(An Empowered Autonomous Institute Affiliated to Shivaji University, Kolhapur)

NAAC Accredited with A+ Grade, ISO 9001:2015 Certified



#### DEPARTMENT: <MECHANICAL ENGINEERING> CURRICULUM

# First Year M.Tech. Mechanical Engineering (Product Design & Development) Program

With effect from 2024-25

**BOS Chairman** 

**Dean Academics** 

Director



(An Empowered Autonomous Institute Affiliated to Shivaji University, Kolhapur)

	Class.: Fir	st Year, B. Tech. Semester: SE	0		5 (		F Level : 7.	-	pillolit		W.E.F.:	2024-	2025	
				Т	'eac	hing So	cheme			Ev	aluatio	on sch	eme	
Sr.	Course		Course					Course		Theory	y	Prac	tical	
No.	Code	Course Title	Category	I.	Т	Р	Contact	Credits	C	IE				Total
				Ĩ	-	-	Hrs/wk		SE-I	SE- II	SEE	CIE	SEE	Total
01	01MEL501	Applied Machine Design	D	3	-	-	3	3	25	25	50	-	-	100
02	01MEL502	Computer Aided Design and Simulation	D	3	-	-	3	3	25	25	50	-	-	100
03	01MEL503	Design of Experiments & Research	В	3	-	-	3	3	25	25	50	-	-	100
03		Methodology												
04	01MELEL1	Elective-I:	D	3	-	-	3	3	25	25	50	-	-	100
05	01MELEL2	Elective-II:	D	3	-	-	3	3	25	25	50	-	-	100
06	01MEP510	Applied Machine Design	D	-	-	2	2	1	-	-	-	50	50	100
07	01MEP511	Computer Aided Design and Simulation	D	-	-	2	2	1	-	-	-	50	50	100
08	01MEP512	Design of Experiments & Research Methodology	В	-	-	2**	1	1	-	-	-	50	-	50
09	01MEPEL1	Elective-I:	D	-	-	2**	1	1	-	-	-	50	-	50
10	01MEPEL2	Elective-II:	D	-	-	2	2	1	-	-	-	50	-	50
Total				15	-	8	23	20	125	125	250	250	100	850

#### Teaching and Evaluation Scheme for Year 2024-25 Program: M. Tech. Mechanical Engineering (Product Design and Development)

\*\* Practical for Alternate Week

L- Lecture T-Tutorial P-Practical SE-I: Semester Examination-I SE-II: Semester Examination-II CIE – Continuous in Semester Evaluation SEE- Semester End Examination

	BSC	/ESC	Prog Cou	gram rses	Multidiso Cou		Skill Courses		nities Soc anageme			Expe	erientia Cou	al Lear rses	ning	Liberal Learning Courses
Course Category	BSC	ESC	РСС	PEC	MDM	OE	VSEC	AEC	Entrp / Mgmt	IKS	VEC	RM	CEP/ FP	Proj	Int/ OJT	CC
Credits		4	16													
Cum. Sum		4	16													



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#### **Teaching and Evaluation Scheme for Year 2024-25**

	Class.: Fi	rst Year, B. Tech. Semester: SEM-II		8(-			vel : 7.0	<b>F</b>	,	W.	E.F.: 2	024-2	025	
				T	'eacl	ning so	heme			Eva	aluatio	on sch	eme	
Sr.	Course Code	Course Title	Course Categor					Course		Theor	y	Prac	tical	
No.	course coue	course mile	y	L	Т	Р	Contact Hrs/ wk	Credits	C	IE	CEE	CIE	CEE	Total
			, ,				1115/ WK		SE-I	SE-II	SEE	CIE	SEE	
01	01MEL520	Manufacturing System Design	D	3	-	-	3	3	25	25	50	-	-	100
02		Creativity, Innovation & New Product Development	D	3	-	-	3	3	25	25	50	-	-	100
03	01MEL522	Product Life Cycle Management	D	3	-	-	3	3	25	25	50	-	-	100
04	01MELEL3	Elective-III:	D	3	-	-	3	3	25	25	50	-	-	100
05	01MELEL4	Elective-IV:	D	3	-	-	3	3	25	25	50	-	-	100
06	01MEP529	Manufacturing System Design	D	-	-	2	2	1	-	-	-	50	50	100
07		Creativity, Innovation & New Product Development	D	-	-	2**	1	1	-	-	-	50	-	50
08	01MEP531	Product Life Cycle Management	D	-	-	2**	1	1	-	-	-	50	-	50
09	01MEPEL3	Elective-III:	D	-	-	2	2	1	-	-	-	50	50	100
10	01MEPEL4	Elective-IV:	D	-	-	2	2	1	-	-	-	50	-	50
Total				15	0	8	23	20	125	125	250	250	100	850

#### Program: M. Tech. Mechanical Engineering (Product Design and Development)

\*\* Practical for Alternate Week

L- Lecture T-Tutorial P-Practical SE-I: Semester Examination-I SE-II: Semester Examination-II

CIE – Continuous in Semester Evaluation SEE- Semester End Examination

	BSC,	/ESC	Prog Cour		Multidisc Cour	• •	Skill Courses		anities So Managem			Expe		al Lear rses	ning	Liberal Learning Courses
Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC	Entrp / Mgmt	IKS	VEC	RM	CEP/ FP	Proj	Int/ OJT	СС
Credits			20													
Cum. Sum		4	36													



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#### **Teaching and Evaluation Scheme for Year 2025-26**

#### Program: M. Tech. Mechanical Engineering (Product Design and Development)

	Class.: Fi	rst Year, B. Tech. Semester: SEM-III	U	υ	NC	rF Le	evel : 7.5	•	,	<b>W</b> .	E.F.: 2	025-2	026	
				Те	achi	ng so	cheme			Eva	aluatio	on sch	eme	
Sr.	Course Code	Course Title	Course Categor				Gentred	Course		Theory	y	Prac	tical	
No.	course coue	course ritie	V	L	Т	Р	Contact Hrs/ wk	Credits	C	IE	CEE	CIE	CEE	Total
			, j				III 5/ WK		SE-I	SE-II	SEE	CIE	SEE	
01	01MED601	Dissertation Phase-I	F	-	-	16	16	16	-	-	-	50	50	100
02	01MED602	Mini Project/ Industrial Trg*	F	-	-	2	2	2	-	-	-	50	-	50
03	01MED603	Seminar	F	-	-	2	2	2	-	-	-	50	-	50
Total				0	0	20	20	20	0	0	0	150	50	200

\* Should be completed at the end of Sem.II and evaluation is to be carried out at the end of Sem.III based on training report.

#### L- Lecture T-Tutorial P-Practical SE-I: Semester Examination-I SE-II: Semester Examination-II

CIE – Continuous in Semester Evaluation SEE- Semester End Examination

	BSC,	/ESC	Prog Cour		Multidisc Cour	- v	Skill Courses		anities So Managem			Expo	erientia Cou	al Lear rses	ning	Liberal Learning Courses
Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC	Entrp / Mgmt	IKS	VEC	RM	CEP/ FP	Proj	Int/ OJT	СС
Credits														20		
Cum. Sum		4	36											20		



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#### **Teaching and Evaluation Scheme for Year 2025-26**

#### Program: M. Tech. Mechanical Engineering (Product Design and Development)

	Class.: Fi	rst Year, B. Tech. Semester: SEM-IV			NC	rF Le	evel : 7.5			W.	E.F.: 2	025-2	026	
				Те	achi	ng se	cheme			Eva	luatio	on sch	eme	
Sr.	Course Code	Course Title	Course Categor					Course		Theory	y	Prac	tical	
No.	course coue	course ritte	V	L	Т	Р	Contact Hrs/ wk	Credits	C	IE	CEE	CIE	CEE	Total
			, j				III 5/ WK		SE-I	SE-II	SEE	CIE	SEE	
01	01MED604	Dissertation Phase-II	F	-	-	20	20	20	-	-	-	50	50	100
Total				-	-	20	20	20	-	-	-	50	50	100

L- Lecture T-Tutorial P-Practical SE-I: Semester Examination-I SE-II: Semester Examination-II

CIE – Continuous in Semester Evaluation SEE- Semester End Examination

	BSC,	/ESC	Prog Cour		Multidisc Cour	- v	Skill Courses		anities So Managem			Exp		al Lear rses	ning	Liberal Learning Courses
Course Category	BSC	ESC	РСС	PEC	MDM	OE	VSEC	AEC	Entrp / Mgmt	IKS	VEC	RM	CEP/ FP	Proj	Int/ OJT	CC
Credits														20		
Cum. Sum		4	36											40		



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course	e Cod	le	01MEL501	Course Name	Applied Machine	Design		
т	'each	ning S	cheme			Ev	aluation Sche	eme
L	Т	Р	Credits	_		SE-I Marks	SE-II Marks	SEE Mark
3	-	-	3	-		25	25	50
Course	e Obj	ectiv	es:					
01	To u	inder	stand design	process.				
02	To s	tudy	design metho	ds.				
				ship of processin				
04	Stud	ly of s	tress-strain r	elationship in ela	stic bodies.			
Course				م الانتخاب الم				
01 01	•			student will be al				
01				process of design	r new product desig	n		
02		-		-	the requirements o			
03				, ,	ass of elasticity prob			اد
			•	of these probler			iy the analytic	201
	teen	mqu						
				Co	ourse Contents			
Unit	1			< Dee	• -			
standa	rds -	Conc	urrent Engine	ogy of Design - D eering - Product li	<pre>ign Process &gt; esign drawings -Con fe cycle - Technologi ering - Life Cycle Fr</pre>	ical Forecastir	ng - Market Id	entification
standa Compe Industi	rds - etitio rial D	Conc on Ber	urrent Engine nch marking	ogy of Design - D eering - Product li - Systems Engine	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er	ical Forecastir	ng - Market Id	Designing c entification s in Design
standa Compe Industr <b>Unit</b>	rds - etitio rial D	Conc on Ber Design	urrent Engine nch marking	ogy of Design - D eering - Product li - Systems Engine <b>- Desi</b>	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er gn Methods >	ical Forecastir ngineering - H	ng - Market Id Iuman Factor	Designing c entification s in Design 8 Hours
standa Compe Industr <b>Unit</b> Creativ Embod Elemer	rids - etitio rial D II /ity a diment nt M	Conc on Ber Design and P nt De lodeli	urrent Engine nch marking  roblem Solvi sign - Detail	ogy of Design - D eering - Product li - Systems Engine <b>&lt; Desi</b> ng - Product Des Design -Mathema	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er	cal Forecastin ngineering - H Conceptual o nulation - Ge	ng - Market Id Iuman Factor design - Decis ometric Mod	Designing o entification s in Design 8 Hours sion theory eling - Finit
standa Compe Industr <b>Unit</b> Creativ Embod Elemer	rids - etitio rial D line vity a dime nt M izatic	Conc on Ber Design and P nt De lodeli	urrent Engine nch marking  roblem Solvi sign - Detail	ogy of Design - D eering - Product li - Systems Engine <b>&lt; Desi</b> ng - Product Des Design -Mathema ation - Search M	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er gn Methods > ign Specifications - atical Modeling - Sir	Conceptual on Conceptual of Co	ng - Market Id Iuman Factor design - Decis ometric Mod	Designing o entification s in Design 8 Hours sion theory eling - Finit
standa Compe Industr Unit Creativ Embod Elemer Optimi Unit I	rids - etitio rial D ll vity a dimen nt M izatio	and P nt De lodeli	roblem Solvi sign - Detail	ogy of Design - D eering - Product li - Systems Engine <b>&lt; Desi</b> ng - Product Des Design -Mathema ation - Search M <b>&lt; Introduction</b>	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er gn Methods > ign Specifications - atical Modeling - Sir lethods - Geometric	Conceptual of mulation - Geogrammir	ng - Market Id Iuman Factor design - Decis ometric Mod ng - Structura	Designing c entification s in Design 8 Hours sion theory eling - Finit al and Shap
standa Compe Industr Unit Creativ Embod Elemer Optimi Unit I	rds - etitio rial D /ity a diment fizatio	and P nt De lodeli	roblem Solvi sign - Detail ng - Optimiz 2-d and 3-d, r	ogy of Design - D eering - Product li - Systems Engine <b>&lt; Desi</b> ng - Product Des Design -Mathema ation - Search M <b>&lt; Introduction</b> elation between s	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er gn Methods > ign Specifications - atical Modeling - Sir lethods - Geometric to Solid Mechanics	Conceptual of nulation - Ge Programmir	ng - Market Id Iuman Factor design - Decis ometric Mod ng - Structura	Designing c entification s in Design 8 Hours sion theory eling - Finit al and Shap
standa Compe Industr Unit Creativ Embod Elemer Optimi Unit I Stress, Unit I Stress, Init I for Ass	rds - etitio rial D ll vity a diment M izatio Stra Stra Stra semb	and P nt Design nt De lodeli on in in 2 electic cessir oly - D	roblem Solvi sign - Detail ng - Optimiz 2-d and 3-d, r n Process - E ng and Design	ogy of Design - D eering - Product li - Systems Engine <b>&lt; Desi</b> ng - Product Des Design -Mathema ation - Search M <b>&lt; Introduction</b> elation between s <b>Material Selectio</b> conomics - Cost V n - Classification c	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er gn Methods > ign Specifications - atical Modeling - Sir lethods - Geometric to Solid Mechanics stress and strain, the	Conceptual of nulation - Ge Programmin cories of failur esign > ighted prope pocess - Design	ng - Market Id Iuman Factor design - Decis ometric Mod ng - Structura re. rty Index - Val	Designing o entification s in Design <b>8 Hours</b> sion theory eling - Finit and Shap <b>6 Hours</b> <b>8 Hours</b> lue Analysis ture - Desig
standa Compe Industr Unit Creativ Embod Elemer Optimi Unit I Stress, Unit I Materi Role of for Ass	rds - etitio rial D II vity a diment M izatio III Stra V Stra semb e, Fra	and P nt Design nt De lodeli on in in 2 electic cessir oly - D	roblem Solvi sign - Detail ng - Optimiz 2-d and 3-d, r 2-d and 2-d, r 5 n Process - E ng and Design 5 esign for cas	ogy of Design - D eering - Product li - Systems Engine <b>&lt; Desi</b> ng - Product Des Design -Mathema ation - Search M <b>&lt; Introduction</b> elation between s <b>Material Selectio</b> conomics - Cost V n - Classification c stings, Forging, M	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er gn Methods > ign Specifications - atical Modeling - Sir lethods - Geometric to Solid Mechanics stress and strain, the n Processing And De stress formance - We of Manufacturing Pro-	Conceptual of nulation - Ge Programmin seories of failur esign > ighted prope pocess - Design ining and We	ng - Market Id Iuman Factor design - Decis ometric Mod ng - Structura re. rty Index - Val	Designing o entification s in Design <b>8 Hours</b> sion theory eling - Finit and Shap <b>6 Hours</b> <b>8 Hours</b> lue Analysis ture - Desig
standa Compe Industr Unit Creativ Embod Elemer Optimi Unit I Stress, Unit I Stress, Unit I Role of for Ass Fatigue Unit Y Probak Reliabi	rds etitio rial D II vity a dimen nt M izatio Stra Stra Stra Stra Stra V Dility -	e Conc on Ber Design and P nt De lodeli on in in 2 electic ocession oly - Dis - Dis	roblem Solvi sign - Detail ng - Optimiz 2-d and 3-d, r 2-d and 3-d, r con Process - E ng and Design Design for case and Failure.	ogy of Design - D eering - Product li - Systems Engine <b>&lt; Desi</b> ng - Product Des Design -Mathema ation - Search M <b>&lt; Introduction</b> elation between s <b>Material Selectio</b> conomics - Cost V n - Classification c stings, Forging, M <b>&lt; Engineering St</b> est of Hypothesis ad Maintenance.	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er gn Methods > ign Specifications - atical Modeling - Sir lethods - Geometric to Solid Mechanics stress and strain, the n Processing And De stress and strain, the f Manufacturing Pro- etal Forming, Mach atistics And Reliabili s - Design of Experi	Conceptual of nulation - Ge Programmir eories of failur esign > ighted prope ocess - Design ining and We	ng - Market Id Iuman Factor design - Decis ometric Mod ng - Structura re. rty Index - Val for Manufac elding - Residu	Designing o entification s in Design 8 Hours sion theory eling - Finit al and Shap 6 Hours 8 Hours lue Analysis ture - Desig ual stresses 5 Hours
standa Compe Industr Unit Creativ Embod Elemer Optimi Unit I Stress, Unit I Materi Role of for Ass Fatigue Eatigue Vnit V	rds - etitio rial D II vity a diment M izatio III Stra Stra V Stra F Pro Seemb e, Fra V Dility - VI	in in 2 election consignation in in 2 election coessim oly - Dis Relia	roblem Solvi sign - Detail ng - Optimiz 2-d and 3-d, r 2-d and 3-d, r an Process - E ng and Design Design for case and Failure. tributions -T bility centere	ogy of Design - D eering - Product li - Systems Engine < Design ng - Product Des Design -Mathema ation - Search M < Introduction elation between s Material Selectio conomics - Cost V n - Classification c stings, Forging, M < Engineering St est of Hypothesis d Maintenance. < Qualit	esign drawings -Con fe cycle - Technologi ering - Life Cycle Er gn Methods > ign Specifications - atical Modeling - Sir lethods - Geometric to Solid Mechanics stress and strain, the n Processing And De 's Performance - We of Manufacturing Pro- etal Forming, Mach atistics And Reliabili	Conceptual of nulation - Ge Programmin cories of failur esign > ighted prope pocess - Design ining and We ity >	ng - Market Id Iuman Factor design - Decis ometric Mod ng - Structura re. rty Index - Val for Manufac elding - Residu	Designing o entification s in Design 8 Hours sion theory eling - Finit al and Shap 6 Hours 8 Hours lue Analysis ture - Design al stresses 5 Hours 7 - Design o 4 Hours



Texts B	ooks:
1	Dieter George E., "Engineering Design - A Materials and Processing Approach", McGraw Hill, International Edition Mechanical Engg. Series ,1991.
2	Karl t. Ulrich and Steven d Eppinger "Product Design and Development", McGraw-Hill, Edition 2000.
3	Palh .G. and Beitz .W. "Engineering Design ", Springer - Verlag NY. 1985.
Referer	nce Books:
1	Ray .M.S., "Elements of Engg. Design ", Prentice Hall Inc. 1985.



