cycles for lathe and milling Use and simulate cycles using various Controls Knowledge of the parameters for various machining cycles and operations 	Introduction to CNC programming Introduction and demonstration of line programs CNC programming for lathe & milling machine using iso codes into the CNC simulator. CNC programming for lathe and milling machines using different machining cycles into the CNC simulator. Procedures Associated with part programming, Cutting process parameter selection, Process planning issues and path planning, G & M Codes, Interpolations, Canned Cycles and Subprograms, Tool compensations Exposure for programming and simulator of FANUC, SINUMERIC, DMG TURNPLUS & Controls through post processors. Programming exercise. Machining of programmed exercise on CNC lathe & milling machines.	6	10	
UNIT-III	CNC Machining – Lathe	 After completion of unit Student should be able to Calculate parameters for turning operations Understand the parameters of lathe operations Explain operation sequence for the lathe operations Prepare operation sequence for test run Set , Simulate, and perform various operations like turning , 	 Plan and optimize programs for CNC turning operations. Calculate parameters like speed feed etc. and set a references for the various operations Prepare operation and operation sequence for the lathe operations like turning, grooving etc. Prepare & set CNC lathe operations and test run programmed Execute program and inspect simple geometrical forms / standard parts Use of various PPE's on CNC lathe machine 	8	12	

		grooving threading etc.				
UNIT-IV	CNC Machining – Milling	 After completion of unit Student should be able to Calculate parameters for milling operations Understand the parameters of milling operations Explain operation sequence for the milling operations Prepare operation sequence for test run Set , Simulate, and perform various operations like core milling , cavity milling , PCD drilling etc. 	Plan and optimize programs for CNC Milling operations. Calculate parameters like speed feed , depth of cut etc. and set a references for the various operations Various methods of work process like edge finding block center etc. Prepare & set CNC Milling operations and test run programmed Execute program and inspect simple geometrical forms / standard parts Use of various PPE's on CNC milling machine	6	8	
UNIT-V	CNC Machining – EDM & WEDM	 After completion of unit Student should be able to Calculate parameters for EDM and WEDM operations Understand the parameters related to surface finish of work parts Explain operation sequence for the operations Calculate and set various parameters of the EDM and WEDM machines Explain and describe difference between EDM and WEDM 	 Plan and optimize programs for CNC Wire EDM operations. Calculate parameters affecting surface finish Calculate various machining parameters like Ip, voltage etc Prepare & set CNC Wire EDM operations and test run programmed Execute program and inspect simple geometrical forms / standard parts Plan and optimize programs for CNC EDM operations. Prepare & set CNC EDM operations and test run programmed Execute program and inspect simple geometrical forms. Prepare & set CNC EDM operations and test run programmed Execute program and inspect simple geometrical forms / standard parts Use of various PPE's on CNC milling machines 	6	10	
UNIT-VI	Modern CNC Systems	 After completion of unit Student should be able to Explain and use Indexable tools Describe and use ATC and explain its applications 	Indexable carbide tools, Modular Tooling & Tool Presetting, Machining Centers, Automatic tool changers Introduction to advanced cnc systems like HSM, RP,CIM	8	12	

•	Describe advanced CNC systems	Importance and application of advanced CNC		
	and its applications	systems		
•	Explain the importance of	Computer Aided Part Programming		
	Computer Aided Part	Part Program Generation through Pro E/Del CAM		
	Programming	Post Processors Computations for part		
		programming		

COURSE NAME: Computer Aided Design (CAD-Auto CAD/Collab CAD and Solid works)

COURSE CODE:

COURSE OUTCOMES: The aim of this course student should be able to:

- Understand types of different CAD/CAM/CAE software.
- Create 2D geometric sketches by using Auto CAD/Collab CAD and Solid works a software.
- Develop 3D modeling by using advanced command.
- Clarify of Knowledge to the assembly constraint & develop different types of assembly design by using Collab CAD & Solid Work.
- Understand design generative & interactive drafting.

THEORY HOURS: PRACTICAL HOURS: 120

THEORY MARKS:

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR	Marks	
UNIT-I		 At the end of this Unit the student should be able to: Understand CAD/CAM/CAE software. Understand various feature in CAD software. Understand various types of CAD software. Understand Uses and Importance of CAD software in Industries. Understand selection criteria of CAD software. 	Capability of CAD Software and Introduction to AutoCAD, Collab CAD, Solid Work. Description of the feature that have been added or changed since new Release CAD. Criteria for selection of CAD workstations, Shingle Design Process, Design criteria, Geometric modeling, entities, 2D & 3D Primitives. Different Types of cad software. Also comparison of various CAD Software. CAD software features. Concept of hardware & software.	20	8	
UNIT-II		 At the end of this Unit the student should be able to: Understand drawing curve object. Create various types of sketch geometry. Understand editing property tools. Understand controlling drawing display. Understand geometric dimension & tolerance method 	Drawing curve objects (Circle, Arc, Ellipse, elliptical arcs). Creating solid filled areas- Regions, Hatch, Dot-nut, DD type. Drawing line object like line, polyline, multiline etc. Drawing curve objects like Circle, Arc, Ellipse, elliptical arcs etc. Editing objects using the object property tool bar and various method & Controlling Drawing Display. (Carry, Lengthen, Stretching, Offset, Align, Trim, Extend, Array etc. Detailed discussion on Dimensions,	20	10	