Cour	se Co	de	01MEL502	Course Name	Computer Aided			
	Teacl	ning S	cheme	_		Ev	aluation Sche	me
L	Т	Р	Credits	_		SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
	se Ob	· · · · · · · · · · · · · · · · · · ·						
01	_			o Create 2-D draw	-			
02			•	ple machine com	•			
03		oduce FEA.	e students to	Finite Element An	alysis fundamentals	and formula	te the design p	oroblems
04			e the student s of compute		ledge and analysis sl	kills to interp	ret and draw o	conclusion
Cour	se Ou	tcome	es:					
On c	omple	tion o	of the course,	student will be al	ole to –			
01	· ·				Computer-Aided De	esign softwar	е	
02	Use	parar	metric model	ling techniques to	reflect engineering	requirement	S.	
03	Use	profe	essional-level	finite element so	ftware to solve engir	neering probl	ems	
04	Тос	develo	p the studen	t's skills in modell	ing, meshing, and se	etting up mat	erial propertie	es, loads,
	and	const	traints for cor	nputer simulatior	and solve the probl	lem using sof	tware tools.	
				Co	ourse Contents			
Un	it I				Design Consideratio	ons >		8 Hours
Natu	ire and	d scop	e of product	engineering - crea	ative thinking and or	ganizing for p	product innova	ation criteri
for p	roduc	t succ	ess in life cycl	e of a product, rol	e of models in produ	ict design, Ma	aterial selectio	n - problem
			•		ics of materials - the	e materials se	lection proces	s-economic
			•	rmance relations				
			•		n-influence of basic			
	-				anufacture by machi	-	ls. Influence of	t space, size
				-	onomic consideratio		duct	6 Hours
Un	it II		< I olerance A		ensioning and toler nctional >	ancing a pro	auct-	6 Hours
Prod	uction	and i	nspection da	tum-tolerance and				
	it III		•		phics Fundamentals	& Solid Mo	deling>	8 Hours
				•	D transformation (Tr			
-	-				alism: Hidden - Line		-	-
	•		-		and variational- ge			-
	-		-	-	s using these packag	-		
Solid	Mod	eling:	Introduction	n to solid model	ing concepts, sketo	ching and co	onstraining th	ie geometr
	erating	primi	tive shapes b	y using part mode	ling workbench, crea	ation of surfa	ces-types and	application
gene	rious	types	of surfaces, A	ssembly of parts	, tolerance analysis r	mass propert	y calculations.	
-				< Finite Element	Analysis & 2D Probl	em>		8 Hours
of va Uni	it IV							
of va <mark>Un</mark> i Histo	orical	-	round - Weig		thods -Basic conce			
of va Uni Histo B.V.F	orical   P Rit	z metl	round - Weig hod - Finite el		- Element Equation -			



Basic boundary value problems in 2 Dimensions - Triangular, quadrilateral, higher order elements - Poisons and Laplace's Equation - Weak formulation - Element Matrices and vectors - Application to solid mechanics, Heat transfer, Fluid Mechanics.

Unit	V <pre>&lt; ISO-Parametric Formulation &gt;</pre>	4 Hours
	al Coordinate Systems – Lagrangian Interpolation Polynomials – Isoparametr	•
	ulation - Numerical Integration ID - IID Triangular elements - Rectangular elemen	ts - illustrative
Exam Unit		5 Hours
	n and System Environment: Components of a system, Continuous and discrete syster	
	n, Modeling. Random Number Generation: Methods and Tests for random numb	
•	om Variable Generation, Simulation of Systems: Simulation of continuous system	-
	te system, Simulation of event occurrences using random numbers. Simulation	
	es, using Exponential and waybill models. Input modeling and output analy	•
	ations: Single server queue problems and multi-server queue problems, Inventory sy	
	em, Shop Floor problems in a manufacturing environment.	Sterry Network
P1001		
Texts	Books:	
1	Ibrahim Zeid "CAD/CAM Theory and Practice" McGraw Hill, International Edition, 19	98.
-	Mikell .P. Grooves and Emory .W. Zimmers Jr. "CAD/CAM Computer - Aide	
2	Manufacturing", Prentice Hall, Inc., 1995.	
3	Narsingh Deo., System simulation with Digital Computer, Prentice Hall of India, 1979	)
-	ence Books:	
	William .M. Neumann and Robert .F. Sproul "Principle of Computer Graphics", McGra	aw Hill Book Co.
1	Singapore, 1989.	
2	Donald Hearn and .M. Pauline Baker "Computer Graphics", Prentice HallInc., 1992.	
3	Jones J.C., "Design Methods", Interscience, 1970.	
4	Buhl, H.R., "Creative Engineering Design", Iowa State University Press, 1960.	
5	Robert Matouseek, "Engineering Design", Blackie & Sons Ltd., 1963.	
6	Niebel, B.W. & Draper, A.B., "Product Design and Process Engineering, McGraw Hill,	1974.
7	Harry Peck, "Designing for Manufacturing", Sir Issac Pitman and Sons Ltd., 1973.	
8	Gladman, C.A., "Manual for Geometric Analysis of Engineering Designs", Australian	Frade
	Wade, Or, "Tolerance Control in Design and Manufacture", Industrial Press, Inc. B	
9	J.S., and Nelson B.L., Discrete Event System Simulation, PHI, New Delhi, 1996.	-,
10	Gottfried B.S., Elements of Stochastic Process Simulation, Prentice Hall, London, 198	4.
11	Geoffrey Gordon., System Simulation, Prentice Hall of India, 1984.	
	· · · · · · · · · · · · · · · · · · ·	



Cour	se Co		01MEL503	Course Name	ring (Product Design Design Of Experir	· · · · ·		
			cheme	course Name	Design Of Experin	1	aluation Sch	
L	T	P	Credits	-		SE-I Marks	SE-II Marks	
3	-	-	3	-		25	25	50
	se Ob	jectiv				23	23	30
01	1	•		ics of research.				
02				of research design	า.			
03	_	•		of research mode				
04	_				nd factorial design.			
05	_			the analysis in res	-			
				,				
Cour	se Ou	tcome	es:					
On c	omple	etion o	f the course,	student will be ab	ole to –			
01	Far	niliariz	e with resear	ch and types of re	esearch.			
02	Kno	w var	ious steps in	the research meth	nodology.			
03	Un	dersta	nd research n	nodelling and sim	ulation			
04	Kno	w var	ious methods	of experimentati	on and process opti	mization.		
05	Use	e vario	us analysis te	chniques and pre	pare report of the re	esearch work.		
				Со	urse Contents			
Un	it I			< Int	roduction >			6 Hours
	-				sis, Scientific Metho	d, Types of R	esearch, Res	earch Process
and s	rtopc	in it D						
	•			••	ntents, sponsoring a			
Соор	peration			s, Research proble	em selection, Neces			m
Coop Uni	eratio it II	on and	Legal aspect	s, Research proble < Rese	em selection, Neces arch Design >	sity of definin	g the proble	m 7 Hours
Coop Uni Mear	oeratio it II ning,	on and Need,	l Legal aspect Concepts rela	s, Research proble < Rese ated to it, categori	em selection, Neces arch Design > les; Literature Surve	sity of definin y and Review	g the proble , Dimensions	m 7 Hours and issues of
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Pre-writing Considerations, Principles of Thesis Writing, Formats of Report Writing & Publication in Research Journals, Oral Presentations (Briefing)

Texts	Books:
1	Krishnaswamy, K.N., Sivakumar, Appa Iyer & Mathirajan M., (2006) - Management Research Methodology: Integration of Principles, Methods & Techniques (New Delhi, Pearson Education)
2	Montgomery, Douglas C. (2004) - Design & Analysis of Experiments, 5/e. (New York, John Wiley & Sons)
3	Kothari, C.K. (2004) - Research Methodology, Methods & Techniques, 2/e. (New Delhi, New Age International Ltd. Publishers)
Refer	ence Books:
1	Ross, Phillip J. (1996) - Taguchi Techniques for Quality Engineering, 2/e. (New York, McGraw Hill)
2	Rao S. S. (2004) - Engineering Optimization Theory & Practices, 3/e (New Delhi, New Age International Ltd., Publishers)
3	Handbook of Industrial Automation - Richard L. Shell & Ernest L. Hall (Marcel Decker Inc.)
4	Trochim, William M.K. (2003), - Research Methods 2/e, (New Delhi, Biztantra, Dreamtech)



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Texts	s Bo	oks:														



1	Charles J A, Crane F.A.A. & Furness J A G /'Selection and use of Engineering Materials", (3 rd edition ), Butterworth - Heiremann - 1977
2	"Materials and their applications", (4th Edition)- Jaico- 1999
3	Technology of engineering materials by M. Phillip and W Bolten
Refer	ence Books:
1	W.D.Callister: Materials Science and Engineering: An Introduction, Wiley
2	Charles J A, Crane F.A.A. & Furness J A G, "Selection and use of Engineering Materials", (3 rd edition
2	), Butterworth – Heiremann
3	Physical Metallurgy and Advanced Materials, Seventh edition, R. E. Smallman & Ngan, Elsevier
4	Materials & Processes in Manufacturing", E. Paul DeGarmo, J. T. Black & Ronald A. Kohser, (PHI)
5	"Design & Manufacturing of Composite Structures", Geoff Eckold (Jaico Publishing House)
6	"Manufacturing Processes for Engineering Materials", S. Kalpaljian, Steven R. Schmidt, (Pearson)
7	"Materials and their applications", (4th Edition) Jaico- 1999
8	"Materials & Processes in Manufacturing", E. Paul DeGarmo, J. T. Black & Ronald A. Kohser, (PHI)
9	Design & Manufacturing of Composite Structures", Geoff Eckold (Jaico Publishing House)



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Texts	s Book	s:						
1	"Pro	ogram	mable Logic	Controller - Prine	ciples and Application	ns" by J. W.	Webb, R. A. R	eis; Prentice
1	Hall	of Ind	dia Ltd. ISBN	81-203-2308-4.	-			
2	"Pro	ogram	mable Logic	Controller : Princ	iples and Applications	s" by NIT, PH	l Pub.	
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1"Programmable Logic Controller - Principles and Applications" by J. W. Webb, R. A. Reis; Prentice Hall of India Ltd. ISBN 81-203-2308-4.2"Programmable Logic Controller : Principles and Applications" by NIT, PHI Pub.3"Desirable facility on equivalent make PLC with supporting programming software and interfacing sensor" by Allen Bradley.4"Industrial Robotics - Technology, Programming and Applications"; M. P. Groover, M. Weiss, R. N. Nagel, N. G. Ordey; McGraw Hill International Editions, Industrial Engineering Series, ISBN 0-0- 100442-45"Programmable Logic Controller - Programming methods and Applications" Hackworth John R. and Hackworth Frederick D. Jr.; Pearson Education LCE, ISBN 81-297-0340-8.6Introduction to 8085 - Gaonkar7Process control and instrumentation - Johnson C.D.8Introduction to PLC - Gary Dumming - Delmar Pub.9Programmable Logic Controller - FESTO Pneumatics, - Bangalore10PLC Textbook and related literature by FESTO.11Various PLC manufacturers catalogue		
<ul> <li>"Desirable facility on equivalent make PLC with supporting programming software and interfacing sensor" by Allen Bradley.</li> <li>"Industrial Robotics - Technology, Programming and Applications"; M. P. Groover, M. Weiss, R. N. Nagel, N. G. Ordey; McGraw Hill International Editions, Industrial Engineering Series, ISBN 0-0-100442-4</li> <li>"Programmable Logic Controller - Programming methods and Applications" Hackworth John R. and Hackworth Frederick D. Jr.; Pearson Education LCE, ISBN 81-297-0340-8.</li> <li>Introduction to 8085 - Gaonkar</li> <li>Process control and instrumentation - Johnson C.D.</li> <li>Introduction to PLC - Gary Dumming - Delmar Pub.</li> <li>Programmable Logic Controller - FESTO Pneumatics, - Bangalore</li> <li>PLC Textbook and related literature by FESTO.</li> </ul>	1	
<ul> <li>sensor" by Allen Bradley.</li> <li>"Industrial Robotics - Technology, Programming and Applications"; M. P. Groover, M. Weiss, R. N.</li> <li>Nagel, N. G. Ordey; McGraw Hill International Editions, Industrial Engineering Series, ISBN 0-0-100442-4</li> <li>"Programmable Logic Controller - Programming methods and Applications" Hackworth John R. and Hackworth Frederick D. Jr.; Pearson Education LCE, ISBN 81-297-0340-8.</li> <li>Introduction to 8085 - Gaonkar</li> <li>Process control and instrumentation - Johnson C.D.</li> <li>Introduction to PLC - Gary Dumming - Delmar Pub.</li> <li>Programmable Logic Controller - FESTO Pneumatics, - Bangalore</li> <li>PLC Textbook and related literature by FESTO.</li> </ul>	2	"Programmable Logic Controller : Principles and Applications" by NIT, PHI Pub.
<ul> <li>A Nagel, N. G. Ordey; McGraw Hill International Editions, Industrial Engineering Series, ISBN 0-0-100442-4</li> <li>S "Programmable Logic Controller - Programming methods and Applications" Hackworth John R. and Hackworth Frederick D. Jr.; Pearson Education LCE, ISBN 81-297-0340-8.</li> <li>Introduction to 8085 - Gaonkar</li> <li>Process control and instrumentation - Johnson C.D.</li> <li>Introduction to PLC - Gary Dumming - Delmar Pub.</li> <li>Programmable Logic Controller - FESTO Pneumatics, - Bangalore</li> <li>PLC Textbook and related literature by FESTO.</li> </ul>	3	
<ul> <li>Hackworth Frederick D. Jr.; Pearson Education LCE, ISBN 81-297-0340-8.</li> <li>Introduction to 8085 - Gaonkar</li> <li>Process control and instrumentation - Johnson C.D.</li> <li>Introduction to PLC - Gary Dumming - Delmar Pub.</li> <li>Programmable Logic Controller - FESTO Pneumatics, - Bangalore</li> <li>PLC Textbook and related literature by FESTO.</li> </ul>	4	Nagel, N. G. Ordey; McGraw Hill International Editions, Industrial Engineering Series, ISBN 0-0-
<ul> <li>7 Process control and instrumentation - Johnson C.D.</li> <li>8 Introduction to PLC - Gary Dumming - Delmar Pub.</li> <li>9 Programmable Logic Controller - FESTO Pneumatics, - Bangalore</li> <li>10 PLC Textbook and related literature by FESTO.</li> </ul>	5	
<ul> <li>8 Introduction to PLC - Gary Dumming - Delmar Pub.</li> <li>9 Programmable Logic Controller - FESTO Pneumatics, - Bangalore</li> <li>10 PLC Textbook and related literature by FESTO.</li> </ul>	6	Introduction to 8085 - Gaonkar
<ul> <li>9 Programmable Logic Controller - FESTO Pneumatics, - Bangalore</li> <li>10 PLC Textbook and related literature by FESTO.</li> </ul>	7	Process control and instrumentation - Johnson C.D.
10 PLC Textbook and related literature by FESTO.	8	Introduction to PLC - Gary Dumming - Delmar Pub.
· ·	9	Programmable Logic Controller - FESTO Pneumatics, - Bangalore
11 Various PLC manufacturers catalogue	10	PLC Textbook and related literature by FESTO.
	11	Various PLC manufacturers catalogue



	Firs	t Year	M. Tech. Me	chanical Enginee	ring (Product Desigr	n & Developn	nent) (Semest	ter–l)
Cour	se Co	de	01MEL506	Course Name	System Design (El	lective I)		
	Teac	ning S	cheme			Ev	aluation Sche	me
L	Т	Р	Credits			SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
	se Ob							
01			•		f mathematics, scier			
02			p an ability to onstraints.	o design a system	, component, or pro	cess to meet	desired needs	within
03				•	ate, and solve engine			
04			p an ability to ng practice.	o use the techniqu	ues, skills, and mode	rn engineerir	ng tools neces	sary for
Cour	se Ou							
01				•	elated to system de		· · ·	
02					ing systems And ger		v	
03					is system design elei I mathematical mod		ng requiremen	t of
04	То	develo	p the studen	t's skills in system	simulation.			
					urse Contents			
Un					ess & System Appro			7 Hours
					ystem, elements of	•		
			cteristics of e constraints.	engineering system	n, Problem formula	tion, identifie	cation & analy	isis of need
Uni	it II			< System theo	ories and modeling >	>		7 Hours
•		•	various app thematical m	•	n design, need for	modeling, va	rious modelir	ig concepts
Uni	it III			< Syster	n Evaluation >			7 Hours
Feasi	ibility	assess	ment, time v	alue of money fin	ancial analysis, selec	tion betweer	n alternatives	
Uni	t IV			< Op	timization >			6 Hours
	ory of o	optim	zation calcul	us methods of on	timization for two o	r mara variak		
Theo	'		zation, calcul	as meeneds of op		i more variat	nes.	
	it V	•			gn Analysis >		Jies.	6 Hours
Uni	it V			< Desi				
Uni	<b>it V</b> sion m			<b>&gt; Desi</b> proach to decision	gn Analysis >			
Uni Decis Uni Simu	it V sion m t VI Ilation	odels	, scientific ap	< Desi proach to decision < Syster	<b>gn Analysis &gt;</b> n process, quantitati	ve methods i	n decision ma	king 6 Hours
Uni Decis Uni Simu syste	it V sion m t VI Ilation ems	models	, scientific ap	< Desi proach to decision < Syster	<b>gn Analysis &gt;</b> n process, quantitati <b>n Simulation &gt;</b>	ve methods i	n decision ma	king 6 Hours
Uni Decis Uni Simu syste Texts	it V sion m t VI llation ems s Bool	models mode	, scientific ap els, Queuing t	< Desi proach to decision < Syster heory, monte car	gn Analysis > n process, quantitati n Simulation > lo method, Applica	ve methods i tion of syster	n decision ma	king 6 Hours
Uni Decis Uni Simu syste	it V sion m t VI llation ems s Bool Me	models mode (s: chanic	, scientific ap els, Queuing t	< Desi proach to decision < Syster heory, monte car sign - Siddiqui, Ma	<b>gn Analysis &gt;</b> n process, quantitati <b>n Simulation &gt;</b>	ve methods i tion of syster	n decision ma	king 6 Hours



	se Coo		cheme	Course Name	Dynamic Analysis	Ev	aluation Sch	•
	T	P	Credits	-			SE-II Marks	1
L 2	-	P		_		SE-I Marks		
3	- 0h	-	3			25	25	50
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01			•	exity of vibration	problems.			
02				namic analysis				
03					tal methods of vibra	ition design.		
04	Red	uction	n vibration us	ing Vibration cont	trol techniques.			
Cour		tcome	c. At the end	of the course stu	dents will			
01					principles of vibratio	nc		
02					ate model for the sa			
02		-		· · · · · · · · · · · · · · · · · · ·	cal system, by analy		tion signatu	<u>م</u>
04					machine, from know	-	•	
04			history.			vicage of the	machine 5 v	bracion
	5.8.	ature	inscory.					
				Со	urse Contents			
Un	it I		< Europhana					
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- Imp with vibra Free syste	ew of s oulse r elasti ation - vibrat em - Fo	espon ically Laplac ion of	degree freed se function - coupled visc ce transforma spring-coupl	lom systems - Res Virtual work - Lag ous dampers - S ation formulation. ed system -Mass pration Absorber	ponse to arbitrary p grange's equations - system identificatio coupled system - Be - Vibration isolation	eriodic execu Single degree n from frequ ending variatio	itions - Duha freedom fo iency Respo	mel's integra rced vibration nse-Transien gree freedon
- Imp with vibra Free syste Uni	ew of s oulse r elasti ation - vibrat em - Fo <b>it II</b>	espon ically Laplac ion of prced	degree freed se function - coupled visc ce transforma spring-coupl vibration - Vil	lom systems - Res Virtual work - Lag ous dampers - S ation formulation. ed system -Mass bration Absorber < <b>Multi degre</b>	ponse to arbitrary p grange's equations - system identificatio coupled system - Be - Vibration isolation ee freedom system >	eriodic execu Single degree n from frequ ending variatio	utions - Duha freedom fo uency Respo on of two de	imel's integra rced vibration nse-Transien gree freedon 6 Hours
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- Imp with vibra Free syste Uni Norn Orth dam	ew of s oulse r elasti ation - vibrat em - Fo <b>it II</b> nal m ogona ping ir <b>it III</b>	espon ically Laplac ion of prced ode o l prop force	degree freed se function - coupled visc te transformation spring-coupled vibration - Vil of vibration - perties - Mode ed vibration - <b>/ibration of c</b>	lom systems - Res Virtual work - Lag ous dampers - S ation formulation. ed system -Mass bration Absorber <b>&lt; Multi degre</b> - Flexibility matri dal matrix - Moda Numerical metho ontinuous system a	ponse to arbitrary p grange's equations - system identificatio coupled system - Be - Vibration isolation e freedom system > x and stiffness ma al analysis - Forced ds of fundamental f ns & Experimental n nalysis >	eriodic exect Single degree n from frequending variatio ending variatio trix - Eigen vibration by requencies nethods in vil	itions - Duha e freedom fo uency Respo on of two de value and E matrix inve bration	imel's integra rced vibration nse-Transien gree freedon <u>6 Hours</u> igen vector rsion - Moda <u>6 Hours</u>
- Imp with vibra Free syste Uni Orth dam Uni Syste - Effe Vibra Vibra	ew of soulse r elasti ation - vibrat em - Fo <b>it II</b> nal m ogona ping ir <b>it III</b> ems go ect of f ation In	espon ically Laplacion of orced ode of proce of prop force < \ overne Rotary nstrur cests.	degree freed se function - coupled visc ce transforma spring-coupl vibration - Vil of vibration - oerties - Mod ed vibration - <b>/ibration of c</b> vibratia and s nents-Vibrati Collection of	lom systems - Res Virtual work - Lag ous dampers - S ation formulation. ed system -Mass bration Absorber <b>&lt; Multi degre</b> - Flexibility matri dal matrix - Moda Numerical metho <b>ontinuous system</b> au quations -Vibration chear deformation on Exciters Measu	ponse to arbitrary p grange's equations - system identification coupled system - Be - Vibration isolation e freedom system > x and stiffness ma al analysis - Forced ds of fundamental f ns & Experimental n	eriodic exect Single degree n from frequending variatio ending variatio trix - Eigen vibration by requencies nethods in vil on of rods - E s. ysis - Vibratio	itions - Duha e freedom fo uency Respo on of two de value and E matrix inve bration Euler's equat n Tests - Fre	imel's integra rced vibration nse-Transien gree freedon <u>6 Hours</u> igen vector rsion - Moda <u>6 Hours</u> ion for beam e and Forced
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	bers- Design of Springs, Dynamic Applications-Optimum design of single, two deg ms, Vibration absorbers. Application in Mechanisms- optimum design of Simple linkag	
Unit	VI < Vibration Control >	6 Hours
select absor Types struct	duction-Reduction of Vibration at the source-Control of vibration-by structural tion- Localized additions-Artificial Damping-Resilient isolation, Vibration isola bers, Active Vibration control: Introductions-Concepts and Applications, Review of s and characteristic review of smart structures - Characteristic Active vibration co tures Dynamic balancing and alignment of machinery -Dynamic balancing of Rotors, Fi plane, Two planes and in several planes, Machinery alignment.	tion, Vibration mart materials- ontrol in smart
Texts	Books:	
1	Roa, S.S., "Mechanical Vibrations", Addison Wesley Longman, 1995.	
2	D.J. Ewins, Modal Testing: Theory and Practice, Research Press Ltd, Letchworth England) (1984).	(Herefordshire,
3	M.I. Friswell, J.E. Mottershead, Finite Element Model Updating in Structural E Mechanics & Its Applications.) Kluwer Academic Publishers (1995)	Dynamics (Solid
Refer	ence Books:	
1	Roa, J.S. & Gupta K., "Ind. Course on Theory and Practice Mechanical Vibrat International (P) Ltd., 1984.	ion", New Age
2	Thomson, W.T., "Theory of Vibration with Applications" CBS Publishers and Distribu ,1990	itors, New Delhi
3	Den Hartog, J.P., "Mechanical Vibrations", Dover Publications, 1990.	
Suppl	lementary Readings:	
Usefu	ıl Links:	
1.	http://www.ecgcorp.com/velav/	
2.	http://www.auburn.edu/isvd/	
3.	http://www.vibetech.com/techpaper.htm	



Cour	se Co		01MEL508	Course Name	ring (Product Desigr Reverse Engineer					
	Теас	hing So	cheme			Ev	aluation Sch	eme		
L	Т	Р	Credits	-		SE-I Marks	SE-II Marks	SEE Marks		
3	-	-	3			25	25	50		
Cour	se Ol	ojective	es:							
01	Int	roduce	the process	of duplication in o	domain analysis.					
02	Un	derstai	nd the tools v	which are using in	reverse engineering					
03	Pro	ovide ki	nowledge ab	out evaluation an	d verification of data	from reverse	e methodolo	gy.		
04	Un	derstai	nd the data n	nanagement and i	ntegration of all dat	a used in reve	erse engineei	ing.		
Cour	se O	utcome	es:							
01	Un	derstai	nd the role of	f duplication in re	verse engineering.					
02	На	ve an u	inderstanding	g of the concepts	and techniques of to	ols which are	e used in prot	o typing.		
03	Ha	ve kno	wledge of sta	ges and verificati	on of data.					
04	Eva	aluate t	he reverse e	ngineering tool ar	nd integrate it.					
				Co	ourse Contents					
Un					roduction >			5 Hours		
Scop	e and	l tasks	of RE - Doma	in analysis- proce	ss of duplicating					
Uni	it II			<	: Tools >			8 Hours		
		-			al data - digitizing tec	•				
		t mate	rial- characte	eristics evaluation	-software and applic	cation- proto	typing – verif	ication		
Uni					everse Engineering >			6 Hours		
Histo	ory of	Revers	e Engineerin		l preparation for the	four stage p	rocess			
Uni	t IV			< Evaluatio	n and Verification >			5 Hours		
		Data G	eneration, D	ata Verification, P	roject Implementati	on				
Uni					Management >			8 Hours		
- Soft Desig user <b>Uni</b> Cogn engir	tware gn ex inter <b>t VI</b> nitive neerin	e applic perime faces - approa	ation - Findir nts to evalua Reverse Engi ach to progr itegrating re	ng reusable softwate te a Reverse Engi neering of asseml < In ram understated verse engineering	engineering strategie are components - Re neering tool - Rule b oly programs: A mod tegration > - Integrating forma g, reuse and specif re capturing - surface	ecycling real-t based detection lel based app al and struct ication tool	time embedd on for reverse roach and its ured method environment	ed software Engineerin logical basic 7 Hours ds in revers		
Texts										
1					euse, T J Biggerstaff,					
2				<u> </u>	al Report, Georgia In	istt. of Techn	ology, 1994			
3				atheryn, A. Ingle,	McGraw-Hill, 1994					
Kete		Books								
~	Da		-	-	McGraw-Hill, 1996	4000				
1		VORCO F		unda Milla Klubua						
1 2					r Academic Publishei ngineering, Donald R			• -		



					ring (Product Design	· · · · · ·		ter–I)
Cours			01MEL509	Course Name	<b>Computational Fl</b>		• •	
			cheme				aluation Sche	
L	Т	Р	Credits			SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
	-	jectiv						
01			stand the basi					
02		•			tions of fluid dynam			
03		•			deling of fluid dynan			
04			•		n and grid transform	nation.		
05				LE technique for v	various applications			
	1	tcome						
01				• •	tational fluid dynam	ics field and l	earn about its	applications
02			•	the solution proce				
03				•	sing governing equa			
04				-	and transformation	۱.		
05	Use	SIMP	LE technique	to solve CFD prob				
					urse Contents			1
Uni					ntroduction >			6 Hours
		•		•	ages of CFD, application			•
		etup P	re-Process, N		<ul> <li>CFD solver, result</li> </ul>	•	isualisation – I	
Uni					lations of fluid dyna			7 Hours
					nt, the substantial o			quation, the
		n equ	ation, the ene		vier Stokes equation		tions	
Unit					ce and its modelling			6 Hours
					e averaged Navier St	•		•
				-	ngth model, k-ε mo	del, Reynold	s stress equat	tion models,
-		tress	equation mod		• • • •			<b>C</b> 11
Unit			<u> </u>		ropriate transform			6 Hours
			neral transfor itted coordina		uations, form of gov	erning equat	ions particular	ly suited for
Unit				•	CFD Techniques >			7 Hours
		off Te	chnique. Mag	· · · ·	ue, ADI Technique,	pressure corr	ection Techni	
Algor					,			
Unit				lqqA >	ications of CFD >			7 Hours
		soluti	ons of Quasi (		nozzle flow, Two din	nensional Su	personic flows	
		a flat p			,			,
Texts		•						
1			tional fluid dy	namics The basics	with applications –	John Anderso	on McGraw Hil	l Publication
2		•			l approach - Jiyuan			
3	An i	•	uction to Com	•	ynamics – Veerstee			
Webs								
1			- <b>online</b> .com/					
2				ses/112105045/				
2	Inch	.,,np		303/112103043/				



Cou	rse Co	de	01MEP51	0 Course Name	Applied Machine D	lesign	
					Applica machine B		n Scheme
L	Teachi	P	Credits			CIE Marks	SEE Marks
L 		2	1			50	50
		Z	<u> </u>				50
Cou	rse Ob	iectiv	00.				
		-		e, student will be able	)_		
01	· ·		tand design	-			
02			esign meth				
03		•	-	nship of processing a	nd design.		
04							
Cou	rse Ou	tcome	es:				
At tl	he end	of the	e course, sti	udents will be able to			
01				f process of design.			
02				design methods for ne	ew product design.		
03		-		-	e requirements of the	product.	
04	Be a	ble to	identify and	d formulate the class	of elasticity problems	and apply the analy	tical techniques
	for s	olutio	n of these p	oroblems.			
				List o	of Experiments		
	Min	imum	ı six assign	ments based on the	topics		
	Subr	nissio	n: Complete	ed Journal.			
Text	ts Bool						
1			-		A Materials and P	rocessing Approach	n", McGraw Hi
				Mechanical Engg. Seri			
2					ct Design and Develop		II, Edition 2000.
3	Palh	.G. ar	nd Beitz .W.	"Engineering Design	", Springer - Verlag NY	1985.	
Def		Deal					
ROTO	erence	ROOK	S:				
1	_ <b>D</b>		//=!	of Engg. Design ", Prei			



Cou	rse Co	de	01MEP51	1	Course Name	Computer Aid	ed Design and Simulation	on
	Teachi		<u> </u>		course nume	comparent au	_	on Scheme
L	T	P	Credits				CIE Marks	SEE Marks
		2	1				50	50
Cou	rse Ob		_					
		·		se. st	udent will be able	-		
01	-				reate 2-D drawing			
02					e machine compor			
03				•	•		and formulate the design	gn problems into
04			e the stude computer a			ge and analysis s	kills to interpret and dra	w conclusion the
Cou	rse Ou	tcome	es:					
At th	ne end	of the	e course, st	ude	nts will be able to			
01	Desi	gn a p	art or asse	mbly	of parts using Co	mputer-Aided De	esign software	
02	Use	param	netric mode	elling	g techniques to ref	lect engineering	requirements.	
03	Use	profes	sional-leve	el fin	ite element softwa	are to solve engir	neering problems	
04		•				•	etting up material prope using software tools.	rties, loads, and
					List o	f Experiments		
1					els for minimum tw ATIA, Solid works,		any industrial products	using solid
2	Solut	tion of	f two probl	ems	in statics for using	g FEA software lik	ke Ansys, Hypermesh, N	astran etc.
3	Simu	lation	of any me	char	nical system using	simulation softw	vare	
4		-	•	-	ams to solve design C/FORTRAN etc.	n problems and p	production of drawings	using any
5	Two	assigr	nments on	gene	eration of surfaces	using modelling	software like CATIA.	
	Subr	nissio	<b>n:</b> Complet	ed J	ournal.			
Text	s Book							
1			-		•		International Edition, 19	
2					l Emory .W. Zin Hall, Inc., 1995.	nmers Jr. "CAD	)/CAM Computer - Ai	ded Design and
3	Nars	ingh D	Deo., Syster	n sir	nulation with Digi	tal Computer, Pre	entice Hall of India, 1979	Э
Refe	erence							
1	Singa	apore,	, 1989.		-		omputer Graphics", McG	iraw Hill Book Co
2							Prentice HallInc., 1992.	
3					ds", Interscience,			
4				-	neering Design", Io		•	
5	Robe	ert Ma	touseek, "	Engiı	neering Design", B	lackie & Sons Lto	1., 1963.	



6	Niebel, B.W. & Draper, A.B., "Product Design and Process Engineering, McGraw Hill, 1974.
7	Harry Peck, "Designing for Manufacturing", Sir Issac Pitman and Sons Ltd., 1973.
8	Gladman, C.A., "Manual for Geometric Analysis of Engineering Designs", Australian Trade
0	Wade, Or, "Tolerance Control in Design and Manufacture", Industrial Press, Inc. Banks J., Carson. J.S.,
9	and Nelson B.L., Discrete Event System Simulation, PHI, New Delhi, 1996.
10	Gottfried B.S., Elements of Stochastic Process Simulation, Prentice Hall, London, 1984.
11	Geoffrey Gordon., System Simulation, Prentice Hall of India, 1984.



	First Y	ear M. Tech. M	echanical Engineeri	ng (Product Desig	n & Development) (Ser	nester–I)
Cou	rse Code	01MEP512	Course Name	Design Of Expe	riments And Research I	Vethodology
	Teaching	Scheme			Evaluatio	n Scheme
L	T	P Credits			CIE Marks	SEE Marks
	2	2/ 1			50	
	A	lt.				
	V	Vk				
Cou	rse Object	tives:				
On d			student will be able	2 -		
01		erstand the basic				
02	· ·	-	f research design.			
03			f research modellin	-		
04		•	perimentation and			
05	To study	y and interpret t	he analysis in resea	rch.		
	rse Outco					
	1		ents will be able to			
01			h and types of research mathed			
02 03			ne research method odelling and simula			
03			of experimentation		nization	
04			hniques and prepar			
05	USE Vali	ious analysis tec	iniques and prepar	e report of the res		
			List o	f Experiments		
1	Collectio	on and review of	f literature on a spe	cific topic related	to design or manufactu	ring engineering.
2	-		ection processing, a	analysis, interpreta	ation, inferences and co	nclusions for an
2	-	ring problem.				
3			f experiments using			
4	-		g and simulation of			
5	Present	ation of any one	above using MS po	wer-point or simil	lar.	
	Cubaic	ion. Completed	lournal			
	Submiss	sion: Completed	Journal			
Text	ts Books:					
		swamy, K.N., S	ivakumar. Appa lv	er & Mathiraian	M., (2006) - Manag	ement Research
1		•••		•	es (New Delhi, Pearson	
2			• •	•	ments, 5/e. (NY John W	•
2	-				Techniques, 2/e. (New	
3		tional Ltd. Publis				
Def		aka				
	erence Bo			for Quality Engine	oring 2/o (Now York A	
1					ering, 2/e. (New York, Nov. 2 (a (New Polki, Nov. 4	-
2				•	s, 3/e (New Delhi, New A	-
3 4					t L. Hall (Marcel Decker Delhi, Biztantra, Dream	•
4	nochim	i, vviilidifi ivi.K. (.	2005), - Research IV	ietilous z/e, (New	Deilli, Diztalitia, Dieali	



Cou	rse Co	de	01MEP513	Course Name	Advanced Engir	neering Materials (Elect	tive I)
	Teachi						n Scheme
L	Т	P	Credits			CIE Marks	SEE Marks
		2/	1			50	
		Alt.	-			50	
		Wk					
Cou	rse Ob		es:				
				student will be able	! -		
01	· ·			es of advanced mat			
02		-		l information on ad			
03		•		es of materials used		dentistry	
04		-				ies and applications	
	1	-		•			
Cou	rse Ou	tcome	es:				
At t	he end	of the	e course, stud	ents will be able to			
01	Und	erstan	d basic inform	nation on different	materials.		
02	Und	erstan	d fundamenta	al knowledge of con	nposite materials.		
03	Sugg	gest su	iitable materia	l for different appli	ications		
04	Sugg	gest th	e property red	quirements for part	icular applications	S	
				List o	f Experiments		
1	Stud	y of di	ifferent streng	thening mechanisn	ns in steels		
2	Sele	ction o	of material for	high temperature a	applications		
3	Sele	ction o	of material for	medical implant			
4	Sele	ction o	of material for	sports vehicle part	s		
5			•	applications of Sma			
6	Stud	y of p	roperties and	applications of fund	ctional Materials		
7				hysical vapour depo	osition of matrix o	n fibres	
8				tural ceramics,			
9	Stud	y of P	rocessing of p	olymer matrix com	posites		
10	Stud	y of al	loys for modif	ication of structure	and properties.		
	Subr	nissio	n: Completed	Journal.			
_							
Text	ts Bool			<u> </u>		· - · ·	
1					election and use o	of Engineering Materials	s", (3 rd edition
			th - Heireman				
2				lications", (4th Edi	•		
3	Tech	nolog	y ot engineeri	ng materials by M.	Phillip and W Bolt	en	
D.f		D !					
	erence						
1				Science and Engine			-// (2 and a shirt)
2					election and use o	of Engineering Materials	s", (3 rd edition
	BUTT	erwor	th – Heiremar	111			