UNIT-III	 At the end of this Unit the student should be able to: Working with block & defining block attributes. Understand Concept of Isometric Drawing, Layout & Plotting. Execute of solid modeling / 3d modelling. Create surface modeling. 	Geometrical Dimension, Tolerance method in AUTOCAD. Working with block & defining block attributes. Concept of Isometric Drawing, Layout & Plotting. Creating of solid modeling / 3d modelling. Like creating, Editing, and modification technique. Creating of surface modeling like creating, Editing, and modification technique.	20	12	
UNIT-IV	 At the end of this Unit the student should be able to: Understand Capability of Collab CAD. Understand 2D drawing generation with dimensioning & detailing. Create and Modification of Surface Entities Trimming and Lofting of Surfaces, Surface Diagnostics, Reflection Line Analysis. Create Solid Modeling and Feature Based Part Modeling. Understand Assembly- Constraint based Parametric Profile Editing and 3D Constraint Solver. 	Capability of Collab CAD Software and Brief Introduction to Collab CAD. Introduce Collab CAD Modeling Philosophy & PLM Strategy. Build and Edit entities in Virtual 3D Space, 2D Profile and free hand Sketching, Plot Configurator, Generation of 2D Drawings, Dimensioning and Detailing. Creation and Modification of Surface Entities Trimming and Lofting of Surfaces, Surface Diagnostics, Reflection Line Analysis. Generate complex Surfaces and Curves from a set of Points obtained from Raw/Scanned Data Create Solid Modeling Primitive Solids Slab, Revolution Solid, Sweep Solid Boolean operations, Mass and Section property calculations, Sectioning, Slicing, and Feature Based Part Modeling. Assembly- Constraint based Parametric Profile Editing and 3D Constraint Solver.	20	8	

UNIT-V	 At the end of this Unit the student sho able to: Understand Capability of Solid wor Software. Understand Basic Part Modeling, E Modeling, Terminology, Choosing Profile, Choosing the Sketch Plane of the Part feature. Understand concept of assembly constraint. Clarify Different type of assembly. 	build beIntroduction & Capabilities of Solid Work. SolidWorks Basics and the User InterfacerkWhat is the SolidWorks Software Design Intent File References Opening Files The SolidWorks UserBasicInterface.the BestBasic Part Modeling, Basic Modeling, Terminology, Choosing the Best Profile, Choosing the Sketch Plane, Details of the Part Boss Feature, Patterning, revolving, shelling, ribs & editing features. Assembly- Bottom-Up Assembly, Creating a New Assembly.	20	10	
UNIT-VI	 At the end of this Unit the student sho able to: Understand Bill of Materials. Create Assembly Drawings. Create & draw various drafting vie Understand dimensions, annotation various Engineering symbols. 	build be Bill of Materials, Assembly Drawings, Drafting generate standard three views, model view, and predefined view, standard section views, crafting drawings, creating dimensions, annotations, notes and surface finish symbols, add geometric tolerance to the drawing views, add center marks and center lines to the drawing views, add center marks and center lines to the drawing views	20	12	

COURSE NAME: Computer Aided manufacturing. (Master CAM & Unigraphics CAM)

COURSE CODE:

COURSE OUTCOMES: The aim of this course student should be able to:

- Understand capabilities of CAM Software like Master CAM & UG CAM.
- Create 2D geometric sketches by using Master CAM & UG CAM.
- Understand 3D solid & surface terminology.
- Clarify the Concept of CNC Programming.
- Understand Post processing.
- Execute & generate various Milling, Lathe, EDM operations NC program.

THEORY HOURS: PRACTICAL HOURS: 120

THEORY MARKS: PRACTICAL MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	Marks	
UNIT-I		 At the end of this Unit the student should be able to: Understand capabilities of CAM Software like Master CAM & UG CAM. Understand scope of software. Understand difference between CAM/CAD/CAE software. Understand various CAM software compare to Master CAM & UG CAM. 	Capability of CAM Software and Introduction to Master CAM and Unigraphics CAM. Scope of CAM software in Market advantages of CAM. Introducing CNC machining by using CAM. Distinguish between Various types of CAM software and Master CAM and Unigraphics CAM. CAD software features. Concept of hardware & software.	05	8	
UNIT-II		 At the end of this Unit the student should be able to: Understanding 2D drawing. Create basic geometry. Execute editing, modification, creating features. Understand brief Transformation feature. Understand modify tool. 	Introduction to master CAM environment. To understanding 2D drawing. Creation of basic geometry like Point, line, rectangle, arc, ellipse, helix, spline & polygon. Modify Like fillet, chamfer, Trim, Break, Join, Extend, Dragging spline to arc, control point I NURBS Spline, Break Drafting etc. Transformation of object - Mirror, Rotate, Translate, Scale. Selection Methods Creating Groups / Masking of entities / Assigning / Changing colors. Chain / Window / Area / Group / Delete / Undelete / Undo.	25	10	