3	Physical Metallurgy and Advanced Materials, Seventh edition, R. E. Smallman & Ngan, Elsevier
4	Materials & Processes in Manufacturing", E. Paul DeGarmo, J. T. Black & Ronald A. Kohser, (PHI)
5	"Design & Manufacturing of Composite Structures", Geoff Eckold (Jaico Publishing House)
6	"Manufacturing Processes for Engineering Materials", S. Kalpaljian, Steven R. Schmidt, (Pearson)
7	"Materials and their applications", (4th Edition) Jaico- 1999
8	"Materials & Processes in Manufacturing", E. Paul DeGarmo, J. T. Black & Ronald A. Kohser, (PHI)
9	Design & Manufacturing of Composite Structures", Geoff Eckold (Jaico Publishing House)



	EII:				•••••••	& Development) (Se	incoter ij		
Cou	rse Co	de	01MEP514	Course Name	Industrial Automa	ation (Elective I)			
	Teachi	ng Sch	ieme	I		Evaluatio	n Scheme		
L	Т	Р	Credits			CIE Marks	SEE Marks		
		2/	1			50			
		Alt.							
		Wk							
Cou	rse Ob	jective	es:						
On d	comple	tion o	f the course	, student will be able	-				
01	To ex	xpose	students to	fundamentals of PLC					
02	To e	nable	students to a	apply PLC programm	ing and SCADA.				
Cou	rse Ou	tcome	es:						
At tl	1			dents will be able to					
01				s industrial applicatio					
02		•			y, timer and counte	r instructions and oth	ner		
03	-		ing instructi						
04	Appl	y the o	concept of S	CADA system.					
					f Experiments				
			-	•	pics in syllabus giving	g understanding of p	actical exposure		
			ng experienc						
	Subr	nissio	<b>n;</b> Complete	d Journal.					
<b>T</b>									
Text	s Bool			Controllor Drinsipler	and Analisations" k		aia. Drantica Hall		
1		-	1. ISBN 81-20	•	and Applications it	oy J. W. Webb, R. A. F	rentice hall		
2				Controller : Principles	and Applications" h				
2	-					rogramming softwar	e and interfacing		
3			Allen Bradle	•	, with supporting pi	logramming softwar			
Refe	erence								
	1			Controller - Principles	s and Applications" h	oy J. W. Webb, R. A. F	eis: Prentice Hall		
1						.,			
2				of India Ltd. ISBN 81-203-2308-4.					
		-	"Programmable Logic Controller : Principles and Applications" by NIT, PHI Pub.						
-		"Desirable facility on equivalent make PLC with supporting programming software and interfacing sensor" by Allen Bradley.							
3	"Industrial Robotics - Technology, Programming and Applications"; M. P. Groover, M. Weiss, R. I						e and interfacing		
			Allen Bradle	equivalent make PLC ey.	with supporting p				
3 4	"Ind	ustrial	Allen Bradle Robotics -	equivalent make PLC ey. Technology, Program	with supporting proming and Application		, M. Weiss, R. N.		
4	"Indu Nage	ustrial el, N. C	Allen Bradle Robotics - G. Ordey; Mo	equivalent make PLC ey. Technology, Progran Graw Hill Internatior	with supporting proming and Applicational Edi, Industrial Eng	ons"; M. P. Groover	, M. Weiss, R. N. 10-0-100442-4		
	"Indu Nage "Pro	ustrial el, N. G gramn	Allen Bradle Robotics - G. Ordey; Mo nable Logic	equivalent make PLC ey. Technology, Progran Graw Hill Internatior	with supporting provide and Applicational Edi, Industrial Engiming methods and	ons"; M. P. Groover gineering Series, ISBN Applications" Hackw	, M. Weiss, R. N. 10-0-100442-4		
4	"Indu Nage "Pro Hack	ustrial el, N. C gramn worth	Allen Bradle Robotics - G. Ordey; Mo nable Logic	equivalent make PLC ey. Technology, Progran Graw Hill Internation Controller - Program D. Jr.; Pearson Educat	with supporting provide and Applicational Edi, Industrial Engiming methods and	ons"; M. P. Groover gineering Series, ISBN Applications" Hackw	, M. Weiss, R. N. 10-0-100442-4		
4 5	"Indu Nage "Pro Hack Intro	ustrial el, N. G gramn worth oductic	Allen Bradle Robotics - G. Ordey; Mo nable Logic Frederick D on to 8085 -	equivalent make PLC ey. Technology, Progran Graw Hill Internation Controller - Program D. Jr.; Pearson Educat	with supporting provide and Applicational Edi, Industrial Engiming methods and ion LCE, ISBN 81-297	ons"; M. P. Groover gineering Series, ISBN Applications" Hackw	, M. Weiss, R. N. 10-0-100442-4		
4 5 6	"Indu Nage "Pro Hack Intro Proc	ustrial el, N. G gramn worth oductic ess co	Allen Bradle Robotics - G. Ordey; Mo nable Logic Frederick D on to 8085 - ntrol and ins	equivalent make PLC ey. Technology, Progran Graw Hill Internation Controller - Program D. Jr.; Pearson Educat Gaonkar	with supporting provide and Applicational Edi, Industrial Engination Edi, Industrial Engination LCE, ISBN 81-297	ons"; M. P. Groover gineering Series, ISBN Applications" Hackw	, M. Weiss, R. N. 10-0-100442-4		
4 5 6 7	"Indu Nage "Pro Hack Intro Proc Intro	ustrial el, N. G gramn worth oductic ess co oductic	Allen Bradle Robotics - G. Ordey; Mo nable Logic Frederick D on to 8085 - ntrol and ins on to PLC - G	equivalent make PLC ey. Technology, Progran Graw Hill Internation Controller - Program D. Jr.; Pearson Educat Gaonkar Strumentation - John	with supporting provide and Applicational Edi, Industrial Engiming methods and ion LCE, ISBN 81-297 son C.D. ar Pub.	ons"; M. P. Groover gineering Series, ISBN Applications" Hackw 7-0340-8.	, M. Weiss, R. N. 10-0-100442-4		
4 5 6 7 8	"Indu Nage "Pro Hack Intro Proc Intro Prog	ustrial el, N. G gramn worth oductio ess co oductio ramm	Allen Bradle Robotics - G. Ordey; Mo nable Logic Frederick D on to 8085 - ntrol and ins on to PLC - G able Logic C	equivalent make PLC ey. Technology, Program Graw Hill Internation Controller - Program D. Jr.; Pearson Educat Gaonkar Strumentation - John Gary Dumming - Delm	c with supporting provide and Applicational Edi, Industrial Engliming methods and ion LCE, ISBN 81-297 son C.D. ar Pub.	ons"; M. P. Groover gineering Series, ISBN Applications" Hackw 7-0340-8.	, M. Weiss, R. N. 10-0-100442-4		



	rse Co	e Code 01MEP515 Course N		Course Name	System Design (Elect	Elective-I)		
•	Teach	ing Scł	neme			Evaluatio	on Scheme	
L	Т	P	Credits			CIE Marks	SEE Marks	
		2/ Alt. Wk	1			50		
Cou	rse Ob	ojectivo	es:					
				tudent will be able	9 -			
01	· ·				nathematics, science, ar	nd engineering out	tcomes	
02	To d	levelop	, ,,		omponent, or process to	<u> </u>		
03	To d	levelop	o an ability to i	dentify, formulate	, and solve engineering	problems.		
04		•	o an ability to a practice.	use the techniques	s, skills, and modern eng	gineering tools nee	cessary for	
	engi	ncerm	B practicel					
	rse Ou	itcome	es:					
At th	r <mark>se Ou</mark> ne end	i <b>tcome</b> l of the	es: e course, stude	ents will be able to				
At th 01	r <mark>se Ou</mark> ne end Defi	I <mark>tcome</mark> I of the ne and	es: e course, stude l describe vari	ous parameter rela	ated to system design u			
At th 01 02	r <mark>se Ou</mark> ne end Defi Forn	Itcome l of the ne and nulate	es: e course, stude describe vari and design cc	ous parameter rela mplex engineering	ated to system design us systems And generate	industrial drawing	gs.	
At th 01	r <mark>se Ou</mark> ne end Defi Forn Estir	Itcome I of the ne and mulate mate d	es: e course, stude I describe vari and design co design parame	ous parameter rela mplex engineering ters for a various s	ated to system design us g systems And generate system design elements	industrial drawing	gs.	
At th 01 02	r <mark>se Ou</mark> ne end Defi Forn Estir appl	Itcome I of the ne and nulate nate d licatior	es: e course, stude d describe vari and design co design parame n, using optimi	ous parameter rela mplex engineering ters for a various s	ated to system design us g systems And generate system design elements nathematical models	industrial drawing	gs.	
At th 01 02 03	r <mark>se Ou</mark> ne end Defi Forn Estir appl	Itcome I of the ne and nulate nate d licatior	es: e course, stude d describe vari and design co design parame n, using optimi	ous parameter rela mplex engineering ters for a various s ization tools and m s skills in system sir	ated to system design us g systems And generate system design elements nathematical models	industrial drawing	gs.	
At th 01 02 03	rse Ou Defi Forn Estir appl To d	I of the ne and nulate nate o lication levelop	es: e course, stude describe vari and design co design parame n, using optimi o the student's	ous parameter rela mplex engineering iters for a various s ization tools and m s skills in system sir List c its based on topics	ated to system design us g systems And generate system design elements nathematical models mulation.	industrial drawing fulfilling requiren	gs. nent of	
At th 01 02 03	rse Ou Defi Forn Estir appl To d Max and	itcome l of the ne anc nulate mate o licatior levelop	es: e course, stude d describe vari and design co design parame n, using optimi o the student's Six assignmen	ous parameter rela mplex engineering ters for a various s ization tools and m s skills in system sir List c ts based on topics	ated to system design us g systems And generate system design elements nathematical models mulation. of Experiments	industrial drawing fulfilling requiren	gs. nent of	
At tH 01 02 03 04	rse Ou Defi Forn Estir appl To d Max and Subi	itcome l of the ne anc nulate mate o licatior levelop imum workir <b>missio</b>	es: e course, stude describe vari and design co design parame n, using optimi o the student's Six assignmen ng experience.	ous parameter rela mplex engineering ters for a various s ization tools and m s skills in system sir List c ts based on topics	ated to system design us g systems And generate system design elements nathematical models mulation. of Experiments	industrial drawing fulfilling requiren	gs. nent of	
At tH 01 02 03 04	rse Ou Defi Forn Estir appl To d Max and Subi	itcome l of the ne anc nulate mate o licatior levelop kimum workir <b>missio</b>	es: e course, stude d describe vari and design co design paramen n, using optimi o the student's Six assignmen ng experience. n: Completed	ous parameter rela mplex engineering eters for a various s ization tools and m s skills in system sir List c ts based on topics Journal.	ated to system design us g systems And generate system design elements nathematical models mulation. of Experiments	industrial drawing fulfilling requiren	gs. nent of	



		ar M. Tech. Me	chanical Engineeri	ng (Product Design &		·
Cou	rse Code	01MEP516	Course Name	Dynamic Analysis 8	Testing Methodol	ogy (Elective-II)
	Teaching Sc	heme			Evaluatio	n Scheme
L	ТР	Credits			CIE Marks	SEE Marks
	2	1			50	
Cou	rse Objectiv	'es:				
On c	completion of	of the course, s	tudent will be able	-		
01	Understar	nd the complex	ity of vibration pro	blems.		
02	To Study a	analytical dynai	mic analysis			
03	Measure v	ibration and st	tudy experimental	methods of vibration	design.	
04	Reduction	vibration usin	g Vibration control	techniques.		
Cou	rse Outcom	es:				
At th	1		ents will be able to			
01				ciples of vibrations.		
02			•	model for the same.		
03				system, by analysing t	-	
04		• •	rformance of a ma	chine, from knowledg	e of the machine's	vibration
	signature	history.				
				f Experiments		
1	-			nic test data of machi		
2	-			alysis of machine elem		
3				FEA software like Na		
4	One Assig	nment on mod	el data correlation	for any one model us	ed in sr. no. 1 and 2	
	Submissio	n: Completed	Journal.			
Toyt	s Books:					
1		"Mechanical Vi	hrations" Addison	Wesley Longman, 199	35	
±				ictice, Research Press		(Herefordshire,
2	England) (					(nerefoldsinie,
3	M.I. Frisw	vell, J.E. Mott	ershead, Finite El	ement Model Upda	ting in Structural	Dynamics (Solid
5	Mechanic	s & Its Applicat	ions.) Kluwer Acad	emic Publishers (1995	)	
Refe	erence Book	s:				
1	Roa, J.S. &	Gupta K., "Ind.	Course on Theory	and Practice Mechanic	cal Vibration", New	Age International
-	(P) Ltd.,19					
2		•		pplications" CBS Publ		ors, Delhi, 1990
3	Den Harto	og, J.P., "Mecha	inical Vibrations", I	Oover Publications, 19	90.	
Sup	plementary					
		ww.ecgcorp.co				
		ww.auburn.ec				
	3. <u>http://w</u>	www.vibetech.c	com/techpaper.htm	<u>1</u>		



	Firs	st Yea	r <mark>M. Tech.</mark> I	Mechanical Engineeri	ng (Product Design &	& Development) (Sei	mester–I)
Cour	se Coo	le	01MEP51	7 Course Name	Reverse Engineeri	ng (Elective-II)	
٦	Teachi	ng Sch	eme	I	1	Evaluatio	n Scheme
L	Т	Р	Credits			CIE Marks	SEE Marks
		2	1			50	
Cour	se Obj	jective	es:				
On c	omple	tion o	f the course	e, student will be able	-		
01			•	of duplication in dom	•		
02				which are using in rev	<u> </u>		
03			-	out evaluation and ve			
04	Unde	erstan	d the data i	management and inte	gration of all data us	ed in reverse engine	ering.
	se Ou						
				idents will be able to			
01				f duplication in revers			
02				g of the concepts and		which are used in pr	oto typing.
03			-	ages and verification of			
04	Evalu	iate th	ie reverse e	engineering tool and in	ntegrate it.		
				List o	f Experiments		
	Minii	mum S	Six assignm	ents based on topics i	n syllabus, which also	o include at least on	e case study.
	Subn	nissio	n: Complete	ed Journal.			
Text	s Book	s:					
1			overy for N	laintenance and Reus	e, T J Biggerstaff, IEE	E Corpn. July 1991	
2				Rugaban, Technical R			ļ
3				Katheryn, A. Ingle, Mc		0,,	
			<u> </u>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Refe	rence	Books	:				
1	Data	Rever	se Enginee	ring, Aiken, Peter, Mc	Graw-Hill, 1996		
2	Reve	rse En	gineering,	Linda Wills, Kluiver Ac	ademic Publishers, 1	996	
3			e Measurm rers Associ	ent and reverse engi ation	neering, Donald R. H	lonsa, ISBN 1555897	7, American Ge



Cou	rse Code	01MEP518	Course Name	Computational F	luid Dynamics (Electiv	ve-II)
•	Teaching Sch	ieme			Evaluatio	on Scheme
L	ТР	Credits			CIE Marks	SEE Marks
	2	1			50	
Cou	rse Objective	es:				
On c	•		tudent will be able	2 -		
01		and the basics				
02	To acquire	knowledge of	governing equation	ons of fluid dynamic	S	
03	To acquire	knowledge of	turbulence model	ing of fluid dynamic	cs	
04	To study a	nd interpret th	e Grid formation a	and grid transforma	ition.	
05	To study a	nd use SIMPLE	technique for vari	ious applications		
Cou	rse Outcome	es:				
At th	ne end of the	e course, stude	ents will be able to			
01		•	•		cs field and learn abo	ut its application
02		•	e solution procedu			
03	Solve vario	us fluid dynar	nics problems using	g governing equation	ons.	
04	Know vario	ous methods o	f grid formation ar	nd transformation.		
05	Use SIMPL	E technique to	solve CFD probler	ns		
	1			of Experiments		
		-		ackages like ANSYS	, ICEM HEXA, FLUENT,	CFX, COSMOS o
			ing topics like –			
1		•	one dimension.			
2		quation in one				
3			rough a nozzle.			
4	Flow over	a cylinder and	backward facing st	tep.		
	Submissio	n: Completed	Journal.			
_						
	s Books:			11 It		
1					ohn Anderson McGrav	
2		•		• •	I, Yeoh, Liu, Elsiever P	
3	An introdu Technical	ction to Comp	outational fluid dyr	namics – Veersteeg	, Malalasekhra, Longn	han Scientific an
Sup	olementary	Readings:				
		online.com/				
	2. <u>http://np</u>	tel.ac.in/cours	<u>es/112105045/</u>			



					ing (Product Design	· · · · ·		er–II)
Cour	se Co		01MEL520	Course Name	Manufacturing Sy			
	1		cheme				aluation Sche	
L	Т	P	Credits			SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
		jectiv						
01	parameters and their industrial specifications.							
02	Introduce students to development of non-metallic components using injection moulding							ing
03			•		n, assembly and insp	ection		
04	Inti	roduce	e the students	to gauge and gau	ige design			
Cour		Itcom						
01					e design in sheet me			
02		-	-	ercing Dies, Bendi ndamental princip	ng, Forming and dra le	awing die for	component ur	nder
03		dersta uge de	•	ent of non-metalli	c components using	; injection mo	oulding and Ga	luge and
04	Des	sign of	Fixtures for F	abrication, Assem	bly and Inspection.			
				Со	urse Contents			
Un	it I		<	<b>Design of Sheet N</b>	Vietal Blanking and	Piercing >		7 Hours
•	ing de	d die d evices.	•	·	uction, die clearanc entals of die design		etal material h	andling and
		on Dr	occ work mat		on criteria, Blanking		a dia constru	
	pers a	and pr			for piercing, strip la		-	
Uni	t III			< Bending, Formi	ng and drawing die	design >		7 Hours
as pe	er AST	ME, e	ffect of variou	us process parame	and forming die de eters during drawing	-		•
		i as pe		nk size calculation				Cillering
Uni		on +::			c components using derations, calculation			6 Hours
			•	•	derations, calculation	on or import	ant paramete	ers, material
· ·		orinj	ection mouldi	-	huination Associate	and transfer		Cllowe
Uni					brication, Assembly			6 Hours
			-		ation, Assembly an	•		
					n considerations, c	actuation of	i clamping fo	rce, various
		es used	a in design of	fixtures for above	••			Cllower
Uni		00.75	nuiromant of		and Gauge Design >		ion of materia	6 Hours
Introduction, requirement of a gauge, Types of gauges, Gauge tolerances, Selection of material for gauges, indicating gauges and automatic gauges, design of simple gauges like snap gauge, plug gauge and thread gauge.								
				, features, softwa	re interface, elabora	ition of capab	pllities for vario	ous
meas	surem	nent re	equirements.					



Use c	Use of CMM in reverse engineering, generation of drawing details from the existing component.			
Texts	s Books:			
1	Tool Design - Cyrill Donaldson, G.H LeCain, V.C. Goold, Tata McGraw Hill Publi.			
2	Jigs & Fixtures- Kempster, ELBS.			



	First	Year	M. Tech. Me	chanical Engineer	ing (Product Design	& Developm	nent) (Semest	er–II)	
Cours	se Coo	de	01MEL521	Course Name	Creativity, Innova	tion & New Product Development			
Teac		hing Scheme				Ev	Evaluation Scheme		
L	Т	Р	Credits			SE-I Marks	SE-II Marks	SEE Marks	
3	-	-	3			25	25	50	
Cours	se Ob	jectiv	es:						
01	_	o make students aware about the importance of creativity and innovation in new product design.							
02		e various techniques for idea generation and problem solving in.							
03	Kno righ								
04	Kno	ow journeys in product development.							
	se Ou								
01		ble to find opportunities of new product development.							
02		ble to use market research, benchmarking in project planning.							
03		e creativity and innovation in new product development.							
04		e design engineering for new product, able to prepare model, build test, refine.							
05	Able	Able to track procedures, file patent preserve intellectual property rights.							
Course Contents									
Uni					ntroduction >			7 Hours	
•			-		rs contributing to su		-		
		eativi	ty and innova		nd problem solving -		ing - different	1	
Unit II		< Project Selection and Evaluation >						7 Hours	
	ction on niques		as and purpos	e of project - Sele	ction criteria - scree	ning ideas foi	r new product	s (evaluatio	
Unit III		< New Product Development >					7 Hours		
			ew product d ctual property	•	ents - Patent search	n - Patent lav	vs - Internatio	nal code fo	
Unit	t IV			< New I	Product Planning >			6 Hours	
Desig	gn of p	roto	type - testing	- quality standard	s - marketing resear	ch - introduc	ing new produ	icts.	
Unit V		< Journeys in Product Development, Product Development Process Tools, Scoping Product Developments >					6 Hours		
Techi	nical a	ind Bu	usiness Conce	rns					
Unit VI			< Understa	nding Customer I	Needs, Establishing	Product Fund	ction >	6 Hours	
	uct Te uct Ar		•	erimentation, Be	nchmarking and Es	stablishing E	ngineering Sp	ecifications	
Texts	s Book	s:							
1		HARRY NYSTROM, " Creativity and innovation", John Wiley & Sons, 1979.							
2		BRAIN TWISS, "Managing technological innovation", Pitman Publishing Ltd., 1992.							
			,	0			,		



(An Empowered Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Course Name       Product Life Cycle Management         Teaching Scheme         L       T       P       Credits       SE-I Marks       SE-II Marks       SEE Marks         3       -       -       3       -       25       25       50         Course Objectives:								
L         T         P         Credits           3         -         -         3         SE-I Marks         SE-II Marks         SEE Marks           25         25         50								
3 3 25 25 50								
Course Objectives:								
Familiarize the current principles, practices, and applications of Product Lifecycle Management (PLCM).								
Learn integrated, information driven approach to all aspects of a product's life from its design inception, through its manufacture, deployment and maintenance, and culminating in its removal from service and final disposal								
Experience effective integration of PLCM technologies into the product development process that can put the industry at a competitive advantage to deliver innovative products								
perience modern PLCM strategies, methods, and tools								
Course Outcomes:								
Integrate the various stages of PLCM into engineering product ranges and portfolios that will eventuate into commercial success.								
Integrate lifecycle management strategies and knowledge to develop new and/or formulate appropriate engineering design solutions in engineering environment.								
Applying product modelling and using analyse tools for solving engineering problems.								
<ul> <li>Applying product modelling and using analyse tools for solving engineering problems.</li> <li>Experience Product Data Management (PDM) technology and recent advances in PLCM.</li> </ul>								
Course Contents								
Unit I < Introduction > 5 Hou								
Background, Overview, Need, Benefits, Concept of Product Lifecycle. Components / Elements of PLI								
Emergence of PLM, Significance of PLM, Customer Involvement.								
Unit II     < Product Life Cycle Environment >     6 Hou								
Product Data and Product Workflow, Company's PLM vision, The PLM Strategy, Principles for PLM strate								
Preparing for the PLM strategy, Developing a PLM strategy, Strategy identification and selection, Change Management for PLM.								
Unit III <pre>&lt; Product Development Process &amp; Methodologies &gt;</pre> 9 Hou								
Integrated Product development process - Conceive - Specification, Concept design, Design - Detailed design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing , Manufacture, Build/Assemble , Test (quality check) , Service - Sell and Deliver , Use , Maintain and Support, Dispose. Bottom-up design, Top-down design, Front loading design workflow, Design in context, Modular design. Concurrent engineering - work structuring and team Deployment - Product and process systemization - problem, identification and solving methodologies. Product Reliability, Mortality Curve.								
design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing , Manufactur Build/Assemble , Test (quality check) , Service - Sell and Deliver , Use , Maintain and Support, Dispo Bottom-up design, Top-down design, Front loading design workflow, Design in context, Modular desi Concurrent engineering - work structuring and team Deployment - Product and process systemization								
design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing , Manufactur Build/Assemble , Test (quality check) , Service - Sell and Deliver , Use , Maintain and Support, Dispo Bottom-up design, Top-down design, Front loading design workflow, Design in context, Modular desi Concurrent engineering - work structuring and team Deployment - Product and process systemization								
design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing, Manufactur Build/Assemble, Test (quality check), Service - Sell and Deliver, Use, Maintain and Support, Dispo Bottom-up design, Top-down design, Front loading design workflow, Design in context, Modular desi Concurrent engineering - work structuring and team Deployment - Product and process systemization problem, identification and solving methodologies. Product Reliability, Mortality Curve.								
design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing , Manufactur Build/Assemble , Test (quality check) , Service - Sell and Deliver , Use , Maintain and Support, Dispo Bottom-up design, Top-down design, Front loading design workflow, Design in context, Modular desi Concurrent engineering - work structuring and team Deployment - Product and process systemization problem, identification and solving methodologies. Product Reliability, Mortality Curve.Unit IV< Product Modelling: Product Modeling >5 HourDefinition of concepts – Fundamental issues - Role of Process chains and product models -Types of product								
design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing , Manufactur Build/Assemble , Test (quality check) , Service - Sell and Deliver , Use , Maintain and Support, Disport Bottom-up design, Top-down design, Front loading design workflow, Design in context, Modular desi Concurrent engineering - work structuring and team Deployment - Product and process systemization problem, identification and solving methodologies. Product Reliability, Mortality Curve.Vertication S Hour Definition of concepts – Fundamental issues - Role of Process chains and product models - Types of prod models - model standardization efforts-types of process chains - Industrial demands.S Hour S Hour S HourUnit V </td								
design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing , Manufactur Build/Assemble , Test (quality check) , Service - Sell and Deliver , Use , Maintain and Support, Dispo Bottom-up design, Top-down design, Front loading design workflow, Design in context, Modular desi Concurrent engineering - work structuring and team Deployment - Product and process systemization problem, identification and solving methodologies. Product Reliability, Mortality Curve.Unit IV< Product Modelling: Product Modelling >5 HourDefinition of concepts – Fundamental issues - Role of Process chains and product models -Types of prod models - model standardization efforts-types of process chains - Industrial demands.5 HourUnit V< Types Of Analysis Tools >5 HourFMEA - QFD - Design for product life cycle. Estimation of Manufacturing costs, Reducing the component costs and assembly costs, Minimize system complexity.5 Hour								
design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing , Manufactur Build/Assemble , Test (quality check) , Service - Sell and Deliver , Use , Maintain and Support, Dispo Bottom-up design, Top-down design, Front loading design workflow, Design in context, Modular desi Concurrent engineering - work structuring and team Deployment - Product and process systemization problem, identification and solving methodologies. Product Reliability, Mortality Curve.VUnit IV< Product Modelling: Product Modeling >5 HourDefinition of concepts – Fundamental issues - Role of Process chains and product models - Types of prod models - model standardization efforts-types of process chains - Industrial demands.5 HourUnit V< Types Of Analysis Tools >5 HourFMEA - QFD - Design for product life cycle. Estimation of Manufacturing costs, Reducing the component5 Hour								



Management - An Introduction to Concepts, Benefits and Terminology, CIM Data. PDM functions, definition and architectures of PDM systems, product data interchange, portal integration, PDM acquisition & implementation.

Recent Advances: Intelligent Information Systems - Knowledge based product and process models - Applications of soft computing in product development process - Advanced database design for integrated manufacturing.

Texts Books:								
1	Grieves, Michael. Product Lifecycle Management, McGraw-Hill, 2006. ISBN 0071452303							
2	Product Life Cycle Management - by Antti Saaksvuori, Anselmi Immonen, Springer, 1st Ed. (2003)							
3	Stark, John. Product Lifecycle Management: Paradigm for 21st Century Product Realization, Springer- Verlag, 2004. ISBN 1852338105							
Refe	Reference Books:							
1	Product Design & Process Engineering, McGraw Hill - Kogalkusha Ltd., Tokyo, 1974.							
2	Product Design & Development - by Kari Ulrich and Steven D. Eppinger, McGraw Hill International Edns, 1999.							
3	Effective Product Design and Development - by Stephen Rosenthol, Business One Orwin, Homewood, 1992 ISBN 1-55623-603-4.							
4	Burden, Rodger PDM: Product Data Management, Resource Pub, 2003. ISBN 0970035225							
5	Clement, Jerry; Coldrick, Andy; & Sari, John. Manufacturing Data Structures, John Wiley & Sons, 1992. ISBN 0471132691							
6	Clements, Richard Barrett. Chapter 8 ("Design Control") and Chapter 9 ("Document Control") in Quality Manager's Complete Guide to ISO 9000, Prentice Hall, 1993. ISBN 013017534X							
7	Crnkovic, Ivica; Asklund, Ulf; & Dahlqvist, Annita Persson. Implementing and Integrating Product Data Management and Software Configuration Management, Artech House Publishers, 2003. ISBN 1580534988							
8	Garwood, Dave. Bills of Materials for a Lean Enterprise, Dogwood Publishing Co., 2004. ISBN 0962111848							
9	Fan ,D(Ed.), Virtual Reality for Industrial Applications, Springer							



Cours	-	Year						
	se Coo		01MEL523	Course Name	Experimental Str		Elective III) aluation Sche	
		ching Scheme						
	Т	Р	Credits	-		SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
	se Ob	·						
01				•	echanics theory and	•	•	SIS.
02		•			es to real world en			
03	Арр	ly exp	perimental str	ress analysis techr	niques to real world	engineering	design problen	n.
<u> </u>		•						
Cours	1							
01					ept of stress and str			
02					rlying principles in u			
03		•			surements and ana	•		1
04			vill be able to	understand basic	principles of photo	-elasticity, an	d use it as an a	analysis
	too							
				C_	urse Contents			
Uni	. I				ourse Contents			<b>F</b> Hours
				-	Experimental appro			5 Hours
			by ESA Strate	-	iques, Necessity of	Valious ESA	methous, met	nouology o
Unit	t II							
Strain	n Tens	sors, (	Constitutive I	rement: Review o Models Strain Ga	surement Technique of Stress, Strain, and ges: Properties of S S. Gage Sensitivity, S	d Hooke's Lav Strain gauge S	Systems, Type	s Resistance
Strain Strain const Corre Static	n Tens n gaug ant ci ections c and l	sors, ( ges: Co urrent s Gag	Constitutive I onstruction, N t circuits Calik ge Factor, Pe	rement: Review o Models Strain Gag Mounting methods pration of circuits, rformance Chara g, Digital Data Acq	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects Iemetry Syste	Systems, Type rcuits: Wheats nent Correctio 5. Recording 1	of Stress and s Resistance tone bridge ons, Therma
Strain Strain const Corre Static Unit	n Tens n gaug cant co ections c and l t III	sors, ( ges: Co urrent s Gag Dynar	Constitutive I onstruction, N t circuits Calik ge Factor, Pe nic Recording	rement: Review o Models Strain Gag Aounting methods pration of circuits, prformance Chara c, Digital Data Acq <b>Strain</b>	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods >	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste	Systems, Type rcuits: Wheats nent Correctio 5. Recording 1 ems Strategy.	f Stress and s Resistance itone bridge ons, Therma nstruments <b>5 Hours</b>
Strain Strain const Corre Static Unit Three analy	n Tens n gaug cant co ection c and l t III e elem rsis, re	sors, ( ges: Co urrent s Gag Dynar Dynar nent r	Constitutive I onstruction, N t circuits Calik ge Factor, Pe nic Recording ectangular st I stress deter	rement: Review o Models Strain Gag Aounting methods oration of circuits, orformance Chara c, Digital Data Acq < Strain rain rosette, corre mination Applicat	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr	Systems, Type rcuits: Wheats nent Correctio s. Recording I ms Strategy. ninistic metho	of Stress and s Resistance stone bridge ons, Therma nstruments <b>5 Hours</b> ods for strain
Strain Strain const Corre Static Unit Three analy	n Tens n gaug cant cr ections c and l t III e elem vsis, re eratu	sors, ( ges: Co urrent s Gag Dynar Dynar nent r	Constitutive I onstruction, N t circuits Calik ge Factor, Pe nic Recording ectangular st I stress deter	rement: Review o Models Strain Gag Aounting methods oration of circuits, rformance Chara g, Digital Data Acq <b>Strain</b> rain rosette, corre mination Applicat cion, stress and str	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr strain gauges	Systems, Type rcuits: Wheats nent Correctio s. Recording I ms Strategy. ninistic metho	of Stress and s Resistance stone bridge ons, Therma nstruments <b>5 Hours</b> ods for strain
Strain Strain const Corre Static Unit Three analy temp Unit Basic	n Tens n gaug cant co cand l c and l t III e elem rsis, re beratu t IV of O	sors, ( ges: Co urrent s Gag Dynar nent r esidua re, pro ptics,	Constitutive I onstruction, M t circuits Calib ge Factor, Pe nic Recording ectangular st I stress deter essure, vibrat Optical Instr	rement: Review o Models Strain Gag Aounting methods oration of circuits, orformance Chara c, Digital Data Acq <b>strain</b> rain rosette, corre- mination Applicat cion, stress and str <b>&lt; Optical Met</b> cumentation Moir	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of rain etc. Strategy hods of Stress Anal re Fringe technique	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr strain gauges lysis >	Systems, Type rcuits: Wheats nent Correctio s. Recording I ems Strategy. ninistic metho for measuren experimental	of Stress and s Resistance itone bridge ons, Therma instruments <b>5 Hours</b> ods for strain nent of load <b>6 Hours</b>
Strain Strain const Corre Static Unit Three analy temp Unit Basic Fracti	n Tens n gaug cant co ection: c and l t III e elem vsis, re veratu t IV of O ional f	sors, ( ges: Co urrent s Gag Dynar nent r esidua re, pro ptics,	Constitutive I onstruction, M t circuits Calib ge Factor, Pe nic Recording ectangular st I stress deter essure, vibrat Optical Instr	rement: Review o Models Strain Gag Aounting methods oration of circuits, rformance Chara , Digital Data Acq <b>strain</b> rain rosette, corre mination Applicat cion, stress and str <b>&lt; Optical Met</b> rumentation Moir at -Tardy's Metho	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of rain etc. Strategy chods of Stress Anal re Fringe technique d, Babinet Soleil Me	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr strain gauges lysis > e-theory and ethod. Strateg	Systems, Type rcuits: Wheats nent Correctio s. Recording I ems Strategy. ninistic metho for measuren experimental	f Stress and s Resistance itone bridge ons, Therma nstruments <b>5 Hours</b> ods for strain nent of load <b>6 Hours</b> procedures
Strain Strain const Corre Static Unit Three analy temp Unit Basic Fracti Unit	n Tens n gaug cant co ections c and l t III e elem vsis, re eratu t IV of O ional t t V	sors, ( ges: Co urrent s Gag Dynar Dynar nent r esidua re, pro ptics, fringe	Constitutive I onstruction, N t circuits Calib ge Factor, Pe mic Recording ectangular st l stress deter essure, vibrat Optical Instr measuremer	rement: Review o Models Strain Gag Jounting methods oration of circuits, rformance Chara s, Digital Data Acq <b>Strain</b> rain rosette, corre- mination Applicat cion, stress and str <b>Optical Met</b> rumentation Moir nt -Tardy's Methor <b>Cheory of Pho</b>	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of rain etc. Strategy chods of Stress Anal re Fringe technique d, Babinet Soleil Me to-elasticity, Polari	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr strain gauges lysis > e-theory and ethod. Strateg scope >	Systems, Type rcuits: Wheats nent Correctio s. Recording I ems Strategy. ninistic metho for measuren experimental Sy	of Stress and s Resistance itone bridge ons, Therma instruments <b>5 Hours</b> ods for strain nent of load <b>6 Hours</b> procedures <b>7 Hours</b>
Strain Strain const Corre Static Unit Three analy temp Unit Basic Fracti Unit Plane	n Tens n gaug cant cu ection: c and l t III e elem rsis, re eratu t IV of O ional 1 t V e pola	sors, ( ges: Co urrent s Gag Dynar nent r esidua re, pro ptics, fringe riscop	Constitutive I onstruction, M t circuits Calib ge Factor, Pe nic Recording ectangular st l stress deter essure, vibrat Optical Instr measuremer pe, Circular p	rement: Review o Models Strain Gag Aounting methods oration of circuits, orformance Chara t, Digital Data Acq <b>Strain</b> rain rosette, corre- mination Applicat cion, stress and str <b>Coptical Met</b> rumentation Moir nt -Tardy's Methor <b>Coptical Pho</b> olariscope, Differe	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of rain etc. Strategy chods of Stress Anal re Fringe technique d, Babinet Soleil Me to-elasticity, Polari ent Arrangements	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr strain gauges lysis > e-theory and ethod. Strateg scope > photoelastic	Systems, Type rcuits: Wheats nent Correctio s. Recording I ems Strategy. ninistic metho for measuren experimental sy photography,	of Stress and s Resistance itone bridge ons, Therma nstruments <b>5 Hours</b> ods for strain nent of load <b>6 Hours</b> procedures <b>7 Hours</b> Photoelastic
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Strain Strain const Corre Static Unit Three analy temp Unit Basic Fracti Unit Plane mater direct	n Tens n gaug cant cu ection: c and l t III e elem vsis, re eratu t IV of O ional f t V e pola rials-p tion o	sors, ( ges: Co urrent s Gag Dynar Dynar nent r esidua re, pro sidua re, pro proper f Prino	Constitutive I onstruction, N t circuits Calib ge Factor, Pe mic Recording ectangular st l stress deter essure, vibrat Optical Instr measuremer pe, Circular p rties, selection cipal stresses	rement: Review o Models Strain Gag Jounting methods oration of circuits, rformance Chara s, Digital Data Acq <b>Strain</b> rain rosette, corre- mination Applicat cion, stress and str <b>Optical Met</b> rumentation Moir nt -Tardy's Methor <b>Cheory of Pho</b> olariscope, Differe- on, casting meth at given point, De	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of rain etc. Strategy chods of Stress Anal re Fringe technique d, Babinet Soleil Me to-elasticity, Polari ent Arrangements p nods, calibration. A	d Hooke's Law Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr strain gauges lysis > e-theory and ethod. Strateg scope > photoelastic p Analysis Tech ct fringe order	Systems, Type rcuits: Wheats nent Correctio s. Recording I ems Strategy. ninistic metho for measuren experimental sy photography, nniques-Deter N and the pri	if Stress and s Resistance itone bridge ons, Therma nstruments <b>5 Hours</b> ods for strain nent of load <b>6 Hours</b> procedures <b>7 Hours</b> Photoelasti mination o ncipal stres
Strain Strain const Corre Static Unit Three analy temp Unit Basic Fracti Unit Plane mater direct Separ	n Tens n gaug cant cu ection: c and l t and l t III e elem rsis, re beratu t IV of O ional f t V e pola rials-p tion o ration	sors, ( ges: Co urrent s Gag Dynar nent r esidua re, pro sidua re, pro prics, fringe riscop propel f Prino	Constitutive I onstruction, M t circuits Calib ge Factor, Pe nic Recording ectangular st l stress deter essure, vibrat Optical Instr measuremer pe, Circular p rties, selectio cipal stresses ods, Method	rement: Review o Models Strain Gag Aounting methods oration of circuits, erformance Chara t, Digital Data Acq <b>&lt; Strain</b> rain rosette, corre- mination Applicat cion, stress and str <b>&lt; Optical Met</b> toumentation Moir nt -Tardy's Methon <b>&lt; Theory of Pho</b> olariscope, Differed on, casting meth at given point, De based on Hooke's	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of rain etc. Strategy thods of Stress Anal re Fringe technique d, Babinet Soleil Me to-elasticity, Polaris ent Arrangements nods, calibration. A etermination of exact Law, Electrical anal	d Hooke's Law Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr strain gauges lysis > e-theory and ethod. Strateg scope > photoelastic p Analysis Tech ct fringe order ogy method, 0	Systems, Type rcuits: Wheats nent Correctio s. Recording I ems Strategy. ninistic metho for measuren experimental sy photography, nniques-Deter N and the pri Dblique incide	if Stress and s Resistance itone bridge ons, Therma nstruments <b>5 Hours</b> ods for strain nent of load <b>6 Hours</b> procedures <b>7 Hours</b> Photoelasti mination o ncipal stres nce method
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Strain Strain Corre Static Unit Three analy temp Unit Basic Fracti Unit Plane mate direct Separ Shear D Stree Unit	n Tens n gaug cant cu ection: c and l t and l t ll e elem rsis, re eratu t V of O ional t t V e pola rials-p tion o ration r diffe ess an t VI	sors, ( ges: Co urrent s Gag Dynar nent r esidua re, pro sidua re, pro ptics, fringe riscop oropei f Prino meth rence	Constitutive I onstruction, M t circuits Calik ge Factor, Pe nic Recording ectangular st l stress deter essure, vibrat Optical Instr measuremer oe, Circular p rties, selectio cipal stresses ods, Method e method, Sca strategy < Opti	rement: Review o Models Strain Gag Aounting methods oration of circuits, erformance Chara t, Digital Data Acq <b>&lt; Strain</b> rain rosette, corre- mination Applicat cion, stress and str <b>&lt; Optical Met</b> toumentation Moir nt -Tardy's Methon <b>&lt; Theory of Pho</b> olariscope, Differed on, casting meth- at given point, De based on Hooke's ling model results cal methods for D	of Stress, Strain, and ges: Properties of S s, Gage Sensitivity, S , Bridge Sensitivity a cteristics, Environn uisition Systems, Te Analysis Methods > ection, stress gauges ions: Application of rain etc. Strategy thods of Stress Anal re Fringe technique d, Babinet Soleil Me to-elasticity, Polaris ent Arrangements nods, calibration. A etermination of exact Law, Electrical anal	d Hooke's Lav Strain gauge S Strain Gage Ci and Measurer nental effects lemetry Syste s, over-deterr strain gauges lysis > e-theory and ethod. Strateg scope > photoelastic p Analysis Tech ct fringe order ogy method, Q lication of pho	Systems, Type rcuits: Wheats nent Correctio s. Recording I ems Strategy. ninistic metho for measuren experimental sy photography, nniques-Deter N and the pri Dblique incide pto-elasticity t	if Stress and s Resistance itone bridge ons, Therma nstruments <b>5 Hours</b> ods for strain nent of loac <b>6 Hours</b> procedures <b>7 Hours</b> Photoelasti mination of ncipal stress nce methoc o 2-D and 3 <b>6 Hours</b>