		Transformation of object - Mirror, Rotate, Translate, Scale.			
UNIT-III	 At the end of this Unit the student should be able to: Understand Plane concept. Understand Wireframe 3D modeling. Create surface modeling by use modification & editing surface feature. Understand solid terminology Create Drafting with all Engineering symbols & dimensions. 	Plane concepts. Wireframe Modelling: 3D Wireframe, normal, entity, rotated, named, number. Surface terminology. Modification of surfaces and Editing of Surfaces features. Solid terminology - Creation of solids extrude, revolve, lofts, sweep, solids manager, fillet, chamfer, solids editing, trim, Boolean operations, shell, draft etc. Creating drafting : dimensions/ drafting note/ freestanding witness / leader lines / attributes / Editing drafting text/ Creating hatch /Smart mode function to create a layout of different part views/ Layout view selection / dimensioning.	25	12	
UNIT-IV	 At the end of this Unit the student should be able to: Understand 2D tool path generation. Understand concept of CNC machining. Perform & execute generate various milling & Lathe operations. Understand Post processing. Understand NC program Transfer to machine. 	2D Tool path generation. Concepts of Machining: CNC control basics, & coordinate systems, Selection of tool, tool parameters, Program Manager / Creation of 2D tool path: contour / Facing / Pocket. Compensations, Drilling parameters / 3D contour machining surface roughing methods Pocket / Parallel for 3D Surfaces And Solids. Various 3D machining surface finishing methods.3D machining surface roughing methods. Various 3D machining surface finishing methods. Various 3D machining surface finishing methods. Post Processing: Generating NC / Nci Files / Editing NC Files / Verification and Program generation for actual machining / verification / post processing / Job machining on CNC Milling Machine DMU 50 T simulation - Backlot / Solid NC Verification of material cutting and simulation .DNC Data I.e. NC Program Transfer to machine.	25	8	
UNIT-V	 At the end of this Unit the student should be able to: Understand capabilities of UG CAM. Understand CAM concept, Master Model concept. 	Introduction to Unigraphics CAM environment. Review of Modelling. Introduction to CAM concept, Master model concept. Machining environment, Operation Navigator. Re-entering into the Manufacturing application. Manufacturing Tools,	20	10	

	Understand Manufacturing application.	Creating new operation. Manufacturing applications, Saving part file, closing part file.			
UNIT-VI	 At the end of this Unit the student should be able to: Understand Various Milling and Lathe operations by using Unigraphics CAM. Execute various drilling, reaming operation & hole making etc. Understand various boundary setting. Execute all milling & lathe operation by using UG CAM. Understand Wire EDM, EDM operation. Understand generate Wire EDM Operation. 	Various Milling and Lathe operations by using Unigraphics CAM. Point to point machining. Creating drilling & reaming operation and hole making. Planner mill overview Profiling, Single level, Multi- level. Multi region, Creation of Boundaries. Setting Custom Boundary Member Data Setting Drive Cutting Method, Ramping method. Cut types, Trim boundary, and Uncut Region boundary. Creating Cavity Milling operation. Blank Geometry and offset, Uses of cutting option. Creating fixed contour operation. Lathe cross section, common turning parameters. Rough & Finish turning, What is wire EDM, EDM dialog overview? Wire EDM operation, creating Wire EDM Operation. Internal & External Trim operation	20	12	

COURSE NAME: DESIGN OF JIGS, FIXTURES AND GAUGES

COURSE CODE:

COURSE OUTCOMES: After completion of course Student should be able to:

- Understand clearly the tool design parameters of Jigs, fixtures and Gauges
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: 40 PRACTICAL HOURS: 80

THEORY MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hrs.	Marks	
UNIT-I		 At the end of this unit student should be able to: Describe and classify locating elements Explain locating principle and methods Select locating devices Use standard parts 	Locating Elements: Introduction, Jigs (Production Devices), Locating Principle, Locating methods and devices, Standard parts and their selection	6	10	
UNIT-II		At the end of this unit student should be able to: Describe and classify devices Explain working of Pneumatics and hydraulic actuation clamping Determine clamping force Interpret tolerance in design Analyze error	Clamping Devices: Introduction, Pneumatics and hydraulic actuation clamping, Analysis of clamping force, Tolerance and error analysis	6	12	

UNIT-III	 At the end of this unit student should be able to: Understand deign of jigs Design procedure for different jigs Select material in Jig design Determine economic justification of use of jigs and fixture 	Design of Jigs: Introduction, drill bushes, elements of jig, construction, material for jig elements, different types of jigs-plate jig, table jig, box jig, indexing device, multi station jig, economic justification for jigs and fixtures, clearances and selection of jigs	8	12	
UNIT-IV	 At the end of this unit student should be able to: Understand deign of fixture Design procedure for different fixture Select material in fixture design Maintenance of Fixture Use of CAD/CAM in Jigs and Fixture Design 	Design of fixtures: Introduction, Design principles of fixtures, types of fixture, general principles of boring fixtures, classification of boring fixture, lathe fixture, , Milling fixture, Grinding fixture, Inspection Fixture, welding fixture	8	12	
UNIT-V	At the end of this unit student should be able to: • Explain and Classify Gauges • Understand deign of gauges • Design procedure for different gauges	Design of Gauges: Introduction, Types of gauges-plug gauge, snap gauge, profile gauge, Gauge design Practices, Design principles of gauges	10	14	

COURSE NAME: DESIGN OF PRESS TOOLS

COURSE CODE: DPT

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Press Tools
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: 40 PRACTICAL HOURS: 120

THEORY MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hrs.	Marks	
UNIT-I		At the end of this unit student should	Classification of Mechanical, Hydraulic, and pneumatic	6	10	
		be able to:	presses, Press Characteristics, safety devices in presses.			
		• Understand and classify Press	Principles of stretch forming machines, principles of			
		machines	feeding and unloading equipment			
		• Describe the characteristics of				
		press machines				
		• Explain the principle of stretch				
		forming machine				
		• Understand feeding and				
		unloading equipment				
		Have fundamental knowledge of				
		Design principles of presses				
UNIT-II		At the end of this unit student should	Design of Dies: Introduction terminology shearing dies-	6	12	
		be able to:	types of dies – analysis process shearing clearance – size			