(An Empowered Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Coating Techniques- Bifringent coating- stress-optic and strain-optic relation, sensitivity and coating materials, fringe order determination. Brittle coating technique. Strategy HOLOGRAPHY:Plane and spherical waves - coherence - holographic setup –Interferometry - Displacement measurement -obtaining Isopachics, Strategy.

Texts Books:					
1	Sadhu Singh - Experimental Stress Analysis, Khanna Publishers, New Delhi, 1996.				
2	JW Dalley & WF Riley, Experimental Stress Analysis, McGraw Hill Book Co. N.Y. 1991				
3	L.S. Srinath et al, Experimental Stress Analysis, Tata McGraw Hill Company, New Delhi, 1984				
Refe	Reference Books:				
1	R.S.Sirohi, HC Radhakrishna, Mechanical Measurements, New Age International (P)Ltd. 1997				
2	F.K Garas, J.L. Clarke and GST Armer, Structural assessment, Butterworths, London, 1987				
3	D.E. Bray & R. K.Stanley, Non-destructive Evaluation				
4	Dove and Adams, Experimental Stress Analysis and Motion Measurement, PHI, 1965.				



				aluation Sche				
L	Т	Р	Credits	-		SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
Cours	se Obj	jective	es:					
01	To i	ntrodu	uce principles	s of reliability in er	ngineering design			
02	Тос	levelo	p understand	ling of concepts o	f failures, maintaina	ability and ava	ailability of the	intended
	prod	ducts/	'systems and	services.				
03	То с	levelo	p an ability to	o analyze field fail	ure data in order to	o evaluate syst	em reliability.	
04	Тос	levelo	p an ability to	o apply various rel	liability techniques	to solve inter	disciplinary rel	iability
	prol	olems	•					
Cours	e Out	tcome	25:					
01	-			ance of selection of	of proper manufact	turing process	and its influe	nce on nev
		-	•		erstand the interre	• •		
			•	•	uct performance du	•	•	0
02	· ·				on in assembly time		-	rate
		•		ly guidelines in pro				
03	Utili	ize rel	iability conce	pts, failure analys	is tools and technic	ues and accel	erated life tes	t methods
	for i	mpro	ving product	life cycle.				
04	Und	lerstai	nd the factors	s controlling cost a	and time required f	or the produc	t maintenance	and utilize
	this	inforr	mation for de	sign for maintena	nce.			
				Со	urse Contents			
Uni	tl			< Eleme	nts of Probability >			7 Hours
			epts, Rules fo Sample distri	•	babilities, Complen	nentary event	s, Conditional	probability
Unit		,	•		Reliability >			7 Hours
		•		oility, Failure patte	rns and mathemati eliability, Fault tree	•		rate <b>model</b>
Unit		epen			ability testing >	allalysis, Fivil		6 Hours
		ting E	Rinomial Test		esting, Accelerated	life Testing D	ogradation Mc	
Unit		ung, L	Smormal rest		liability Function >	-		6 Hours
		to Ha	azard Rate		Relationship betwo		Reliability Cha	
					ime-dependent Haz		-Constant-haz	
•			•••	Gamma Models				
Unit					tem Reliability >			7 Hours
			-		odels, Series-paralle Iodels, Fault-tree A			
Unit		- 1	,		tained Systems >			6 Hours
		on of	Maintenance		down, Preventive	and Predictive	e Maintenanco	
					liability-centered M			



1	Antony J (2003). Design and Experiments for Engineers and Scientists, Butterworth- Heinmann.					
2	Cochran W and Cox G (2000). Experimental Designs, II edition, John Wiley & Sons Inc.					
3	Dean A and Voss D (2006). Design and Analysis of Experiments, Springer.					
Refe	rence Books:					
1	Jeff Wu C and Hamada M (2000). Experiments: Planning, Analysis and Parameter Design					
	Optimization, John Wiley and Sons Inc					



cours	se Co		01MEL525	Course Name	Industrial Robotic	-		
			cheme	-			aluation Sche	
L	T	Р	Credits	_		SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
	se Ob	· · · · · · · · · · · · · · · · · · ·						
01				• .	ology, computer aid	ded process p	lanning, mate	rial
			ent planning					
02					Co-ordinate Measuri	ng Machine (	CMM), Flexibl	e
			uring System					
03			•	• •	automation, and ad		ufacturing tech	nniques to
			-	· · ·	kly, efficiently, inexp	•		
04					manufacturing to re	duce manual	processing an	d linking
	con	npute	rs to all the m	anufacturing mac	hines			
	se Ou							
01		-			ay's scenario and its			on.
02				1 1 0	amming and work or			
03					automation in man	•		
04	Unc	lersta	nd the engine	eering and econon	nical aspects of auto	matic storage	e and retrieva	system.
				Co	urse Contents			
Uni	it I			< Introduction	and Robot Kinema	tics >		7 Hours
			•		Robot anatomy - W			
					nd inverse kinematio	-		trol of robo
	•	ors - R	obot dynami	cs - Methods for o	rientation and locat	ion of objects	S	
Uni					<b>Drives and Control</b> >			7 Hours
					locity sensing device	-	•	•
				•	ators and control v		•	
elect	ric dri	ves - l	Motors - Desi	gning of end effec	tors - Vacuum, mag	netic and air	operated gripp	pers
Uni	t III				< Robot >			7 Hours
Trans	sduce	rs and	Sensors - Tac	tile sensor - Proxin	mity and range sense	ors - Sensing j	oint forces - R	obotic visior
syste	m - Ir	nage	Representati	on - Image Grabb	ing -Image processi	ng and analy	sis - Edge Enł	nancement ·
Cont	rast St	retch	ing - Band Rat	tioning - Image seg	gmentation - Patterr	recognition	- Training of vi	sion system
Unit	t IV			< Robot Cell I	Design and Applicat	ion >		8 Hours
Robo	ot wor	k cell	design and co	ontrol - Safety in R	obotics - Robot cell	layouts - Mu	ltiple Robots a	and machine
inter	ferend	ce - Ro	bot cycle tim	e analysis. Indust	rial application of ro	bots.		
Uni	t V			< Robot Program	ming and Expert Sy	vstems >		6 Hours
Meth	nods d	of Rol	bot Programi	ming - Characteri	stics of task level	languages le	ad through p	rogramming
meth	ods -	Motic	on interpolation	on.				
Unit	t VI			< Artifi	cial intelligence >			4 Hours
Basic	s - Go	als of	artificial inte	elligence - AI tech	niques - problem re	presentation	in Al - Proble	m reductior
and s	olutio	on tec	hniques - App	lication of AI and	KBES in Robots.			
Texts	2 ROOM	s:						



2	Yoram Koren," Robotics for Engineers' Mc Graw-Hill, 1987.
3	Kozyrey, Yu. "Industrial Robots", MIR Publishers Moscow, 1985.
Refer	ence Books:
1	Richard. D, Klafter, Thomas, A, Chmielewski, Michael Negin, "Robotics Engineering - An Integrated Approach", Prentice-Hall of India Pvt. Ltd., 1984.
2	Deb, S.R." Robotics Technology and Flexible Automation", Tata Mc Graw-Hill, 1994.
3	Mikell, P. Groover, Mitchell Weis, Roger, N. Nagel, Nicholas G. Odrey," Industrial Robotics Technology, Programming and Applications", Mc Graw-Hill, Int. 1986.
4	Timothy Jordanides et al ,"Expert Systems and Robotics ", Springer -Verlag, N, May 1991.



Course Code 01MEL526 Teaching Scheme			01MEL526	Course Name	Additive Manufac			
				_			aluation Sche	1
	Т	Р	Credits	_		SE-I Marks	SE-II Marks	SEE Marks
3	- - 0h	-	3			25	25	50
	se Ob			as of Danid proto	whing to chaiguing			
01		-		es of Rapid proto				
02		•			3 D Modeling meth			
03		-			sed in Rapid prototy	yping techniq	ues	
04		•		position technique				
05	Dist	inguis	h materials s	uitable for applica	tion at elevated ten	nperatures		
	1			•	rse, the student sho			
01					essing of CAD mode		rototyping.	
02					apid prototyping te	chniques.		
03			•	g for rapid protot				
04	Use	rapid	prototyping	techniques for rev	erse engineering.			
					urse Contents			<b>C</b> 11
Uni			<b>.</b>		ntroduction >	(55) .		6 Hours
				•	ping Vs. Rapid Proto			•
			-		eneric RP process, D	distinction be	tween RP and	a CNC, other
		nnoio	gies, Classific		and Data Decarding			Cliner
Uni					and Data Processing			6 Hours
		• •	-	•	ta formats (STL, SL			• • •
		-			generation, Suppo slicing, Tool path ge		uesign, woue	i Slicing and
			anization, un			neration.		7 Hours
Unit III         < RP Systems >         7 Hours           Photo polymerization Stereo lithography (SL), SL resin curing process, SL scan patterns, Micro-stereo							an natterns l	
Dhote	o poi			• • • •	SE resin curing pr	00033, JL 300	•	viici 0-stereo
	ranh		lications of P	hoto nolymerizati	on Processes Powd	ler Bed Eusio	n <sup>.</sup> Selective la	ser Sintering
lithog					on Processes, Powd			-
lithog (SLS),	Powe	der fu	sion mechani	sm and powder ha	ndling, SLS Metal ar	nd ceramic pa	rt creation, El	ectron Beam
lithoą (SLS), melti	Powo ng, (I	der fu EBM),	sion mechanis Applications	sm and powder ha	ndling, SLS Metal ar Fusion Processes.	nd ceramic pa	rt creation, El	ectron Beam
lithog (SLS), melti Depo	, Powo ng, (I sition	der fu EBM),	sion mechanis Applications	sm and powder has of Powder Bec Principles, Plottin	ndling, SLS Metal ar Fusion Processes. g and path control,	nd ceramic pa	rt creation, El	ectron Beam tems: Fused
lithog (SLS), melti Depo <b>Unit</b>	, Powo ng, (I sition t IV	der fus EBM), Mode	sion mechanis Applications elling (FDM),	sm and powder ha of Powder Bec Principles, Plottin <b>&lt; Depo</b> s	ndling, SLS Metal ar Fusion Processes. g and path control, <b>ition techniques &gt;</b>	nd ceramic pa . Extrusion-B	rt creation, El ased RP Sys	ectron Beam tems: Fused 6 Hours
lithog (SLS), melti Depo <b>Unit</b> Appli	, Powo ng, (I sition t IV catior	der fus EBM), Mode	sion mechanis Applications elling (FDM), Extrusion-Bas	sm and powder ha s of Powder Bec Principles, Plottin <b>&lt; Depo</b> sed Processes. 31	ndling, SLS Metal ar Fusion Processes. g and path control, sition techniques > D Printing :3D print	nd ceramic pa Extrusion-B ting (3DP), F	rt creation, El ased RP Syst Research achie	ectron Beam tems: Fused <u>6 Hours</u> evements in
lithog (SLS), melti Depo <b>Unit</b> Appli printi	, Powe ng, (I osition t IV catior ing de	der fus EBM), Mode ns of positi	sion mechanis Applications elling (FDM), Extrusion-Bas on, Techr	sm and powder has s of Powder Bec Principles, Plottin <b>&lt; Depo</b> s sed Processes. 31 nical challenges	ndling, SLS Metal ar Fusion Processes. g and path control, sition techniques > D Printing :3D print in printing, Lamir	nd ceramic pa Extrusion-B ting (3DP), F nated Objec	rt creation, El ased RP Syst Research achie t Manufactu	ectron Beam tems: Fused 6 Hours evements in ring (LOM),
lithog (SLS), melti Depo <b>Unit</b> Appli printi Ultra	, Powe ng, (I sition t IV catior ing de sonic	der fus EBM), Mode ns of positi Consc	sion mechanis Applications elling (FDM), Extrusion-Bas on, Techr Ilidation (UC)	sm and powder ha s of Powder Bec Principles, Plottin <b>&lt; Depo</b> sed Processes. 31 nical challenges , Gluing, Thermal	ndling, SLS Metal ar Fusion Processes. g and path control, sition techniques > O Printing :3D print in printing, Lamir ponding, LOM and L	nd ceramic pa Extrusion-B ting (3DP), R nated Objec JC applicatior	rt creation, El ased RP Syst Research achie t Manufactu ns. Beam Depo	ectron Beam tems: Fused 6 Hours evements in ring (LOM), osition: Laser
lithog (SLS), melti Depo <b>Unit</b> Appli printi Ultra Engin	, Powe ng, (I sition t IV catior ing de sonic neered	der fus EBM), Mode ns of positi Consc I Net	sion mechanis Applications elling (FDM), Extrusion-Bas on, Techr Ilidation (UC) Shaping (L	sm and powder ha s of Powder Bec Principles, Plottin <b>&lt; Depo</b> sed Processes. 31 nical challenges , Gluing, Thermal ENS), Direct Me	ndling, SLS Metal ar Fusion Processes. g and path control, sition techniques > D Printing :3D print in printing, Lamir	nd ceramic pa Extrusion-B ting (3DP), R nated Objec JC applicatior	rt creation, El ased RP Syst Research achie t Manufactu ns. Beam Depo	ectron Beam tems: Fused 6 Hours evements in ring (LOM), osition: Laser
lithog (SLS), melti Depo <b>Unit</b> Appli printi Ultra Engin	, Powe ng, (I sition t IV catior ing de sonic neerec onshi	der fus EBM), Mode ns of positi Consc I Net	sion mechanis Applications elling (FDM), Extrusion-Bas on, Techr Ilidation (UC)	sm and powder ha s of Powder Bec Principles, Plottin <b>&lt; Depo</b> sed Processes. 31 nical challenges , Gluing, Thermal ENS), Direct Ma awbacks	ndling, SLS Metal ar Fusion Processes. and path control, <b>ition techniques &gt;</b> Printing :3D print in printing, Lamir conding, LOM and U etal Deposition (D	nd ceramic pa Extrusion-B ting (3DP), R nated Objec JC applicatior	rt creation, El ased RP Syst Research achie t Manufactu ns. Beam Depo	ectron Beam tems: Fused 6 Hours evements in ring (LOM), osition: Laser
lithog (SLS), melti Depo Unit Appli printi Ultra Engin relati Uni	, Powe ng, (I sition t IV catior ing de sonic sonic oneered onshi t V	der fus EBM), Mode ns of positi Consc d Net ps, Be	sion mechanis Applications elling (FDM), Extrusion-Bas on, Techr Ilidation (UC) Shaping (L nefits and dra	sm and powder has of Powder Bec Principles, Plottin <b>&lt; Depo</b> sed Processes. 31 nical challenges , Gluing, Thermal .ENS), Direct Me awbacks <b>&lt; R</b>	ndling, SLS Metal ar Fusion Processes. and path control, <b>ition techniques &gt;</b> Printing :3D print in printing, Lamir bonding, LOM and L etal Deposition (D apid Tooling >	nd ceramic pa Extrusion-B ting (3DP), R nated Objec JC applicatior MD), Proces	rt creation, El ased RP Syst Research achie t Manufactu ns. Beam Depo ssing-structure	ectron Beam tems: Fused 6 Hours evements in ring (LOM), osition: Laser e-properties, 7 Hours
lithog (SLS), melti Depo Unit Appli printi Ultra Engin relati Uni Conv	, Powe ng, (I sition t IV catior ing de sonic sonic neered onshi t V entior	der fus EBM), Mode ns of positi Consc d Net ps, Be	sion mechanis Applications elling (FDM), Extrusion-Bas on, Techr lidation (UC) Shaping (L nefits and dra oling Vs. Rapio	sm and powder has s of Powder Bec Principles, Plottin <b>&lt; Depos</b> sed Processes. 31 nical challenges , Gluing, Thermal ENS), Direct Me awbacks <b>&lt; R</b> d Tooling, Classific	ndling, SLS Metal ar Fusion Processes. and path control, <b>ition techniques &gt;</b> Printing :3D print in printing, Lamir conding, LOM and U etal Deposition (D	nd ceramic pa Extrusion-B ting (3DP), R nated Objec JC applicatior MD), Proces	rt creation, El ased RP Syst Research achie t Manufactu ns. Beam Depo ssing-structure	ectron Beam tems: Fused 6 Hours evements in ring (LOM), osition: Laser e-properties, 7 Hours
lithog (SLS), melti Depo Unit Appli printi Ultra Engin relati Uni Conv Soft a	, Powe ng, (I sition t IV catior ing de sonic sonic onshi t V entior and Ha	der fus EBM), Mode ns of positi Consc d Net ps, Be	sion mechanis Applications elling (FDM), Extrusion-Bas on, Techr Ilidation (UC) Shaping (L nefits and dra	sm and powder ha s of Powder Bec Principles, Plottin <b>&lt; Depo</b> sed Processes. 31 nical challenges , Gluing, Thermal ENS), Direct Ma awbacks <b>&lt; R</b> d Tooling, Classific	ndling, SLS Metal ar Fusion Processes. g and path control, <b>ition techniques &gt;</b> O Printing :3D print in printing, Lamir conding, LOM and U etal Deposition (D apid Tooling > ation of Rapid Toolir	nd ceramic pa Extrusion-B ting (3DP), F nated Objec JC application MD), Proces	rt creation, El ased RP Syst Research achie t Manufactu ns. Beam Depo ssing-structure	ectron Beam tems: Fused 6 Hours evements in ring (LOM), osition: Laser e-properties, 7 Hours ng Methods,
lithog (SLS), melti Depo Unit Appli printi Ultra Engin relati Conv Soft a Unit	, Powe ng, (I sition t IV catior ing de sonic neered onshi t V entior and Ha	der fus EBM), Mode ns of positi Conso I Net ps, Be nal Too ard To	sion mechanis Applications elling (FDM), Extrusion-Bason, Technolidation (UC) Shaping (L nefits and dra oling Vs. Rapio coling method	sm and powder has s of Powder Bec Principles, Plottin <b>&lt; Depo</b> sed Processes. 31 nical challenges , Gluing, Thermal ENS), Direct Me awbacks <b>&lt; R</b> d Tooling, Classific ds <b>&lt; Errors in RP Pr</b>	ndling, SLS Metal ar Fusion Processes. and path control, <b>ition techniques &gt;</b> Printing :3D print in printing, Lamir bonding, LOM and L etal Deposition (D apid Tooling >	nd ceramic pa Extrusion-B ting (3DP), F nated Objec JC applicatior MD), Proces ng, Direct and ations >	rt creation, El ased RP Syst Research achie t Manufactu is. Beam Depo ssing-structure	ectron Beam tems: Fused 6 Hours evements in ring (LOM), osition: Laser e-properties, 7 Hours



Texts	Books:
1	Rapid prototyping: Principles and applications, second edition, Chua C.K., Leong K.F., and Lim C.S., World Scientific Publishers, 2003.
2	Rapid Tooling: Technologies and Industrial Applications, Peter D.Hilton,
3	Chua C K, Leong K F, Chu S L, Rapid Prototyping: Principles and Applications in Manufacturing, World Scientific.
Refer	ence Books:
1	Gibson D W Rosen, Brent Stucker., Additive Manufacturing Technologies: Rapid Prototyping toDirect Digital Manufacturing, Springer.
2	Liou W L, Liou F W, Rapid Prototyping and Engineering applications: A tool box for prototype development, CRC Press.
3	Noorani R, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons.
4	Hilton P, Jacobs P F, Rapid Tooling: Technologies and Industrial Applications, CRC press.



	Teac	hing S	cheme	-			aluation Sche	
L	Т	Р	Credits	-		SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
	rse Ob	-						
01			es to program	•				
02	_			-	nce and neural netw		-	
03					search strategies ar			
04		dersta blems		ent applications of	Al and ANN in varic	ous engineeri	ng and industr	ial
Cour	se Ou	tcom	es: At the end	of the course stu	dents will be able to	)		
01					nce and neural netw		eering.	
02				-	and techniques of ne		-	study of
	the	most	important ne	ural network mod	lels.		C	
03			wledge of sul etworks.	ficient theoretical	background to be a	able to reasor	about the be	haviour of
04	Eva	luate	whether neu	al networks are a	ppropriate to a part	icular applica	tion and apply	/ neural
	net	works	to particular	applications, and	to know what steps	to take to im	prove perform	nance.
					urse Contents			
	it I				undations of A.I., U			6 Hours
state	e spac	e app	roach, Proble	m characteristics,	Components of prok	n, searching f	or solutions, F	orward and
	it II	reaso	ning, means e		ns and trees, measu rch Strategies >	ring problem	solving perior	7 Hours
		d (bli	nd) search- hr		first, and their varia	ations avoidi	ng repeated st	
					Generate and test, E			
			-					
search algorithms- Hill climbing, Simulated annealing, Branch and bound and Local beam search, <b>Knowledge Representation:</b> Simple rational knowledge, Inheritable knowledge, Inferential knowledge, Procedural knowledge, the Frame problem, Propositional logic- Syntax and semantics, well-formed formulas (WFF), conversion to clausal form, using FOPL, inference rules, unification, non-deductive inference methods, resolution, forward and backward chaining, the knowledge engineering process, Handling uncertain knowledge, probability propositions, atomic events, unconditional (prior) and conditional (posterior), priority Bayes' rule and its use, Bayesian network, its semantics and inference.								
Uni	it III			<	<pre>Learning &gt;</pre>			8 Hours
<ul> <li>Forms of learning, inductive learning, decision tree learning, ensemble learning, Pattern recognition-Introduction, recognition, and classification process, learning classification patterns.</li> <li>Knowledge based systems: Expert systems, components, characteristic features of expert systems, rule based system architecture, representing &amp; using domain knowledge, expert system shell, explaining the reasoning and knowledge acquisition, applications.</li> <li>A.I. in Robotics: State space search, path selection, AND-OR graphs, means end analysis in a robotic problem, robot problem solving as a production system, robot learning and task planning, symbolic spatial relationship, obstacle avoidance, graph planning.</li> </ul>								



Uni	n system, applications. Significance, Basic building blocks >	4 Hours			
	ANN - and their representation				
Un	< Learning Modes and Algorithms. >	7 Hours			
Appl	ions of ANN to various engineering and industrial problems	I			
Uni		s > 7 Hours			
	atLab on equivalent. Desirable facilities. MatLab latest version with ANN Tool ing software's preferably like Prolog, LISP, C++.	box and equivalen			
Text	oks:				
1	tuart Russel, Peter Norwig (2003), "Artificial Intelligence : A Modern Appro ducation)	ach" 2/e, (Pearson			
2	laine Rich, Kevin Knight, (1991), "Artificial Intelligence" 2/e, (Tata McGraw Hill)				
3	an W. Patterson (1999), "Introduction to Artificial Intelligence and Expert Sy eprint) (EEE) (Prentice Hall of India)	ˈstems" (7th India			
Refe	ce Books:				
1	ex Mauss, Jessica Keyes , "Handbook of Expert Systems in Mfg.", (McGraw Hill)				
2	Groover, Weiss, Nagel, Audrey, "Industrial Robotics- Technology, Programming and Applications"", (McGraw Hill)				
3	Fu, Gonzalea and Lee, "Robotics: Control, Sensing, Vision and Intelligence", (McGraw Hill)				
4	onference Proceedings and current journals for case studies and applications.				
5	troduction to A.N.N. by Anderson, Prentice Hall of India Publication.				
6	.N.N. by Yadnanarayana, Prentice Hall of India Publication				
7	.N.N. by Zurda J.M.				
8	.N.N. and MatLab by Sivanandan.				
0					



			M. Tech. Me		ing (Product Design			er–II)
	se Coo		01MEL528	Course Name	Design Optimizat	-		
	Teach	ning S	cheme				aluation Sche	
L	Т	Р	Credits			SE-I Marks	SE-II Marks	SEE Marks
3	-	-	3			25	25	50
Cour	se Ob	ioctive						
01				I Optimization Te	chniques			
01	-			•	niques, and Multi-va	riable Ontim	ization Techni	anoc
02			-	ed Optimization Technic	•			ques
04				•	netic Algorithm, Sim	ulated Annea	aling Artificial	Neural
04		works					anng, / a timelar	Neurui
05			ory of Constr	aints				
Cours	se Ou	tcome	es:					
	At t	he en	d of the cours	se students will be	9			
01	Able	e to ur	nderstand typ	e of optimization	problem			
02	Able	e to ap	oply Single-va	riable Optimizatio	on Techniques, and N	Multi-variable	e Optimization	Techniques
	as p	er rec	quirement					
03	Sele	ect and	d apply const	raints in a problen	n			
04	Den	nonsti	rate ability to	use technique lik	e ANN, GA			
					urse Contents			1
Uni				-	timization Techniqu			5 Hours
-			nd Multi-varia r Conditions.	able Optimization,	, Hessian Matrix, Sad	ldle Point, Lag	grange Multipl	iers Methoo
Uni		luckei	Conditions.	< Single veriable	Ontimization Tashr			10 Hours
		nd Soa	rch Exhaucti		Optimization Techr omous Search, Inter		lothod Eibona	
					n Method, Newton N	•	•	
Meth					in Method, Newton i	victilou, qua.		thou, Secan
Unit				< Multi-variable	<b>Optimization Techn</b>	iques >		10 Hours
		ry Opt	timization Me		arch Method, Patter	-	thod, Conjuga	
		<i>'</i> '		<i>i i</i>	Method, Conjugate		, , , ,	
Powe	ell Me	thod						
Unit	t IV			< Constrained (	<b>Optimization Techni</b>	ques >		5 Hours
Interi	ior Pe	nalty l	Function Met	hod, Exterior Pena	alty function Metho	d		
Uni	t V		< Genetic Alg	orithm, Simulate	d Annealing, Artifici	al Neural Ne	tworks >	3 Hours
Gene	etic Alg	gorith	m, Simulated	Annealing, Artific	ial Neural Networks			
Unit					ry of Constraints >			6 Hours
			•		hnology (OPT), Nine	• •		
					es and the Time Buff			er, Modeling
Retu	rn-On	- Inves	stment (ROI)	in TOC, Compariso	on of TOC and Local	Optimization	Approaches.	
-								
	s Book							
1	Deb	) K (20	04). Optimiza	ition for Engineeri	ing Design: Algorithr	ns and Exam	pies, Prentice	Hall of India



2	Dennis J Jr, Schnabel R (1996). Numerical Methods for Unconstrained Optimization and Nonlinear Equations, Society for Industrial and Applied Mathematics.
3	Rao S (1996). Engineering optimization, Theory and Practice, New Age International Publishers.
Refer	rence Books:
nerei	
1	Ravindran A, Ragsdell K and Reklaitis G (2006). Engineering Optimization: Methods and Applications,
	2nd edition, John Wiley and Sons Inc.
2	Goldratt, E. M. and Cox, J. (2004). The Goal: A Process of Ongoing Improvement. 3rd Edition, North
2	River Press. ISBN-10: 0884271781, ISBN-13: 978-0884271789.
-	Dettmer, H. William (1997). Goldratt's Theory of Constraints: A Systems Approach to Continuous
3	Improvement, American Society for Quality. ISBN 0873893700, 9780873893701.



Cou	rse Code	01MEP529	Course Name	Manufacturing	System Design	
•	Teaching Sch	neme			Evaluatio	n Scheme
L	ТР	Credits			CIE Marks	SEE Marks
-	- 2	1			50	50
Cou	rse Objective	es:				
On c	completion o	f the course,	student will be able	2 -		
01	Study of di	e design in sh	neet metal including	g the process, meas	surements, design and	selection of
	•		dustrial specificatio			
02					nts using injection mou	ulding
03			es for fabrication, a		ction	
04	Introduce	the students	to gauge and gauge	design		
	rse Outcome					
	1		ents will be able to		.1	
01	· · · ·	•	damentals of Die de	-		• · · · • • • • •
02	-	-	damental principle	, Forming and drav	ving die for component	tunder
03		-		omponents using i	njection moulding and	Cauga and
05	Gauge des	•		omponents using i	injection moulding and	Gauge and
04	-	-	abrication, Assembly	v and Inspection		
04	Design of I					
			List c	of Experiments		
1	Blanking &	Piercing die	design.			
2	Bending, fo	orming, and d	Irawing die design.			
3	Die design	for injection	molded component	S.		
4	Fixtures fo	r Assembly, fa	abrication, inspection	on.		
5	Use of CM	M for compoi	nent measurement	and reverse engine	eering.	
6	Use of soft	ware's like M	Iould flow / Moulde	x for suitable appl	ications.	
7		ts on syllabus		· · ·		
8	Assignmen	ts on syllabus	5.			
9	Assignmen	ts on syllabus	S.			
10	Assignmen	ts on syllabus	5.			
	Submissio	n: Completed	Journal			
	s Books:					
Tov						
Text	1	n - Cyrill Dong	aldson, G.H LeCain,	VC Goold Tata M	IcGraw Hill Publi	



Cou	se Co	de	01MEP530	Course Name	Creativity, Innovatio	on & New Product	Development
	<b>Feach</b> i	ng Sch	neme			Evaluatio	n Scheme
L	Т	Р	Credits			CIE Marks	SEE Marks
-	-	2/	1			50	
		Alt.					
		Wk					
Cou	se Ob	jective	es:				
On c	omple	tion o	f the course,	student will be able	2 -		
01	To m	iake st	udents awar	e about the importa	nce of creativity and ir	novation in new p	roduct design.
02				•	and problem solving ir		
03			mportance o	f intellectual proper	rty and procedures to p	preserve intellectua	al property
	right						
04	Kno	v jouri	neys in produ	ct development.			
		tcome					
				ents will be able to			
01				es of new product o			
02 03				arch, benchmarking ation in new produ	g in project planning.		
03					ole to prepare model, b	uild tost rofino	
04		· ·	· ·		ve intellectual property	•	
05	Able	totra	ck procedure	s, me patent preser	ve intellectual propert	y rights.	
				List o	of Experiments		
				List 0	Андреннісню		
	Crea	tive de	esign - Mode	Preparation - Testi	ng - cost evaluation - Pa	atent application.	
				· ·	-	· · ·	
	Subr	nissio	n: Completed	Journal.			
Text	s Bool	(S:					
1			•	•	on", John Wiley & Sons	•	
2	BRA	NTW	ISS, " Managi	ng technological inn	ovation", Pitman Publi	shing Ltd., 1992.	