	 Explain shearing theory Explain tooling List different type of tools Perform mathematical calculations for designing Will be able to calculate best economy for production. 	and tolerances of die opening and punch – force, power, energy in shearing – loading center, shearing with inclined edges – strip layouts, economical stock – Utilization.			
UNIT-III	 At the end of this unit student should be able to Describe and select elements of press tool Perform Design calculation for elements Apply alignment system design for press tool 	Elements of shearing dies – die plates – split dies, rules of development for split dies, inserts, types of punches, punch holders, punches – strippers – calculation of springs and rubber ejector, shedders, stops – pilots – stock guides – alignment system design for press tools.	8	12	
UNIT-IV	 At the end of this unit student should be able to Explain compound and progressive dies Design Compound and progressive tool Design Bending tool Understand springback in bending tool 	Compound dies, progressive dies, precision shearing dies, shaving dies, Bending dies, theory of bending development of blank, spring back, curling, flanging and press brake dies, bending on press brake.	8	12	
UNIT-V	 At the end of this unit student should be able to Explain drawing and forming dies Design forming and drawing tool Design Bending tool Understand springback in bending tool Use CAD/CAM/CAE in tool design Identify and rectify defects in Press Tool 	Drawing and forming Dies: Theory of drawing, blank development, strain factor, calculation of force, construction of drawing and drawing dies – Drawing of rectangular components (development, stages draw beeds) – Ironing (application of rubber and hydraulic system) – Defects in deep drawing	10	14	

COURSE NAME: DESIGN OF MOULDS

COURSE CODE:

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Moulds
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: 40 PRACTICAL HOURS: 120

THEORY MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hrs.	Marks	
UNIT-I		 At the end of this unit student should be able to: Describe terminology in moulds Understand different types moulds List elements of moulds Describe the functions of element / component of tools 	Basic terminology in moulds, Mould cavities and cores, Bolters, Ancillary items, Attachment of mould to platen, Basic Terminology injection, ejector plate assembly, ejection techniques, ejection from fixed half, sprue pullers, feed system – runner, gates	6	10	
UNIT-II		 At the end of this unit student should be able to: To select standard moulds system To Clarify select best option among various option available To explain significance of parting surface 	Parting surface –general, flat parting surface, non-flat parting surface, venting. Mould cooling – general, cooling insert-type mould plates, Standard mold system – general considerations, standard two-parts mould systems, deviations from the standard mould, comparative terminology	6	12	

	 Study/Analyses problem faced in designing & manufacturing tool 				
UNIT-III	 At the end of this unit student should be able to: To select split moulds To use standard parts for split moulds Understand side cores and cavities Design moulding with undercuts To identify and apply various design features 	Splits – general, sliding splits, angled-lift splits, standard parts for the splits type mould. Side cores and cavities – general design features, types of side core and side cavity, standard mould parts. Moulding internal undercuts – general, from pin, split cores, side cores	8	12	
UNIT-IV	 At the end of this unit student should be able to: To understand mould for threaded components both internally and externally threaded To use standard unscrewing type mould systems Understand and design malty-daylight moulds Describe hot runner mould 	Mould for thread components – general, moulds for internally threaded components, moulds for externally threaded components, mould construction. Multi-day light moulds – general, underfeed moulds, standard parts for underfeed moulds. Runner less moulds – general, nozzle, hot runner unit mould.	8	12	
UNIT-V	 Understand customer requirement and component specification To draw the conceptual drawing for appropriate mould Perform design calculation for tooling To select different standard element. To draw final tool design. Evaluate design against standard Prepare bill of material 	Procedure for designing an injection mould – general, primary positioning of inserts, ejector system, complete the top half the drawing, complete the plan view, complete the cross-section, complete drawing and checking mould drawings	10	14	

COURSE NAME: DESIGN OF DIE CASTING DIES

COURSE CODE:

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Design of Die Casting Dies
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: 40 PRACTICAL HOURS: 80

THEORY MARKS: 60 PRACTICAL MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hrs.	Marks	
UNIT-I		At the end of this unit student should	Die Casting Machines – types, classification, operations.	10	15	
		be able to:	Die-Casting Dies – introduction, specific details of die			
		• Describe and classify Die Casting	construction, classification dies, general details of die			
		machines	design. theoretical and practical aspect of die casting –			
		• Classify Dies along with general	frommer's theory, other theories, techniques affecting the			
		die details	parts			
		• Explain various theoretical and				
		practical aspect of die casting				
		• Understand various theories				
		related to Die Casting				
		List control variables in Casting				
UNIT-II		At the end of this unit student should	Design of Die casting Dies: selection of parting line and	10	15	
		be able to:	general design, forming after casting, wall thickness, fillets			
		• To knowledge of select parting	and radii, tolerances, cored holes and recesses, inserts,			

	 line To perform design calculations Understand and design various parameters in Die casting Die Compare Die casting with other production processes 	bosses and projections, electroplated parts, designing for economy of production, comparison of Die Casting with other production processes			
UNIT-III	At the end of this unit student should be able to: •Understand characteristics of die steels` •to Knowledge Select steels for Die Casting •Select different Die casting alloys •Understand finishing and machining of Die casting	Die Steels: required characteristics of die steels, quality control of die steel, selection of steels for Die Casting Dies, heat treatment of die steels. Die casting alloys: types of Die Casting alloys and their properties and selection, introduction to Finishing and machining of Die casting	10	15	
UNIT-IV	At the end of this unit student should be able to: •Inspect the Die casting •Estimate Cost of Die Casting •Understand safety in Die Casting •Maintain the Tool	Inspection of Die Casting : first inspection, final inspection, functions of the inspection department Estimating the cost of Die Casting : Estimating the die cost, estimating the casting cost, part cost, maintenance and safety education	10	15	