Cou	rse Co	de	01MEP531	Course Name	Product Life Cyc	le Management			
	Teachi	ng Sch	neme			Evaluatio	on Scheme		
L	Т	P	Credits			CIE Marks	SEE Marks		
-	-	2/	1			50			
		Alt.							
		Wk							
Cou	rse Ob	jective	es:				1		
On d	comple	tion o	f the course,	student will be able	! <b>-</b>				
01	Fam (PLC		the current p	rinciples, practices	, and applications of	of Product Lifecycle Ma	anagement		
02	Learn integrated, information driven approach to all aspects of a product's life from its design								
	ince	otion,	through its m	anufacture, deploy	ment and mainten	ance, and culminating	in its removal		
			ce and final di	•					
03				-	_	e product developmen	t process that		
				competitive advan	•	novative products			
04	Expe	rience	e modern PLC	V strategies, metho	ods, and tools				
	rse Ou								
	1			ents will be able to					
01	-	-		•	ngineering produc	t ranges and portfolios	that will		
			into commer						
02	-	-			-	develop new and/or fo	rmulate		
00				design solutions in					
03						g engineering problem			
04	Expe	rience	e Product Data	Management (PDI	VI) technology and	l recent advances in PL	CM.		
				List o	fExporimonts				
				LISU	f Experiments				
	Mini	mum	Six Assignme	atc.					
					c on cuitable DI M	software and other as	signmonts based		
		ne sylla		on case assignment		soltware and other as:	signifients based		
	Unti	ie syna	abus						
	Subr	nissio	n: Completed	lournal					
	5001		completeu	Journul.					
Text	ts Bool	(S:							
1			e Cycle Mana	gement - by Antti S	aaksvuori. Anselm	i Immonen, Springer, 1	st Edition (Nov 5		
-	2003		,						
2		,	n. Product Life	cycle Management	: Paradigm for 21s	t Century Product Real	ization, Springer		
			04. ISBN 1852		0	,	, ,		
3		-			aaksvuori, Anselm	i Immonen, Springer, 1	st Edition (Nov.5		
	2003			_ ,	-				
Refe	erence	Books	5:						
1				s Engineering, McG	Frank Hill Kogalkur	aboltd Talue 1074			



2	Product Design & Development - by Kari Ulrich and Steven D. Eppinger, McGraw Hill International Edns, 1999.
3	Effective Product Design and Development - by Stephen Rosenthol, Business One Orwin, Homewood, 1992 ISBN 1-55623-603-4.
4	Burden, Rodger PDM: Product Data Management, Resource Pub, 2003. ISBN 0970035225
5	Clement, Jerry; Coldrick, Andy; & Sari, John. Manufacturing Data Structures, John Wiley & Sons, 1992. ISBN 0471132691
6	Clements, Richard Barrett. Chapter 8 ("Design Control") and Chapter 9 ("Document Control") in Quality Manager's Complete Guide to ISO 9000, Prentice Hall, 1993. ISBN 013017534X
7	Crnkovic, Ivica; Asklund, Ulf; & Dahlqvist, Annita Persson. Implementing and Integrating Product Data Management and Software Configuration Management, Artech House Publishers, 2003. ISBN 1580534988
8	Garwood, Dave. Bills of Materials for a Lean Enterprise, Dogwood Publishing Co., 2004. ISBN 0962111848
9	Fan ,D(Ed.), Virtual Reality for Industrial Applications, Springer



Course Code 01MI		01MEP532	Course Name	Experimental Str	ess Analysis (Elective	III)			
•	Teaching Sch	eme		1	Evaluatio	n Scheme			
L	ТР	Credits			CIE Marks	SEE Marks			
-	- 2	1			50	50			
Cou	rse Objective	es:							
On c	completion of	f the course, s	student will be able	-					
01	Understan	d the relatior	iship between mec	hanics theory and e	experimental stress an	alysis.			
02	Apply num	erical stress a	nalysis techniques	to real world engin	eering design problem	۱.			
03	Apply expe	rimental stre	ss analysis techniqu	ies to real world en	gineering design prob	lem.			
Cou	rse Outcome	s:							
At tł	ne end of the	course, stud	ents will be able to						
01			nderstand concept						
02	Student wi	ll be able to u	nderstand underlyi	ng principles in usi	ng strain gauges				
03	Ability to m	nount strain g	auges, take measui	ements and analys	e the obtained data.				
04	Student wi	ll be able to u	nderstand basic pri	nciples of photo-el	asticity, and use it as a	an analysis tool			
			List o	f Experiments					
1					n two stressed membe	ers subjected to			
-	tension, bending, and torsion or combined.								
2			principal strain det	•	r circle method				
3			-d and 2-d photo el	asticity analysis.					
4			es in 2-D elements						
5			es in 3-D elements						
6	Study of coating techniques for stress and strain determination								
	Submission: Completed Journal.								
	s Books:								
1			tal Stress Analysis,		•				
2			•		ill Book Co. N.Y. 1991				
3	L.S. Srinath	et al, Experir	nental Stress Analy	sis, Tata McGraw H	ill Company, New Del	ni, 1984			
Refe	erence Books	:							
1	R.S.Sirohi, I	HC Radhakris	nna, Mechanical M	easurements, New	Age International (P)L	td. 1997			
2			•	•	utterworths, London, 1				
3			Non-destructive Ev						
4		•			asurement, PHI, 1965				



Cou	rse Code	01MEP533	Course Name	Reliability Enginee	ering (Elective III)			
	Teaching Sc	heme			Evaluatio	n Scheme		
L	ТР	Credits			CIE Marks	SEE Marks		
-	- 2	1			50	50		
	rse Objectiv							
On d			student will be able					
01		· · ·	of reliability in engi					
02		o understandi systems and s		ilures, maintainabilit	ty and availability of	the intended		
03	To develo	p an ability to	analyze field failure	e data in order to eva	luate system reliabil	ity.		
04	To develo problems.		apply various reliat	oility techniques to so	olve interdisciplinary	reliability		
	rse Outcom							
	1	-	ents will be able to	<u> </u>				
01	-	•		roper manufacturing	•			
	•	• •		and the interrelation	•	•		
02				performance during in assembly time and				
02			in product design	•		porate assembl		
03				ools and techniques	and accelerated life	test methods fo		
05		product life c	· ·					
04	Understand the factors controlling cost and time required for the product maintenance and utilize							
-	this information for design for maintenance.							
			•					
	1		List o	f Experiments				
	Minimum Six assignments on related topics in syllabus, which should include at least one case study.							
	Submission: Completed Journal.							
Tavi	. De elver							
lext	S Books:	2003) Decign	and Experiments fo	or Engineers and Scie	ntists Butterworth	Heinmann		
1				Designs, II edition, J	•			
				Designs, il cultioll, J	•			
2	Dean A an		, ,	vsis of Experiments	Snringer	~		
2	Dean A an		, ,	ysis of Experiments,	Springer.			
1 2 3 <b>Refe</b>	Dean A an erence Book	d Voss D (200	, ,	ysis of Experiments,	Springer.			
2 3	erence Book	d Voss D (200 <mark>s:</mark>	6). Design and Anal	ysis of Experiments, nts: Planning, Analys				



Cou	rse Code	01MEP534	Course Name	Industrial Robotics 8	& Expert Systems (	Elective III)			
	Teaching Scl	heme			Evaluatio	n Scheme			
L	T P	Credits			CIE Marks	SEE Marks			
-	- 2	1			50	50			
Cou	rse Objectiv	es:			.'				
On d	completion c	of the course,	student will be able	-					
01		ns and benefit nt planning (N		ogy, computer aided pr	rocess planning, ma	aterial			
02		dents to use t uring Systems	•	ordinate Measuring Ma	achine (CMM), Flex	tible			
03	· ·	Emphasize on the quality improvement, automation, and advanced manufacturing techniques to create the highest-caliber products quickly, efficiently, inexpensively.							
04	Applicatio	Application of computers in the area of manufacturing to reduce manual processing and linking computers to all the manufacturing machines							
	rse Outcom		ooto will be oble to						
01		-	ents will be able to	scenario and its impa	st on global compo	stition			
01	-	•		ning and work on CNC					
02				tomation in manufactu		oporations			
04				al aspects of automatic	• •	•			
			List o	f Experiments					
	Minimum	Six assignmen	its on related topics	given in syllabus.					
	Submissio	<b>n:</b> Completed	Journal.						
Text	ts Books:								
1		. Gonzalez an	d C.S.G. Lee, "Robot	ics Control, Sensing, Vi	ision and Intelligen	ce", McGraw Hill			
2	Yoram Kor	en," Robotics	for Engineers' Mc G	Graw-Hill, 1987.					
3	Kozyrey, Y	u. "Industrial	Robots", MIR Publis	hers Moscow, 1985.					
Refe	erence Book								
1			mas, A, Chmielews Il of India Pvt. Ltd., 1	ki, Michael Negin, "Ro 1984.	botics Engineering	g - An Integrate			
2				Automation", Tata M					
3		-	hell Weis, Roger, N. cations", Mc Graw-ŀ	Nagel, Nicholas G. Odr Hill, Int. 1986.	ey," Industrial Rob	otics Technology			
			•						



	Firs	t Yea	r <mark>M. Tech. M</mark>	echanical Engineeri	ng (Product Design &	& Development) (Sen	nester–II)		
Cou	r <mark>se Co</mark> o	de	01MEP535	Course Name	Additive Manufact	turing (Elective IV)			
-	Г <mark>each</mark> i	ng Scł	neme			Evaluatio	n Scheme		
L	Т	Р	Credits			CIE Marks	SEE Marks		
-	-	2	1			50			
	rse Ob	·							
	· ·			student will be able					
01		-		es of Rapid prototyp					
02		•			D Modeling methods				
03		-			d in Rapid prototypin	g techniques			
04		•	•	osition techniques					
	rse Ou								
				lents will be able to					
01				· · ·	sing of CAD models fo				
02					id prototyping techni	iques.			
03	-			g for rapid prototypi	• •				
04	Use i	rapid p	prototyping t	echniques for revers	se engineering.				
				List o	f Experiments				
1	Revie	ew of	CAD Modellir	ng Techniques					
2	Gene	erating	g STL files fro	m the CAD Models &	& Working on STL file	S			
3	Errors in RP Processes and Applications								
4		-		a in Catalyst softwar	re (Selection of Orien	tation, Supports gen	eration, Slicing,		
-			generation)						
5	Fabri	cating	g the physical	part on a RP machi	ne				
6	Learr	ning te	echniques for	fabricating an asse	mbly				
7	Prep	are a (	CAD model w	ith complex geome	try				
8	Geor	netric	al Analysis of	physical prototype					
9	Study	y of op	perating prin	ciples of FDM machi	ne				
	Subn	nissio	n: Completed	l Journal.					
Text	s Book	s:							
1	Rapio	d prot	otyping: Prir	ciples and application	ions, second edition,	Chua C.K., Leong K	.F., and Lim C.S.		
	Worl	d Scie	ntific Publish	ers, 2003.					
2	Rapio	d Tool	ing: Technolo	ogies and Industrial	Applications, Peter D	.Hilton,			
3	Chua	C K, L	_eong K F, Ch	u S L, Rapid Prototy	ping: Principles & App	plications in Mfg, Wo	orld Scientific.		
Refe	rence	Books	s:						
1	Gibso	on D V	N Rosen, Bre	nt Stucker., Additive	e Manufacturing Tech	nnologies: Rapid Pro	totyping toDired		
1	Digit	al Mai	nufacturing, S	Springer.					
2	Liou	WL,	Liou F W,	Rapid Prototyping	and Engineering app	olications: A tool bo	ox for prototyp		
2	deve	lopme	ent, CRC Pres	S.					
3			•		d Applications in Mar		•		
4	Hilto	n P, Ja	acobs P F, Rai	oid Tooling: Technol	ogies and Industrial A	Applications, CRC pre	ess.		



	First Yea	r M. Tech. Me	chanical Engineerir	ıg (Product Design & I	Development) (Sei	mester–II)
Cou	rse Code	01MEP536	Course Name	Artificial Intelligence	e & Neural Netwo	rk (Elective IV)
	Teaching Sch	heme		1	Evaluatio	on Scheme
L	T P	Credits			CIE Marks	SEE Marks
-	- 2	1			50	
Cou	rse Objectiv	es:			-	1
On o	completion o	of the course, s	student will be able	-		
01	Correlates	to program ol	bjectives			
02	Understan	d the role of a	rtificial intelligence	and neural networks	in engineering.	
03	Provide kn	owledge of di	fferent forms of sea	irch strategies and lea	rning in neural net	works.
04	Understan	d the differen	t applications of Al	and ANN in various en	gineering and indu	ustrial problems.
Cou	rse Outcome	es:				
At th	he end of the	e course, stude	ents will be able to			
01	Understan	d the role of a	rtificial intelligence	and neural networks	in engineering.	
02		-		techniques of neural	networks through	the study of the
~~	· · ·		etwork models.			
03	Have know	-	cient theoretical ba	ckground to be able to	o reason about the	behaviour of
04			networks are appr	opriate to a particular	application and an	pply neural
				know what steps to ta	•••	• •
		•	,	•		
			List o	f Experiments		
	Minimum	six exercises b	ased on topics give	n in syllabus, consistin	g of case studies.	
	Submissio	n: Completed	Journal.			
Text	ts Books:					
1	Stuart Rus Education)		orwig (2003), "Artii	ficial Intelligence : A	Modern Approac	h" 2/e, (Pearson
2	Elaine Rich	n, Kevin Knight	, (1991), "Artificial I	ntelligence" 2/e, (Tata	a McGraw Hill)	
3		atterson (1999 EEE) (Prentice I		o Artificial Intelligence	e and Expert Syst	ems" (7th Indian
Refe	erence Books	s:				
1	Rex Mauss	s, Jessica Keyes	s, "Handbook of Ex	pert Systems in Mfg.",	, (McGraw Hill)	
2	Groover, V (McGraw H	-	Audrey, "Industrial	Robotics- Technology	, Programming an	d Applications"",
3		-	obotics: Control, Se	ensing, Vision and Inte	lligence", (McGrav	v Hill)
4				ls for case studies and		
5		-	-	e Hall of India Publica	•••	
6			, a, Prentice Hall of Ir			
7	A.N.N. by Z	•				
8		MatLab by Si	vanandan			
9		itals of A.N.N.				
5	runuamen		sy 11033011.			



	First Yea	r M. Tech. Me	chanical Engineerir	ng (Product Design &	Development) (Sei	mester–II)		
Cou	rse Code	01MEP537	Course Name	Design Optimization	n (Elective IV)			
•	Teaching Sch	heme		1	Evaluatio	on Scheme		
L	ТР	Credits			CIE Marks	SEE Marks		
-	- 2	1			50			
Cou	rse Objectiv	es:						
		•	student will be able					
01			Optimization Techn	•				
02				ues, and Multi-variable	e Optimization Tec	hniques		
03			Optimization Tech					
04	Accustom with latest techniques like Genetic Algorithm, Simulated Annealing, Artificial Neural Networks							
Cour	rse Outcome							
			ents will be able to					
01		-	of optimization pro	blem				
02				echniques, and Multi	-variable Optimizat	ion Techniques		
-	as per requ							
03			ints in a problem					
04	Demonstra	ate ability to u	ise technique like A	NN, GA				
			List o	f Experiments				
	Minimum	six exercises b	based on topics give	n in syllabus, consistir	ng of case studies.			
	Submissio	<b>n:</b> Completed	Journal.					
Text	ts Books:							
1			<u> </u>	Design: Algorithms an				
2			(1996). Numerical dustrial and Applied	Methods for Unconst d Mathematics.	trained Optimization	on and Nonlinea		
3	Rao S (199	6). Engineerin	ng optimization, The	ory and Practice, New	Age International	Publishers.		
Refe	erence Book							
1	2nd editio	n, John Wiley	and Sons Inc.	06). Engineering Optir				
2			, J. (2004). The Goa 84271781, ISBN-13:	I: A Process of Ongoin 978-0884271789.	ng Improvement. 3	rd Edition, North		
	Dattera		997). Goldratt's The	and of Constraints.	A Customa Amanga			



Cou	rse Co	de	01MED60	1	Course Name	Dissertation Phase-I				
•	Teachi	ng Scł	heme				Evaluati	ion Scheme		
L	Т	Р	Credits				CIE Marks	SEE Mark		
-	-	16	16				50	50		
	rse Ob	•								
	1				udent will be able					
01		lentify neerin		sue,	/problem on adva	ince engineering topics	related to Mechanic	al		
02	To g	ain kn	owledge on	the	research problen	ns identified through ex	tensive literature su	rvey.		
03	To u	nderst	and the too	ols r	equired to carry o	out research work.				
Cou	rse Ou	tcome	es:							
At tł	ne end	of the	e course, stu	uder	nts will be able to					
01		-	•	earch	n issue/problem o	on complex engineering	topics related to Me	chanical		
	-	neerin	-							
02						dentified through extens				
03		-	-	•	-	derstand research pape	rs/literature related	to research		
			ugh group-d							
04	-				onal & ethical res					
05	-					the research topic thou	• • • •	ation.		
06	Understanding of simulator tools required to carry out research work.									
	Guidelines :									
	Guidelines : Dissertation Phase-I should be based on the literature survey on any topic relevant to									
•						•	• •			
	CAD/CAM/CAE, Product Design & Development and related advancement. Each student has to prepare a report of about 30 pages. The report typed on A4 sized sheets and									
			•	•	•		••			
•			of Departme	•	rmat should be st	ubmitted after approved	a by the guide and ei	nuorsement		
	-		•		me contribution	by the candidate in the	form of experiment	al results		
•		•			nd inferences etc	•	torm of experiment	arresuits,		
	The	studer	nt has to de	liver	a seminar talk in	front of the teachers of	the department and	d his		
•			s. The Guide		sed on the quality ssment of the ser	of work and preparation	n and understandin	g of the		



	Seco	nd Yea	ar M. Tech	. Me	chanical Engineer	ing (Product Design & Develop	oment) (Seme	ster–III)	
Cou	rse Co	Code         01MED602         Course Name         Mini Project / Industrial Training							
•	Г <mark>eac</mark> hi	ng Scł	neme		1	1	<b>Evaluation Scheme</b>		
L	Т	Р	Credits				CIE Marks	SEE Marks	
-	-	2	2				50		
•	Stud	ents s	hould und	ergo	training of 2 week	s in industry after Semester II,	or		
	Guid	elines	5:						
•		ent sh culum		rtake	small project (mi	ni project) related to the topics	s given in seme	ester I & II	
•	The	detaile	ed training	repo	ort of 25 to 30 pag	es should be submitted during	the Semester	III.	
•	Evalu	uation	will be ca	ried	out at the end of	Semester III based on training r	report.		
							-		



Cou	Course Code		01MED603	<b>Course Name</b>	Seminar		
Teaching Scheme				I		Evaluation Scheme	
L	Т	Р	Credits			CIE Marks	SEE Marks
-	-	2	2			50	
	prep	are a	•		•	gate an in-depth review seminar content by the s	
						stituted for this purpose	



Cou	Course Code 01MED		01MED6	04	Course Name	Dissertation Phase-II						
Teaching Scheme			heme				Evaluat	ion Scheme				
L	Т	Р	Credits				CIE Marks	SEE Marks				
-	-	20	20				50	50				
	rse Ob											
01	Ability to bring ideas into practice through simulation of analysis of research topic.											
02	Ability to identify specific industrial problems in the form of research objectives.											
03	Ability to propose a novel idea/modified technique/new interpretation after analyzing the existing research work.											
	rse Ou											
					nts will be able to							
01						rm of research obje						
02	Propose a novel idea/modified technique/new interpretation after analyzing the existing research work.											
03	Contribute towards the knowledge up gradation of scientific community and society in general.											
04	Impose communication skills (oral as well as writing) through seminars, group discussions, thesis writing and research paper writing.											
05	Und	Understate significance of ethical and research professional.										
06	Stay	Stay updated through continuous learning.										
07	Understand research techniques and simulation tools for analysis of research issues.											
08	Interpret and compile the simulation results to issue at a meaningful conclusion.											
	Guidelines :											
	lt sh	all inc	lude the pr	oble	m definition, litera	ature survey, appro	aches for handling the p	roblem,				
•	finalizing the methodology for the dissertation work and design calculations / experimental design,											
•	etc.											
	A report of the work shall be submitted at the end of Semester IV after approval by the Guide and endorsement of the Head of Department.											
•	It will be assessed for term work, by the evaluation committee appointed by the Head of Department, for appropriateness.											