COURSE NAME: Engineering Metrology and Quality Control

COURSE CODE:

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand Various Principles of Measurements.
- Identify various Length Standards & Knowledge of Limits, Fits & Tolerances.
- Explain and demonstrate various gauges like NPL gauge
- Understand, define ,explain and review Taylor's principles of gauge design and Fixed & Indicating Gauges
- Classify & describe various measuring machines like Floating carriage diameter measuring m/c etc.
- Predict and examine various modes and types of errors and also the demonstration of devices used for measurement.
- Evaluate and do analysis of parameters of screw threads
- Determine and describe various methods of measurements of gear terminology

THEORY HOURS: 40 P

PRACTICAL HOURS:

THEORY MARKS: 60

) PRACTICAL MARKS: -

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH	Marks	
				hours		
UNIT-I		 After completion of unit Student should be able to Understand the Principles of measurements. List the various length standards Knowledge of Limits, fits & tolerances Understand Design of Gauges 	Principles of measurement: Definition of Metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors, errors in measurement of a quality which is function of other variables. Introduction to Coordinate Measuring Machine (CMM). Length Standards: Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges. Limits, fits and Tolerances: Different types of fits and methods to provide these fits. Numerical to calculate	6	10	

		the limits, fits and tolerances as per IS 919-1963. ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges. Different methods of giving tolerances on gauges		
UNIT-II	After complet Student shoul Understa inspection Inspection measurer various In Vernier ca Microme	ion of unitTypes of Inspection:-Inspection by Gauging: limit8d be able togauging, plug gauges, Ring gauges, position gauges1and types ofInspection by Measurement: Direct measurement suchasVernier Caliper, Vernier Height gauge, Vernier DepthasVernier Caliper, Vernier Height gauge, Vernier Depthment by usingMicrometer, Slip gauges (gauge blocks), length bars ,bstrument likeBevel protractor etc. Indirect Measurement such asaliper,Mechanical, optical, & pneumatic comparators, Angularter, Gauges etc.Measurements- Sine bar, angle gauges, precision levels,Introduction to Autocollimator, Interferometers, NPLFlatness Interferometer etc.	12	
UNIT-III	After complet Student shoul Understa features t Inspectio Flatness c Understa & Gear M Calibrate Measurer Measurer	ion of unit d be able to: nd variousStraightness and flatness: Feature inspection such as flatness, roundness, straightness, parallelism, etc. Surface texture, different types of irregularities, Measurement of various surface roughness parameters. Tomlinson surface meter, Taylor-Hobson talysurf.8Screw Thread Measurement. thread ment & Gear mentScrew Thread Measurement: flatness, flatness, flatness, flatness, straightness, parallelism, etc. Surface texture, different types of irregularities, Measurement of various surface roughness parameters. Tomlinson surface meter, Taylor-Hobson talysurf. Screw Thread Measurement: Error in threads, Measurement of elements of screw threads – major dia, minor dia, pitch, flank angle and effective diameter. Various thread gauges. Gear Measurement: Gear terminology, measurement of gear thickness, Gear tooth Vernier caliper Parkinson gear tester.	12	
UNIT-IV	After complet Student shoul • Understa Quality & • Knowledg sampling	ion of unit d be able to : nd Need of AssuranceIntroduction to Quality Assurance: Need of quality, Aspects of quality, Quality specification, and Quality function Shewhart's control charts for variables: X bar and R charts, operating characteristics curves, producer's risk, consumer's risk, Sampling inspection, single double and multiple sampling plan.8	12	

SEMESTER: II COURSE NAME: Advanced-CAD (Unigraphics & CATIA) COURSE CODE:

COURSE OUTCOMES: The aim of this course student should be able to:

- Understand advance Computer aided design software (UG & Catia) as compare to other CAD software.
- Create 2D geometric sketches by using UG & Catia software.
- Develop 3D solid & surface modeling by using advanced command.
- Understand assembly constraint & develop different types of assembly design.
- Understand design generative & interactive drafting.
- Apply knowledge in create complicated modeling & creative/innovative solution.

THEORY HOURS: PRACTICAL HOURS: 120

THEORY MARKS: PRACTICAL MARKS: 60

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR	Marks	
				hours		
UNIT-I		 At the end of this Unit the student should be able to: Understand advance computer aided design. Understand Different types CAD software. Understand advanced features added & changed since new release software. Understand difference between various software as compare to UG & Catia. Execute the concept of hardware & software. 	Capability of CAD Software and Introduction to Unigraphics & Catia. Description of the feature that have been added or changed since new Release software. Criteria for selection of CAD workstations, Shingle Design Process, Design criteria, Geometric modeling, entities, 2D & 3D Primitives. Different Types of cad software. Also comparison of various CAD Software. CAD software features. Concept of hardware & software.	5	8	
UNIT-II		At the end of this Unit the student should be able to:	Introduction of Unigraphics. History of cad & UG. Technical terms related to UG. Drawing sketches for	25	10	
		Have fundamental knowledge of UG	solid models. Creating sketches in the Sketch task			
		software.	environment & Modeling Environment. Understand			

	 Create complicated geometry sketch Understand Adding Geometric & Dimensional Constraint to sketches. Perform Drawing sketches for solid models. Understand various sketching tools. Understand & Create sketches in the Sketch task environment & Modeling Environment. 	Various Sketching Tool. Editing, Extruding, Revolving sketches. Adding Geometric & Dimensional Constraint to sketches.			
UNIT-III	 At the end of this Unit the student should be able to: Understand Working with Datum plane, Coordinate System, and datum axes. Understand Advance Modelling Tool. Apply advance editing, modifying, creating feature. To execute Boolean, extrusion termination operations. Create 3D model design. 	Working with Datum plane, Coordinate System, and datum axes. Specifying Boolean operation, Specification other Extrusion Termination option. Advance Modelling Tool like creating various types of Hole, Grooves, Slots, Dove-Tail Slots, Chamfer, and Edge Blend. Pattern Feature Tool, Mirror Feature Tool, and Sweeping Sketches along guide curve. Creating swept, Tubes or cables, Threads, Shell Features.	30	12	
UNIT-IV	At the end of this Unit the student should be able to: Understand surface modeling concept. Create surface model. Understand concept of assembly constraint. Understand concept of Drafting. Understand different types of view. Use different engineering symbols	Various Assembly constraints. Working with bottom up and top down assembly. Design in context. Generating bill of material. Tool Develop & design in UG. Surface Modelling Feature, surface analysis, curve analysis, Family table. Generating, Editing, and Dimensioning the Drawing views. Types of Drawing View, Modifying the properties of Generated drawing view, printing tools, print, plot.	20	10	
UNIT-V	 At the end of this Unit the student should be able to: Have fundamental knowledge of CATIA software. Create complicated geometry sketch Understand Adding Geometric & 	Introduction to Catia and Important Technical Terms & Definitions. Understand function of Tool bar, hot keys, Color Scheme etc. Drawing Display Tools like Zoom In, Zoom Out, Pan etc. Drawing sketches in Sketcher work bench. Using sketching tools like lines, Center Lines, Rectangle,	25	10	

	 Dimensional Constraint to sket Perform Drawing sketches for models. Understand various sketching Understand & Create sketches Sketch task environment & Mo Environment. Create 3D model by using vario sketch based features. Understand operation, transformation, and dress up f hole & editing feature tool bar 	tches.Point, and Circle etc. Editing and Modifying Tools. solidsolidConstraining Sketches and Creating Base Features. Solid Modeling Feature Tool bars like Reference Element, Sketch Based Feature, Dress up Feature, Hole Feature, Editing Features, Transforming odelings in theHole Feature, Editing Features, Transforming surface design feature. Wire frame geometry, ousoussurface creation methods Extrude, revolve, spheres, offset, fill, swept, loft, blend, Join, healing, untrimmed, disassemble, split, trim, boundary feature, rs.feature, rs.geometry Translate, symmetry, scaling affinity, rotate, nearest, extrapolate
UNIT-VI	 At the end of this Unit the student sho able to: Understand assembly concept different type of assembly. Use editing & constraint assen features. Understand drafting automatic manually drawing 	uld beAssemblyModeling.CreatingBottomup1520Assemblies& Top- downAssemblies.EditingS.&Assembly Features.Working with Drafting Workbench.Types of Views, generating automatically &bench.Types of Views, generating automatically &mblymanuallyDrawingView.AddingVariousDimensions,Tolerances,Datum,Surface finish,c &Welding symbols etc.

COURSE NAME: Manufacturing process-process planning and heat treatment

COURSE CODE:

COURSE OUTCOMES:

After completion of Course Student should be able to

- Describe, explain and Classify Engineering material and explain physical properties of materials.
- Understand the relation of grain size and relation to mechanical properties Review and brief discussion on stress strain
- Evaluate tensile strength percentage of elongation etc. & Annalise Fatigue and Creep testing, testing for Residual stresses
- Explain Selection and specification of carbon and alloy steels and also Describe types of modern Cutting Tool materials
- Understand and describe Powder Metallurgy and its applications
- Understand and explain concept of hardenability, define and explain Austempering, Martempering and Isothermal annealing
- Determine and analysis Tool failures due to improper quenching and loading
- Define and identify various manufacturing processes, Discuss process capabilities
- Understand and explain sheet metal working , its applications and limitations
- Summaries and define man machine consideration and Explain man machine information exchange
- Implement and describe JIT, KANBAN. Describe quality function development
- Explain concept of Rapid Prototyping & Define and implement Modern approaches to product design
- Explain and streamline creation of manufacturing data base and application of computer in production management

THEORY HOURS: 40 PRACTICAL HOURS:

THEORY MARKS: 60 PRACTIC

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH	Marks	
				hours		
UNIT-I	Classification of	After completion of unit Student	Types and Crystal Structures. Imperfections. Strain	6	8	
	materials	should be able to	hardening, Plastic range, Fracture, Fatigue, Creep and			
		Explain and describe	Creep properties. Recovery. Recrystallizations and			
		Crystal Structure	Grain growth. Primary and secondary recrystallization			
		• Define relation of grain	and sub-grain structure. Mechanism of strengthening			
		size and relation to	in metals. Grain size and its relation to mechanical			
		mechanical properties.	properties			
		Review and brief	Review and brief discussion on stress strain diagram			
		discussion on stress strain	of steel and the parameters for ductility toughness,			

		 Evaluate tensile strength percentage of elongation etc Annalise Fatigue and Creep testing, testing for Residual stresses 	strain hardening, and tensile strength percentage of elongation etc. Fracture toughness and crack growth measurement. Failure analysis, Factor-graphy and scanning electronic Microscope. Fatigue and Creep testing, testing for Residual stresses.			
UNIT-II	Tool Materials	 After completion of unit Student should be able to Explain Selection and specification of carbon and alloy steels Describe types of modern Cutting Tool materials Define and explain Properties of plastics Describe Powder Metallurgy 	Selection and specification of carbon and alloy steels for general engineering purpose, Specification of materials as per various standards (IS, BS, AISI, APS etc.) Case hardening steels, Cold work tool steels, hot work tool steels, high speed tool steels. Types of modern Cutting Tool materials like Carbide, Coated carbides, Ceramics, CBN, Diamond, Sialons, Impregnated tools. Introduction to Plastics. Properties of plastics-Thermoplastics-Thermosetting plastics. Methods of processing of plastics and plastic processing machines. Properties and applications of Carbon and alloy Steels, Specification of Grey iron casting IS: 210 SG Cast Iron IS: 865, Malleable iron castings IS: 2108 and IS: 2640. Selection and specification of die casting non-ferrous zinc and Aluminum (IS and LM Series). Powder Metallurgy and New Materials: Production of powders by various methods. Compacting, Sintering applications.	8	12	
UNIT-III	Heat treatment	 After completion of unit Student should be able to Understand and explain concept of hardenability Define and explain Austempering, Martempering and Isothermal annealing Determine and analysis Tool failures due to 	Hardenability, its concepts and its role in steel specification. Hardening and annealing of tool steels. Case hardening and local hardening, methods, selection and specification of such steels study of Isothermal Transformation diagrams. Austempering, Martempering and Isothermal annealing for tool steels. Tool failures due to improper heat treatment like Overheating, improper quenching and loading. ION Nitrating, Vacuum carburizing, Chemical Vapor depositing. Heat treatment of non-ferrous materials-	6	10	

		 improper quenching and loading Understand and explain Heat treatment of nonferrous materials 	Aluminum Alloys.		
UNIT-IV	Manufacturing processes	 After completion of unit Student should be able to Define and identify various manufacturing processes Discuss process capabilities Understand and explain sheet metal working Define and describe physical properties of engineering materials 	Various manufacturing processes, degree of accuracy and finish obtainable, process capability studies. Methods of improving tolerances. Basic product design rules for Casting, Forging, Machining, Sheet metal and Welding. Physical properties of engineering materials and their importance on products. Selection of plastics, rubber and ceramics for product design	8	12
UNIT-V	Industrial ergonomics:	 After completion of unit Student should be able to Summaries and define man machine consideration Explain man machine information exchange Implement and describe JIT , KANBAN Describe quality function development Explain concept of Rapid Prototyping Define and implement 	Man-machine considerations, ease of maintenance. Ergonomic considerations in product design- Anthropometry, Design of controls, man-machine information exchange. Process sheet detail and their importance, Advanced techniques for higher productivity. Just-in-time and Kanban System. Modern approaches to product design; quality function development, Rapid prototyping	6	10

		Modern approaches to product design				
UNIT-VI	Computer aided production management	 After completion of unit Student should be able to Define and explain Role of computer in product design and management Explain and streamline creation of manufacturing data base Define and explain communication network, production flow analysis Describe and explain Computer Aided product design and process Planning 	Role of computer in product design and management of manufacturing, creation of manufacturing data base, Computer Integrated Manufacturing, communication network, production flow analysis, Group Technology, Computer Aided product design and process Planning. Integrating product design, manufacture and production control.	6	8	

COURSE NAME: ENTREPRENEURSHIP

COURSE CODE:

COURSE OUTCOMES: After completion of Course Student should be able to

- Developing a detailed understanding of entrepreneurship along with the perspective of initiating and propelling new ventures.
- Developing the linkage between strategy, innovation, entrepreneurship and creativity.
- Inculcating the role of Intellectual Property perspective and Innovation as the key to entrepreneurship.
- THEORY HOURS: 40 PRACTICA
- PRACTICAL HOURS:

THEORY MARKS: --

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH	Marks	
				hours		
UNIT-I	ENTREPRENEURSH IP AND THE ENTREPRENEURIAL PROCESS	 At the end of this unit Student should be able to Understand Meaning and importance of entrepreneurship Understand the Motivations and reasons to start business Clarity of knowledge Entrepreneurial process Understand Entrepreurship framework. 	Introduction, entrepreneurship, Views on Entrepreneurship, Definitions of Entrepreneurship, historical perspectives on entrepreneurship, motivations to start a business, skill requirement, Entrepreneurial Qualities, Difference between an Entrepreneur and a Manager, different types of entrepreneurs, an entrepreneur converts the demand into supply, role of attitude, values and entrepreneurship, areas of skill development for entrepreneurs.	6	8	
UNIT-II	ENTREPRENEURSH IP FRAMEWORK AND THE ENTREPRENEURIAL PERSONALITY	 At the end of this unit Student should be able to Understand Role of information in opportunity recognition Knowledge of Emergence of entrepreneurship Understand Entrepreneurship framework Clarity of knowledge Entrepreneurial personality. 	Introduction, opportunity recognition, opportunity factors, three ways to identify an opportunity, opportunity recognition process, factors impacting emergence of entrepreneurship, entrepreneurial framework, framework of entrepreneurship, mental sequences in idea development, entrepreneurial development - four major themes, the entrepreneurial personality,	8	12	

			personality traits, fourteen character traits of an entrepreneur, competitive advantages of an entrepreneurial firm,			
UNIT-III	START-UP FACTORS, ORGANISATIONAL PLANNING AND WOMEN ENTREPRENEURSH IP	 At the end of this unit Student should be able to Understand Meaning and importance of start-up factors of entrepreneurship Understand Entry barriers Understand Significance and associated details of new ventures Factual & Theoretical Knowledge of Organizational planning 	Starting the venture, creativity, from creativity to entrepreneurship, environment scanning, swot (strengths, weaknesses, opportunities and threats), competitor analysis, industry analysis, porter's five forces analysis, feasibility studies, market analysis, business plan, preparing project report, marketing plan, marketing research for the new venture, the marketing concept for entrepreneurs, the marketing system, organization plan	6	10	
UNIT-IV	ORGANISATIONAL STRUCTURE AND FORMS OF OWNERSHIP	 At the end of this unit Student should be able to Understand Meaning and importance of various organizational structures in new ventures Understand the perspective of entrepreneurship Activity Forms of ownership Understand Job design Knowledge of Financial planning 	Basic forms of ownership, organizational structure, job design, meaning and importance of manpower planning, financial planning, cash budget, working capital, Performa income statement, Performa balance sheet, break even analysis, sick industries, board for industrial and financial reconstruction,	8	12	
UNIT-V	STAGES OF GROWTH AND STRATEGIC MANAGEMENT PROCESS	 At the end of this unit Student should be able to: Understand the Stages of growth of entrepreneurial ventures Understand Barriers to growth Knowledge of Entrepreneurship in small firms Understand Strategic management process Clarity of knowledge to Linkage of strategy and entrepreneurship 	Five stages of growth and development, grainer's model of organizational growth, business model, Definitions of the Term "Business Model", business model process, importance of the business model, the life cycle of entrepreneurship, barriers to small firm growth, strategic factors of entrepreneurship in small firms, the strategic management process, managerial competencies of entrepreneurs, environmental strategies.	6	10	

UNIT-VI	INTELLECTUAL PROPERTY CONCEPT AND INNOVATION	 At the end of this unit Student should be able to Understand Concept of intellectual property Understand Role perspective of intellectual property concept in entrepreneurship Understand Intellectual property rights 	Concept of property, intellectual property, objectives of intellectual property, nature of intellectual property rights, source of intellectual property, intellectual property and economic development, types of intellectual property, criteria for patentability, some exclusion from patentability, special requirement for patent, trademarks, trade	6	8	
		 Knowledge of IP rights as strategic tools in entrepreneurship Understand to Innovational important tool for entrepreneurship Understand Advantages and disadvantages of family businesses 	names & services marks, geographical indications(GI), industrial designs (id), integrated circuit layout designs, intellectual property management (IPM), transition from entrepreneur to entrepreneurial leader, family business			

Learning Resources:

Reference Books:

SR. NUMBER	AUTHOR	TITLE	PUBLISHER
1	DHOTRE	CNC MACHINE TOOL TECH. WITH PROGRAMMONG & OPERATING	SAITECH
2	B. S. PABLA	CNC MACHINES	NEW AGE PUBLICATION
3	DAVID GIBBS	CNC MACHINES & PROGRAMMING	INDUSTRIAL PRESS. INC.
4	S. N. MAHAJAN	METROLOGY & QUALITY CONTROL	NIRALI PUBLICATION
5	M. MAHAJAN	METROLOGY	DHANPAT RAI &CO.
6	NALINAKSHA MUTSUDDI	YOU TOO CAN BECOME AN ENTERPRENEUR	WHEELER PUBLISHING
7	B. S. RATHORE	A HANDBOOK OF ENTERPRENEURSHIP	AAPGA PUBLICATIONS
8	B. M. NAIK	EDUCATION & LEADERSHIP	ATLANTIC
9	V. D. KODGIRE	MATERIAL SCIENCE & METALLURGY	EVEREST PUBLISHING HOUSE
10	P. H. JOSHI	PRESS TOOL DESIGN & CONSTRUCTION	S. CHAND
11	R. G. W. PYE	INJECTION MOULD DESIGN	EWP
12	JOSHI	JIGS & FIXTURES	MC GRAW HILL EDUCATION
13	V. K. KHANNA	TQM	NEW AGE PUBLICATIONS
14	P. K. ROY	CUTTING TOOL TECHNOLOGY	NIRALI PUBLICATIONS
15	G. R. NAGPAL	TOOL ENGINEERING & DESIGN	KHANNA PUBLICATION
16	PROF. L. C. JHAMB	PRODUCTION PLANNING & CONTROL	EVEREST PUBLISHING HOUSE
17	P. C. SHARMA	PRODUCTION ENGINEERING	S. CHAND
18	PROF. SHAM TICKOO	AUTOCAD 2012 FOR ENGINEERS & DESIGNERS	DREAMTECH PRESS
19	PROF. SHAM TICKOO	SOLIDWORKS 2014 FOR ENGINEERS & DESIGNERS	DREAMTECH PRESS
20	JAMES VALENTINO	LEARNING MASTER CAM X MILLING 2D	INDUSTRIAL PRESS

